

Open Access Networks within the Context of Living Labs

Co-creative Research and Innovation to Connect the Lisbon Strategy to people:
European Network of Living Labs (Guimarães, Portugal, May 21-22, 2007).

Position Paper
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Introduction

The number of potentially connected nodes (people and devices) within urban environments has significantly increased in the last couple of years (see Figure 1), and includes GSM/GPRS wired PDAs, Wi-Fi enabled laptops, 3G mobile phones, ADSL connected game consoles and entertainment PCs, Bluetooth tablet PCs, Videophones, Interactive TVs, real-time environment sensors (e.g. air and water quality), large databases (corporations, libraries, museums, public administration), GPS oriented cars, and GPS traceable trucks and buses. On the other hand, new layers of territory-related data and information are being created on a daily basis, like municipal geographic information, Internet city guides, interactive maps and routes, and 3D worlds. In fact, as computers and communication networks become ubiquitous and interlinked, they will turn out to be another invisible urban infrastructure, analogous to public utilities like electric grids, water distribution systems and sewage systems that sustain daily life. To cope with this increased complexity, a new paradigm of open and standardized communication infrastructure is needed¹.

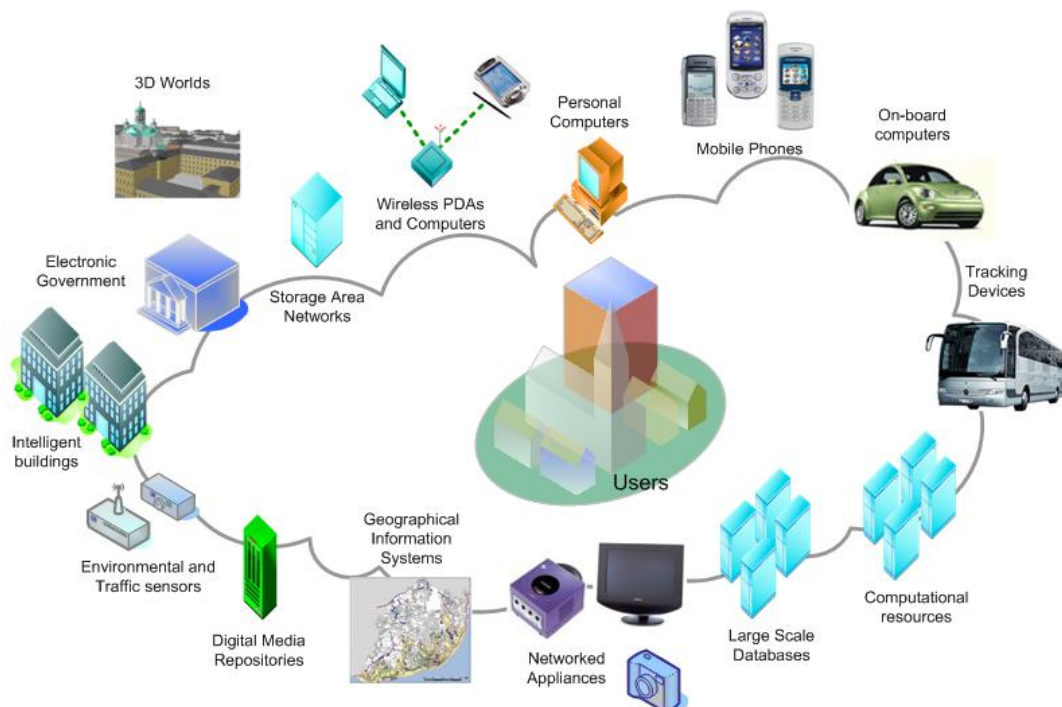


Figure 1 – Grid resources linked together in a ubiquitous infrastructure²

Open Access Networks: a general purpose infrastructure

There is a broad consensus about the significance of broadband penetration for inclusive development and territorial competitiveness³. There is growing evidence of the economic benefits of broadband deployment, namely on employment, the number of businesses overall, and businesses in IT-intensive sectors⁴.

Telephone operators' business model is based on "charging users for exclusive use of a pair of copper wires to the local exchange plus selling/renting customer-premises equipment (CPE) to them [as well as] the orderly allocation of scarcity - trunk and international network capacity (bandwidth) – charging by the 'bit' (time/distance) and latterly, developing and selling network embedded 'value added' services and 'content'"⁵. Moreover, existing broadband offer of telecom companies, both incumbents and green fields, is basically ADSL and Cable Modem. These two technologies and associated business models may be considered more efforts to extend the life of rapidly outdated networks rather than disruptive infrastructures like Fiber-to-the-home (FTTH) or Fiber-to-the-premises (FTTP), which can provide virtually unlimited neutral and symmetrical bandwidth. The central question is how to build and exploit a new networked public utility, considering them as a public good while stimulating new competitive business models to address clients' needs.

Open Access Networks (OAN) may respond to this challenge. OAN refers to "horizontally layered network architecture and business model that separates physical access to the network from service provisioning [...] used by a number of different providers that share the investments and maintenance cost"⁶. The three-layered architecture comprises a passive access network provider; a wholesale transmission provider; and service provider connected by standardized interfaces (see Figure 2).

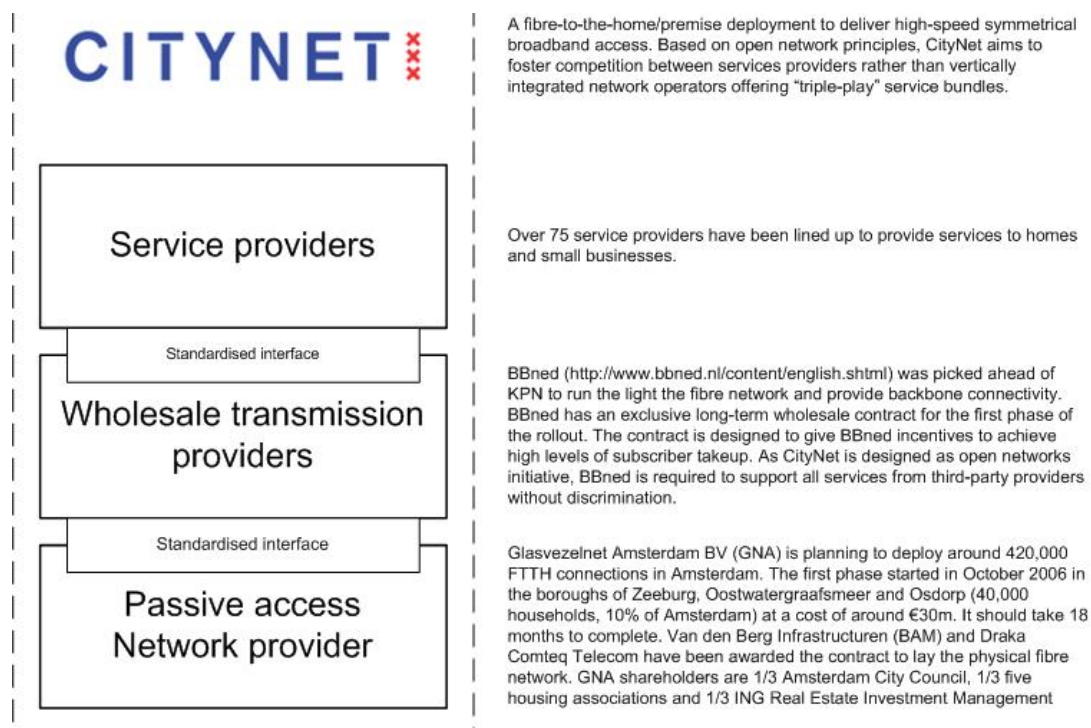


Figure 2 – Example of Open Access Network: CityNet Amsterdam – Overview⁷

Although OAN interprets all types of content – text, images, video, audio, etc. – as bitstreams over an open and neutral communication infrastructure, there is a whole new range of services over broadband that may be tested and implemented. Examples of these services include, but are not limited to: IP connectivity (Internet access, wireless access, VPNs, mobile base stations, etc.); digital content (IPTV, VoIP, VoWiFi, videoconference, e-learning, music, video, WWW, radio, games, etc.); and physical computing (sensors) (intelligent video surveillance, parking, meteorology, urban management, traffic lights, vehicle tracking, locative media, etc.).

As pointed out by the OPLAN Foundation: “local governments have had a long history of providing basic utility services to their residents and there are still many communities that provide a range of these services through local government owned utilities. While many communities once provided telephony services, most of these systems were absorbed and integrated into the operations of the incumbent carrier. In recent years, an increasing number of local governments have begun to re-enter the telecommunications field by building their own networks with the intent of competing with the local carriers. Although this has been primarily restricted to municipalities in developed economies, this trend is now being seen in developing economies, as witnessed by recent municipal wireless deployments”⁸. Focusing on providing a public good for sharing information and knowledge sharing, OAN will enable open innovation and mass collaboration while fostering entrepreneurship and inclusiveness.

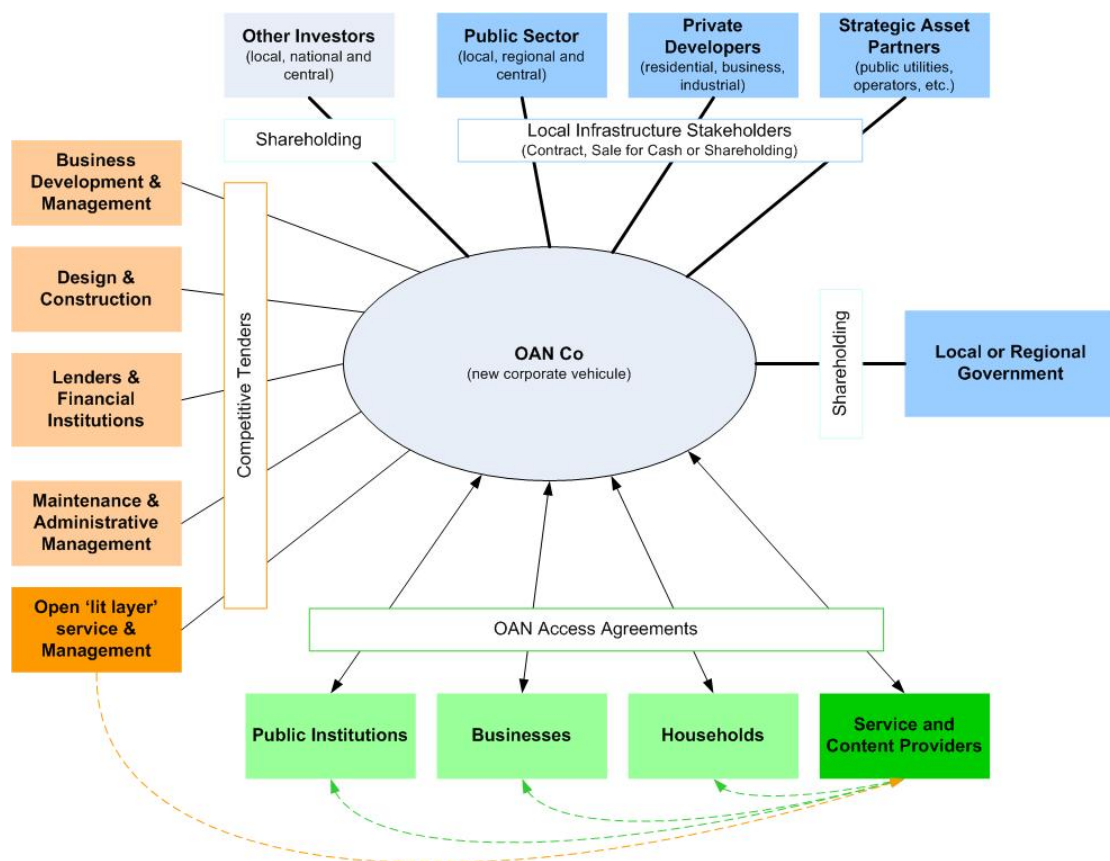


Figure 3 - OAN structure and strategy⁹

Living Labs: a open space for innovation

Living Lab is a rural, urban or industrial environment which operates a “full-scale laboratory and provides ground for inventing, prototyping and marketing” new technology applications proactively involving motivated users and/or citizens. While including “interactive testing, [it] is managed as an innovation environment well beyond the test bed functions”. Changes are driven by the users. As a territory-related “innovation resource the Living Lab can take advantage of the pools of creative talent, the affluence of socio-cultural diversity, and the unpredictability of inventiveness and imagination in [local or regional] settings”¹⁰. Living Labs promote entrepreneurship and inventiveness, creating new ventures in business and society.

Living Labs may be, therefore, considered a new layer of public/private partnerships integrating infrastructures, incentives, institutions and people towards the “exploitation of creating and changing by adding value”¹¹. Locally and regionally, they simultaneously build upon existing networks and actors and present a conceptual framework for filling eventual gaps within regional systems of innovation.

At the Living Labs network level, they globally provide critical mass and social context for the development, testing and dissemination of innovative user-driven/citizen services and products. The network effect (i.e. Metcalfe's Law¹²) increases benefits exponentially for the whole when new nodes are linked. Cross fertilization, serendipity and synchronicity compound with other network externalities and may increase the emergence of innovations. Networks of Living Labs respond to local and regional challenges and opportunities to address global markets and enable collective learning at an European Level. Further, the network of Living Labs may help bridge the digital divide by increasing the absorption capacity of local communities and foster territorial appropriation of information and communication technologies (ICT) by enterprises, not-for-profit organizations and local or regional government.

The implementation of Living Labs calls for the understanding of geographical and demographic dynamics to identify localized communities of practice, interest or proximity that could be enhanced and linked with others with same vision, objectives and/or motivation. Moreover, to fully exploit the Living Labs potential it would be useful to set up a comprehensive result-oriented program that could rearrange and/or enhance existing or potential networks of actors towards the development of new products and services. Finally, the dissemination and exploitation of results to mobilize local and global partners will reinforce feedback loops for value creation and foster user co-creation and mass collaboration.

Labs provide simpler and more flexible mechanisms to develop, test and disseminate innovations at a local or regional level, accelerating the pace of innovation and multiplying its impact at a territorial level. Living Labs are usually deeply embedded in local daily life, both intensifying the dialog with user/citizens and augmenting the responsiveness to their needs and wants. Through constant monitoring and evaluating, Living Labs pay attention to emergent properties of complex systems and are much better positioned to sense new trends and predict new behaviours.

Conclusions

The implementation of complex technology-enabled infrastructures to support large scale Living Labs calls for a broader approach where social and cultural aspects as well as new business models are integrated in early design phases to mitigate uncertainties of networked infrastructures, such as sustainability, flexibility and scalability. OAN may respond to this challenge. Moreover, we can expect Living Labs to have other unexpected properties, or emergent properties, “developed by users of a system” and “often unbeknown to the system designer”¹³. Being so, the stakeholders involved in the co-evolution of and ICTs would be better off if, as proposed by Cooley, “the current mechanistic paradigm of technological and societal development [would be substituted by] human-centered systems [that would] provide a powerful alternative philosophy for system design and a broader educational and societal development”. He adds that “[this philosophy] regards the social and cultural shaping of technology as central to the design and development of future technological systems and society as a whole”, in terms of “knowledge-based adaptive human-centred environments”¹⁴. Again, OAN can cope with these expectations and expand this conceptual framework to the entire city or even whole regions in order to consider the way millions of people interact through ICT in their daily life to foster user-driven innovation.

OAN will also enable networked test beds for the deployment of Living Labs in peripheral and remote areas, providing low-cost ubiquitous (wireline and wireless) broadband for public and private (business and residential) uses in underserved geographies with the objectives of stimulate user-driven innovation and offering relevant content and services to local communities.

It may be expected that the OAN architecture may create the necessary competitive environment where innovative content and services will flourish with positive impacts on bridging the digital divide, strengthening of social networks, local entrepreneurship and user-driven innovation. The results may be used as a toolkit by Living Labs and supporting communities of practice which aim to improve the quality of life, increase business competitiveness and encourage open innovation through the deployment of broadband networks.

¹ Moutinho, J. And Heitor, M., (2007), “Building human-centered systems in the network society”, *Technological Forecasting & Social Change* 74 (2007) 100–109.

² Heitor, M. and Moutinho, J., (2005), “Digital Cities and the network society: Towards a Knowledge-Based View of the Territory?”, in Gibson, D., Heitor, M. and Ibarra, A., (eds.), “Knowledge and learning in the Network Society”, New York, Purdue University Press.

³ European Commission, (2006), “Bridging the Broadband Gap”, retrieved on January 6, 2007 from http://europa.eu.int/information_society/eeurope/i2010/docs/digital_divide/communication/com_bridging_bb_gap_2006_en.pdf

⁴ Lehr, W., Osorio, C. Et al., (2006), “Measuring Broadband’s Economic Impact”, retrieved on January 6, 2007 from http://cfp.mit.edu/groups/broadband/docs/2005/MeasuringBB_EconImpact.pdf.

⁵ Matson, (2006), “Open Networks: A Next Step in Human Social Evolution?”, presentation at Broadband Cities 2006, November 8-9, Stockholm, retrieved on December 12, 2007 from <http://www.smartcommunity.nl/layout/set/print/content/view/full/531>

⁶ Wikipedia, retrieved February 12, 2007 from http://en.wikipedia.org/wiki/Open_Access_Network

⁷ Adapted from ING, (2006) “European telecoms. CityNet Amsterdam: Fibre-to-the-home is becoming a reality”, retrieved on December 12, from <http://www.ftthcouncil.org/documents/736808.pdf>.

⁸ Infodev, (2006), “Study on Local Open Access Networks for Communities and Municipalities ”, retrieved on December 12, from http://www.oplan.org/documents/articles/infodev-v-1-as-on-web/fss_download/file

⁹ Adapted from Infodev, 2006.

¹⁰ Living Labs Europe, “What’s this thing called Living Labs Europe? User-Driven Innovation Environments in the ‘Information Society’”, retrieved on May 3, 2007 from <http://www.livinglabs-europe.com/documents/livinglabs/Living%20Labs%20Folder.pdf>.

¹¹ Conceição, P., Heitor, M. and Veloso, F., (2003), “Infrastructures, Incentives and Institutions: fostering distributed knowledge bases for the Learning Society”, *Technological Forecasting and Social Change*, 70(2).

¹² Wikipedia, retrieved on May 10, from http://en.wikipedia.org/wiki/Metcalf%27s_Law

¹³ Moses, J., (2004), “Foundational Issues in Engineering Systems: a framing paper”, MIT ESD, Engineering Systems Monograph, <http://esd.mit.edu/symposium/pdfs/monograph/framing.pdf>

¹⁴ Cooley, M. (2000). “Human-centered Design”. In Jacobson, R. (ed.), *Information Design*. Cambridge, MA: MIT Press, pp. 59-81.