

ICT Solutions for Smart Cities Andrew Nash

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This paper outlines how a new generation of information and communications technology (ICT) applications can improve the sustainability and liveability of cities. These applications are important building blocks in creating “smart” cities. The paper focuses on mobility, but the concepts described can be applied to all types of urban infrastructure and services.

Why do cities need new IT applications?

Cities are being squeezed on all sides: they are being asked to provide more and better urban services while financial resources are being reduced. Unfortunately government’s ability to raise funds for improving urban infrastructure and services has been hampered by anti-tax sentiment and fears about budget deficits. The problem is compounded by the increasing financial demands of our aging society.

In short, it is hard to feel optimistic that sufficient funding will be available for improving urban services. But, cities must improve these services to improve their sustainability, support economic development and to become more liveable.

Solving this problem means stepping back and re-framing the discussion to ask: where will the **resources** needed to provide improved urban services come from? This paper’s answer is that these resources could be provided by the public and could include ideas, political support and volunteer activities in addition to the traditional financial resources. Unlocking these resources will be a challenge but cities must do this to succeed in the future.

Perhaps not surprisingly, the tools used to unlock these resources will be based on the Internet. The Internet has revolutionized every business sector where it has been applied and the next target is government. Indeed there is a very active community working on how to integrate new internet technologies into government operations today, but there remains much work to be done.

Using the Internet to Improve Cities

The Internet is so pervasive today that sometimes it’s hard to understand the big picture: Chris Anderson, writing in WIRED, puts it this way:

If the past 10 years have been about discovering post-institutional social models on the Web, then the next 10 years will be about applying them in the real world. (Wired 18.02)

In essence, applying these post industrial social models in the real world means unlocking resources that we have been unable or unwilling to use in the past. Anderson refers to this process as “democratizing” and continues, “The Internet democratized publishing, broadcasting, and communications, and the consequence was a massive increase in the range of both participation and participants in everything digital – the long tail of bits. Now the same is happening to manufacturing – the long tail of things.” His article describes the process whereby people are using

Internet-based applications to manufacture products from customized automobiles to tee shirts.

If information could be democratized, and now manufacturing is being democratized, why couldn't urban services be democratized? A democratized system would bring new resources to the table and would create an opportunity for rethinking how cities are organized and how they provide services to their residents. In short it could revolutionize how cities work – a revolution cities need if they are to meet the demands of today's increasingly interconnected and complex society.

The following sections present ideas for extending the Internet-based democratization model to public transport, recognizing that similar approaches could be applied to other services (e.g. water supply, garbage collection, etc.).

Web 2.0 Applications to Improve Urban Transportation

The most important fact about urban problems is that they are not mainly technological, but rather social and political. This is not to say that there are no technical problems to solve, but rather that most problems cities face have been solved and the real question is identifying the right solution and customizing it to fit the specific problem circumstances.

Urban transportation is a perfect example of this technology–policy conflict. Simply put, the transport problem is that there is only a fixed amount of space available on a given city street and therefore different users must 'fight' for their share. A great deal of effort is spent looking for technological solutions to this conflict, but solving the problem really means education, creativity and consensus-building.

This means that cities should focus on educating residents about existing technical solutions and providing opportunities for them to apply creativity to the specific conditions in their neighbourhoods. This should be supported by a system that helps encourage dialog, consensus building and decision-making.

Two key problems cities face in implementing this education – citizen participation approach are making learning fun and making communications efficient. Internet games can solve these problems by providing the organizing tool for making the approach work. Because games are fun they attract users and because they are popular many tools have been developed to facilitate social networking.

Over 62 million people worldwide play Farmville on Facebook (as of June 2010). Why not create a game that reflects real urban conditions and provides the tools to encourage residents to learn more about solutions and to participate in helping get good ideas implemented in real life? Several existing Web 2.0 applications form the building blocks for such a system:

Pure Games – City planning and transportation games such as Sim City and Transport Tycoon are based on planning concepts but are mostly oriented towards having fun rather than education. Nor do they encourage players to take real action to improve their cities.



Educational Games – Some internet games have been used in an educational setting, but these have not yet been made widely available and/or have only the goal of education, not encouraging players to take action (e.g. Gridlock Buster from the University of Minnesota).



Citizen Action – There are a growing number of websites that encourage residents to take action to improve their cities (e.g. seeclickfix). But these websites do not help residents understand urban technologies (i.e. educate them), nor can they be called really fun.



Citizen Action + Education – Several websites educate residents about planning issues and encourage them to provide input, but lack the fun aspect that would encourage participation (e.g. Portland Metro: Build a system tool).



In addition to these existing building blocks, rapid advances in mobile internet services and technologies mean that people have even more access to the web and have the ability to add specific data and information into the databases used to help plan and operate urban systems.

In summary, the basic tools are in place, what's needed is an application that combines a game with educational information and social networking tools. One example of this type of application is Bus Meister.

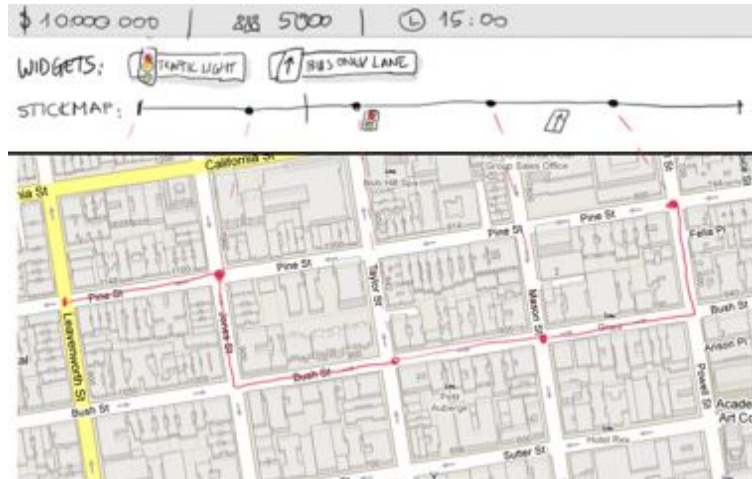
Bus Meister – ICT for Improved Urban Mobility

Bus Meister is an integrated package of internet-based applications designed to enable citizens to help plan and improve the operation of their city's public transport system. It has two main functions: education and empowerment. Bus Meister will educate citizens on measures designed to improve public transport efficiency and attractiveness (using a game and best practices library), and empower them to lobby effectively for measure implementation (using social networking features).

Education is important for public transport priority because most people do not understand how efficiency improvements can improve service (for example: an

improvement measure may seem too small to make a difference, but, if it reduces the number of buses needed, it can save significant money).

Empowerment is important because many residents are disenfranchised by the current system; when public transport companies try to implement public transport priority measures, they are often blocked by automobile supporters (who, as often more wealthy people, are much better integrated into the city power structure than bus riders).



Players would drag various different improvement widgets onto a map of the public transport route. The game would calculate how much these measures improved service (e.g. saved \$xx per year) and how much they cost. Players would compete against each other to develop the most efficient systems.

The initial system would include a generic game designed to teach players about public transport priority. Working with public transport operators and cities, later versions of the game would be developed for specific routes; these games could be especially helpful in detailed route planning studies and neighborhood planning studies. Mobile versions of the game would allow players to add real-time data that can help improve public transport operations.

Once players understood the benefits of public transport priority, from playing the game, they could then act to provide the political support for implementing these measures on their own public transport routes. Bus Meister is currently under development in Vienna.

Conclusions: Improving Cities with ICT

This paper's main conclusion is that innovative internet applications can be used to provide new resources to support improved public transport. Computer games, social networking applications, Web 2.0-based information sharing and ubiquitous mobile access are just four currently available technologies that can be applied to accomplish this ambitious goal. These same techniques can also be used to improve other types of urban infrastructure and services.

The goal is to create applications that transform players from bystanders to participants; to convert people complaining about bus service to citizens suggesting improvements, supporting difficult public policy decisions, volunteering in some way

to make service better (clean-up days at stations), and, hopefully, seeing the benefits of paying higher taxes or fares.

A key question is whether people have the time and inclination to get involved in this way. Currently people are spending hundreds of billions of hours on internet-based communal projects and games, so it's clear that people do have time. Furthermore, research on professional motivation supports the idea that humans have a strong desire to help make the world better. So, a well designed game and associated applications should be attractive to people.

Unfortunately, there may be institutional resistance. Government is not always an early adapter. But progress is being made as shown by Portland's Build a system tool, and many government agencies are recognizing the importance of new technologies.

In summary, the technology needed to create applications that enable residents to become more involved in planning urban systems is mostly in place. Further improvements in game technology like better 3-D and easier ability to incorporate real places into games (e.g. augmented reality) will further increase the ability to make these applications more realistic and interesting. The key will be to find innovative regions willing to demonstrate these new ideas.

More information on Bus Meister and the use of Web 2.0 applications to improve cities can be found at: <http://www.andynash.com>.