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What is the effect of mobile innovation on STPs, and can we create an internet of STPs?

WORKSHOP 3 - STPs and the mobile society

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Background – mobile and internet trends

Technology has transformed the world we live in today, enabling new business models and innovation, and empowering an increasing proportion of the world' s population to take part in the global knowledge economy with capabilities never dreamed of before.

The mobile industry in particular is now considered to make a significant socio-economic contribution to regional economies. For example, it is thought that mobile operators contribute 1.4 per cent to global GDP directly via their revenues, and this is expected to grow to 2.4 per cent by 2017. The industry' s contribution to public funding is projected to be around US$550 billion in 2017, mainly as a result of spectrum fees as well as taxes. The mobile industry supports 9.8 million jobs worldwide.

The mobile and internet are two of the biggest drivers of the new ' industrial revolution' . The number of mobile cellular subscriptions, at 6.8 billion , has almost reached the global population, and the internet is used by 2.7 billion people, almost 40 per cent of the world' s population. Mobile broadband use is also growing rapidly – it is estimated that there will be more than two billion subscriptions worldwide by the end of 2013.

Region Mobile broadband subscriptions (millions) Penetration

Americas 460 48%

Europe 422 68%

CIS 129 46%

Arab states 71 19%

Africa 93 11%

Asia Pacific 895 22%

Table: Mobile broadband subscriptions (estimate for 2013)

Source: ITU World Telecommunication/ICT Indicators database

One of the main methods of accessing the internet while mobile is via the smartphone, and it is estimated that there will be almost 1.5 billion smartphone subscribers in 2013 , with the top 10 countries being:

1. China 354m

2. USA 219m

3. Japan 94m

4. Brazil 70m

5. India 67m

6. UK 43m

7. Korea 38m

8. Indonesia 36m

9. France 33m

10. Germany 32m

Table: Smartphone subscribers 2013 estimates

Source Informa

Even more telling is the usage of tablets – tablet shipments had surpassed desktop and PC shipments in Q4 of 2012 , with over 50 million units shipped that quarter. It is thought that in less than two years, 20 per cent of sales organisations will use iPads as the primary mobile platform for their field sales force. By 2018, 70 per cent of mobile workers will use a tablet or a hybrid device that has tablet characteristics.

What does all this technology proliferation mean – and why does it matter for regional economies?

This proliferation of mobile communications and devices is already driving a new era in the business and social world. We saw the influence and importance of digital networks and social media during two major events in 2012 – at the London 2012 Olympics, and the USA elections. And we are seeing the emergence of mobile as being a platform for enabling new business models in all areas around the world – in government services delivery, in healthcare, in education, and of course in the enterprise.

US elections – a good example of social, mobile, cloud and big data usage

The US 2012 election campaign was the ultimate user of current technologies available in all of these areas. This was both for managing the campaign among campaign staff, and to target voters.

Cloud computing and the internet was used effectively to link many field offices to state and national offices. Since political campaigns are only temporarily active for just a few months, and also geographically spread widely, renting cloud-based infrastructure seemed to be the ideal way of deploying the applications needed to manage the whole campaign. No hardware purchase was necessary, and voter and volunteer data could easily be transferred to low cost data storage devices or services.

The cloud was used to store searchable campaign intelligence, and document all the details about the candidates, their speeches, videos. ‘ Big data’ profiles of voters were created to better target and motivate voters. A number of mobile apps were available from both candidates as well as the news organizations.

And finally social media was used to influence votes and drive donations. In particular, one startup company, Votizen, was apparently influential with its web service that allows you to discover how your friends on social networks are registered to vote, and campaign with them (or influence them) to elect candidates that share your values. It claims to have a 200 million strong voter database which is social media ready. Voters can connect to their own records to see their voting registration and history, as well as use it to prove their power to those that hold and seek office. Voters can then scan their social networks and reveal the voters they can work with to campaign for candidates

they believe in, whether it's nationwide for a presidential election, or in a local city council race.

This is just the beginning of mobile innovation

The availability of the mobile channel to customers and employees presents a need for organizations to design their business around mobile, to improve application delivery, employee productivity and process work flows.

Many in the industry seem to think that much of the innovation in mobile technologies will come from Asia. Countries with large populations such as India and Indonesia, where most people using the Internet do so with their mobile devices, are becoming catalysts for mobile innovation. An example of true innovation (rather than being a rehash of existing technology) is a SIM-based mobile payment system which only requires the phone network and no internet access – this is provided by Malaysian company Tootpay.

It is thought we are only just at the beginning of a new innovation cycle in mobile. There are several areas that point to the future of mobile innovation. Examples include the ability to have a ' point of sale' everywhere, as demonstrated by Square' s claim that 10s of millions of unique Americans have already made payments using its mobile card reader which enables anyone to accept credit cards anywhere; and the rapid growth of video over mobile – Google' s YouTube claims that 25 percent of its content is delivered to mobile, while in Korea this figure is closer to 50 percent.

The technology team at PriceWaterhouseCoopers suggests that we are at the beginning of the mobile ecosystem disruption. Kayvan Shahabi, PwC' s US technology advisory leader, says, " Mobile computing will continue to drive dramatic changes in how we conduct business, communicate with each other, access and share content, pursue knowledge and educate our children. Even with the tremendous breakthroughs to date, in the future, wireless devices and their supporting services will likely run applications faster, store more data, create better pictures and display information in brighter and more compelling images. This path of innovation, combined with the right business models, should ultimately lead to disruptive products that further transform the ecosystem and many industries in ways we never imagined."

The socio-economic benefits of connecting devices to the mobile network: M2M

The convergence of mobile penetration, the use of mobile internet and data, and the ability to connect ' things' – devices other than mobile phones – with SIM cards or radio connections has led to an explosion in what is called machine-to-machine communications, or M2M. This in turn is expected to transform the socioeconomic future of people globally in coming years.

Examples of this transformation can be seen in the following estimated impacts of M2M connectivity . In healthcare, the use of mobile connected devices (mHealth) in developed countries could cut US$400 billion in costs annually, or in developing countries, could save one million lives in places like sub-Saharan Africa. In education, the use of mobile technologies (mEducation) could boost student retention rates by eight per cent, or looked at another way, 1.8 million students could be kept in school. In developing countries, mobile learning could enable 180 million children to get an education.

The argument continues in other sectors too – in automotive, mobile enabled in-car emergency services could save 35,000 lives in developed countries. In developing

countries, the use of fleet telematics to track trucks and monitor storage could save enough food to feed 40 million people annual, equivalent to the entire population of Kenya.

IoT is ‘ the next big thing’ : here’ s an explanation of what it is and its relation to M2M

The internet of things is likely to be a key technology driving innovation over the next few years. In January 2013 the ‘ Internet of Things Consortium’ was launched at International CES in Las Vegas. In addition, Wall Street Journal tech columnist and key influencer Walt Mossberg also highlighted earlier this year that the internet of things (IoT) is the ‘ next big thing’ .

The ‘ IoT’ refers to devices of any kind connected with mobile or wireless to networks, enabling machine-to-machine communications (M2M). Mobile SIM cards or radio modules with Wi-Fi/GPRS can be embedded in almost anything, ranging from entertainment, safety and security, to business services. M2M communications is the networking of intelligent, communications-enabled remote assets, allowing key information to be exchanged automatically without human intervention via a back-end IT infrastructure. The remote assets, which can be fixed or mobile, include cars and truck fleets, utility meters, copiers and printers, ventilation and air-conditioning sensors, home medical devices, fitness monitors and CCTV cameras.

The conditions they monitor can include temperature, location, consumption, heart rate, stress levels, light, movement, altitude and speed – or anything else. This can be used to gain immediate feedback on how a particular remote asset is being used, which features are most popular and what problems typically arise.

Typical examples already common are in energy management, health and well-being: for example, smart energy meters remotely transmitting usage data or controlled by utility companies, or patient monitoring systems where key patient data can be transmitted automatically to a carer or care centre.

In patient monitoring, 2.8 million patients worldwide were using a dedicated home monitoring service based on equipment with integrated connectivity at the end of 2012 (figure excludes patients using their personal mobile phone, tablet or PC for remote monitoring). The number of home monitoring systems with integrated communication capabilities is forecast to grow to reach 9.4 million connections worldwide by 2017.

It is possible to connect any type of remote machine or device to critical information systems and collect real-time field intelligence to improve efficiency, reduce costs, introduce new services and gain competitive advantage. The ultimate aim is to enable anytime, anywhere access to real-time intelligence from remote machines.

Everything will be connected to everything else – the next industrial revolution

The ‘ Internet of Things Consortium’ said at its launch that, “ In the future, everything will be connected to everything else.” The consortium is a non-profit organization with the mission of facilitating cooperation between hardware, software, and service providers. It is primarily focused on Internet enabled devices and related software services that directly touch consumers in the form of home automation, entertainment, and productivity.

One of the goals of the consortium is to see billions of connected devices that benefit from communication with other devices and services. This could easily apply to connecting buildings in STPs (see argument later in this paper).

Global M2M connections will increase from two billion at the end of 2011 to 18 billion at the end of 2022 . Ericsson has been forecasting for a couple of years that there will be 50 billion connections by the year 2020. Connections will be dominated by two sectors: consumer electronics (including cameras, music players and TVs) and intelligent buildings (for example security and HVAC systems). Between them they will account for almost 70% of the total.

By 2022, Europe and developing Asia-Pacific will be tied as the biggest region for M2M, each accounting for 27 per cent of connections. The biggest single markets will be the China and the US with 20 per cent and 19 per cent respectively. In terms of revenue, M2M will grow from US$200 billion in 2011 to US$1.2 trillion in 2022. Two-thirds of the revenue opportunity is accounted for by devices and installation, and one-third by M2M services.

Machina Research says that M2M, in all its diversity, is little short of a second industrial revolution. The growth in connected devices over the next few years will fundamentally change the way we live and work. The potential to save money, generate new revenue streams and create sustainable cities will drive businesses, governments and individuals to embrace M2M. The potential impact is huge.

How does IoT, M2M, relate to another industry buzzword, ‘ big data’ ?

They key thing about M2M is that the technology is transparent or hidden to the application – the user doesn’ t necessarily need to know it exists (think of Apple and its gadgets). The by-products of this is lots of data – hence the phrase ‘ big data’ . The challenge with having billions of connected devices generating many data points in this new era of connectedness is how to read and interpret the data. This introduces the need for good business intelligence systems and analytics – another field where there is lots of expertise in several STPs.

In the cold chain logistics supply chain of the pharmaceuticals and food industries, there is a good example of a company that monitors the temperature and other key parameters of medicines, pharmaceuticals ingredients and food ingredients in storage, transport and distribution. Tags with radio connections travel with the medicines or food or while in transport or cold storage, to monitor the temperature and other key parameters to ensure that they do not deviate outside a specified temperature range stipulated by a company’ s quality requirements as well as regulatory requirements – and patient/consumer safety expectations.

While sensors and hardware are effectively commodities, the important part of such a solution is how that data is gathered and reported. Regulatory requirements might mandate that the entire history of temperature during storage and distribution must to be documented to provide proof of product quality, which means many data points are being generated continuously. The company Dyzle collects this data in the cloud, provides automatic reporting and analysis of that data via personal dashboards, and makes the information available securely via any internet-enabled device anywhere in the world to quality managers and company managers.

These reports and data link into to company-wide business intelligence and ERP systems. Business intelligence is increasingly becoming an area that many organisations are exploring, in order to deal with the massive amount of data that is collected. Hence the emergence of service providers offering platforms that allow you to do things with the data, often in the cloud as a software-as-a-service (SaaS) solution that eliminates the need to install any systems, and requiring no additional resources

for data warehousing; they also provide analytics engines, report building and visualisation tools amongst others.

One such business intelligence provider helps business intelligence and advanced analytical tools to be embedded into the culture of all organisations where enough data exists. Business intelligence in the cloud provides companies with fast, inexpensive deployment, no hardware and setup expenditure, no capital expenditure (lowers entry barriers), software upgrades and maintenance, pre-built connectors and dashboards for many systems. It also provides improved data sharing capabilities to access data anytime and anywhere.

Connect anything, anywhere, anytime

IoT will be the next big thing, especially since it is totally up to the imagination and creativity of business model. Businesses and individuals have the ability to connect anything using a wireless connection to talk to other devices and report back on social or business parameters. In STPs this could involve automatic sharing of data or business processes from each connected park, in the cloud.

This ‘ Internet of things’ will have a huge impact on how businesses look at their business operations, efficiency and productivity – in the next few years it could actually help restore confidence after the global economic crisis, providing a leap forward in global productivity – and economic benefits for STPs. The need to interpret the huge number of data points that will be generated – the so-called ‘ big-data’ – and automated business intelligence and reporting systems also become increasingly important.

The next wave of innovation will therefore come around the internet of things, big data and business intelligence.

Political background – innovation to support more from less

The focus of many governments today is very single-minded: to reduce public expenditure in order to reduce financial deficits, resulting in severe cuts in public services. So how can they stimulate innovation and deliver more from less? One way is to for government to encourage innovations that reduce government size while serving citizens more efficiently and effectively. In the USA, the ‘ Bright Ideas’ program from Harvard University shows how governments achieve this.

Much of this uses the mobile, cloud or internet technologies that we have described above.

Bright Ideas is an example of a program that encourages innovative ideas to be proposed for local services – for example, in Sacramento County, an automated system matches the welfare system against data sources from local, state, and federal entities to help detect and prevent welfare assistance fraud and overpayments, saving millions of dollars annually by preventing and reducing welfare assistance overpayments.

In the city of South Bend, IN, they installed real-time monitoring and control using ‘ smart valves’ technology to meet federal environmental mandates on combined storm and sanitary sewer overflows. Through distributed sensing and control logic to optimize performance of infrastructure already in place, the city can save an estimated US$114 million over a conventional approach.

A health and human services video interviewing scheme in San Diego County, CA, enhances access to public assistance, and increases the efficiency of service delivery for clients who face transportation challenges. Targeted populations include pregnant women, migrant farm workers, homeless clients, residents of battered women' s shelters and transitional housing, and both tribal and rural clients.

What is the effect of mobile innovation on STPs, and can we create an internet of STPs

As the examples from the USA above show, technology – mobile, cloud, big data – are driving innovation in public services. This technology itself is being driven by mobile devices and mobile connectivity. The Consumer Electronics Association (CEA) says that the consumer devices industry will grow to a more than $1 trillion market in 2013, driven by mobile connectivity, smartphones, and tablet computing.

This mobile connectivity and mobile app economy is also creating an ' internet of things' where billions of devices are connected using a SIM card or some kind of wireless connection, in order to improve knowledge, information, business processes, consumer lifestyle and much more. The point about connecting devices is to enable devices to inform a central control system or individual the status of some of their key functioning parameters, so that they can be adjusted or controlled. Also, the information can be fed in to collaborative consumption environments and businesses to inform others about the status of a device.

How are these trends likely to drive the new knowledge economy and impact STPs? Can STPs themselves support collaborative creativity and innovation based on the same principle as the internet of things that we have described above?

Well, since 75 percent of the world's population will have access to the internet by 2015, and some six billion devices will have internet connectivity, this global network of interconnected computer networks and devices will have a huge impact on the way we work and learn.

Location becomes irrelevant – the future of science parks?

There' s already a huge trend in universities providing on-line courses. The take up of courses offered online from US universities in countries like Brazil, China and India has seen significant growth, albeit starting from small numbers.

The key point about this and the trend for connected learning and working is that, to some extent, location becomes irrelevant. So there could be several possibilities for the future of science parks. We could see creative collaboration across borders, or regional nodes of collaboration.

Or there are certain clusters around the world that have specialist skills in a particular sector – such as innovation and research in life sciences or electronics design. We could see the ability for clusters in specific sectors around the world to collaborate with each other for one big super-project. This already happens in large corporates like IBM and Microsoft, where they have internal networks enabling collaboration across multiple global sites for individual projects. We could therefore see this extending to STPs, with STPs having direct connectivity for collaboration between parks.

The other possibility for collaboration is for STPs with complementary skills to collaborate across borders. One might have some specialist data analytics skills, while another might have mobile or cloud apps development expertise. The potential for them to collaborate on, say, developing a solution for big public health projects using

mobile, cloud and internet, could be a huge benefit both to the development of the STPs as well as the end-customer.

The connectivity of STPs would therefore enable real time business development and collaboration. Like the internet of things, where devices are connected to enable business information and enhanced productivity and efficiency, an ‘ internet of STPs’ could enable a greater competitive edge, and enhance the value of the STP because of its connection/affiliation with like-minded and similarly skilled researchers and companies within STPs.

In fact one of the biggest ingredients of success for Silicon Valley is around collaboration and trust. So the fact that this kind of collaboration, and maybe trust, is enabled through connected STPs, could in theory have the same effect – of creating a Silicon Valley-like ecosystem between several STPs.

This enables an ‘ open innovation’ platform across borders, aided by the ‘ virtuality’ enabled by the cloud, the internet and mobile connectivity. It also enables greater knowledge sharing, and enabling learning from different user/customer experiences and different cultures.

There has been one example of this kind of collaboration but it is not clear about the result of that project. The ‘ Next Generation Science Park’ is a consortium of seven partners from five different European countries, which had aimed to identify an approach to a regional science park system which can be transferred as a good practice and its elements adopted by individual science parks. Its objective was to analyze, develop and implement good practices and regional policies for how to build a science park or a group of science parks that supports regional development, facilitates a dynamic dialogue between industry and higher education institutions (HEIs), and attracts national and direct foreign investment in the region.

The sub-project main objective analyzed strategies and models adopted in the involved regions, in particular the ‘ knowledge sites’ a network of chemical parks in Germany, six science parks in Sweden, Innovation Poles in Italy, Digital Plaza in the UK and Innovation and Science Park in Lower Silesia; and by testing and implementing the learning generated during the analysis and experience exchange workshops.

It’ s not clear yet if they managed to validate the ‘ hub concept’ and how connectivity might have played a part, but this is obviously heading in the right direction to create a network of STPs.

Summary

The trend towards connected devices and places could enable STPs to follow the ‘ internet of things’ trend, whereby national or regional networks of STPs can be ‘ connected’ to enable creative collaboration for innovation and knowledge ecosystems to stimulate local and regional economies.

Mobile connectivity and mobile industry growth will create an opportunity for STPs to play a key part in the development of this sector, by STPs ensuring their alignment with mobile and mobile app related research and innovation. By aligning with local and regional government programs to deliver services through innovative use of mobile technology, the tenants of STPs have opportunity to grow through potential deployment of their research, products and services to meet the needs of those programs. Hence STPs will be making a contribution to the need for innovation in economies in austere times.

It is not just public services that can benefit from the innovation resulting from the activities within the STPs. The outputs will also contribute to the wider agenda for the application of mobile technologies and mobile apps – such as for smart homes, for smart health, for education, for smart government, smart metering and smart energy.

So taking this concept further, if STPs are contributing to innovation in development of smart everything via mobile, multiple STPs could be ‘ connected’ to create opportunities for collaborative innovation and research. It could be possible to have ‘ STP hubs’ for a region that feed in to national and regional economic recovery and growth.

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