Are cellphones the thin client of the World Wide Web or a part of the World Wide Web?

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If you see a car bomb blast, your first thought is not to go to an Internet cafe and start blogging. Most likely, you will turn to the device you have on your person - your cell phone. Almost everywhere in the world, cell phones are available, with the ability to send text, photos, even video of such events instantly.

inthefieldONLINE.net is aiming to solve this problem and this paper puts forward some of the important implications and issues faced when doing this.

Let's start with a very short recap of the state of the mobile world.

Cellphones have been successfully used in various social, environmental and economic contexts over the last few years as network coverage expands to populations previously excluded from the global communications revolution. Reports are indicating that we will reach an amazing above 80% coverage in 2007. The number of landlines is decreasing, the number of websites has reached a plateau and the cost of a handset is much lower than any laptop or PC. Therefore cellphones play and will continue to play an essential role in the ongoing paradigm shift towards communications and relationships between citizens of our world with the use of technology.

Events such as the London bombings, the war in Lebanon, the riots in Paris, but also local problems such as corruption, and environmental problems around our globe show the need of a communication channel between people, and why cellphones are an important factor to create such a communication channel. The need has been illustrated for instance by the blog http://itf.typepad.com/lebanon, launched by inthefieldONLINE.net during the conflict in Lebanon for people to share their stories and experiences. The need to share experiences, interact and communicate, but also the need for dialogue was obvious by the hit rate of the blog which during the conflict was well above tens of thousands per day. One of the biggest impacts of the internet has been the borderless, universal behaviour, but also the social aspect such as relationship building between people. Interaction with the World Wide Web via cellphones is an essential part of the creation of the *global* information society especially due to the lack of traditional internet access in the rural parts of this world. Cellphones are ubiquitous almost everywhere and thus a natural way for anyone to interact with the World Wide Web in the field.

Conceptually, internet and cell phones enable any citizen in any country of any background to publish information and share it with the world, across any border and especially across national borders. The result of sharing information and creating a dialogue over everyday local issues as well international issues is that it has provided people with a voice, who normally don't have one. This philosophy is well-known from for instance the UN, Steel-Carbon Union and later the European Union. Build alliances between countries to prevent them from getting into arguments and/or disputes that end up in wars. Similarly, the internet and cellphones - together or separately - can be used to build direct relationships between individuals of different ethnicity, race, cultural background, nationality and so forth. Thereby you empower the community, but also enable them access to online resources and make them members

of the global information society. This is an *important* factor in the creation of a fair global information society.

Therefore and without question, interaction with the web via cellphones is an essential part of any for-profit as well as nonprofit (media) venture in the emerging markets and developing world, especially in Asia, the Middle East and Africa. Besides the technology issues defined below, the human needs and abilities must always be taken into consideration.

The mobile handset constraints

Interaction via cellphones to the web is in theory simple. Think of the phone as a thin client on a network, and much is gained by considering the interaction with today's handsets. This paper does not bring up the hybrid approaches such as the simputer nor other devices such as the Origami developed by Microsoft, nor handheld gaming devices, but focuses on the 'traditional' cellphone.

Any cellphone application, especially if deployed in emerging markets and the developing world, is on the mobile device part constrained by:

- The available **connectivity** often constrained to lower generation networks, especially in emerging markets and the developing world,
- **Restricted interactability** is a fact due to small keyboards,
- The **small screens** constrains the amount of representable data
- The **lack of operating system standards** complicates development of general cellphone clients.
- The **battery lifetime** of any mobile device is also **strongly correlated** to the bandwidth need.

The connectivity and optimization of the battery lifetime of the mobile device is best addressed by making the data model low-bandwidth intense and non-constant. The restricted interactability is easiest dealt with by making the application such that the user can predefine actions on the server, as well as having a set of default actions. Thereby the number of necessary "commands" by the user is minimized, and could in some cases be eliminated. By presenting an abstract or light version of the content on the cell phone combined with an easy access to the full version in the corresponding web application, the issue with small screens is addressed. Such an approach will also benefit the educational part of any project as you drive the users towards the PC-platform. Ultimately this will also improve the available bandwidth using the "supply and demand" strategy. By making sure the mobile strategy supports already in the handset built-in technology you ensure independence of operating systems on the handset.

Network generation independent solutions such as SMS and almost independent ones such as EMS, MMS and WAP are all choices which fulfill all the above requirements, if combined with some careful thought about what data makes sense to present on the cellular platform. The method has been successfully proven on inthefieldONLINE.net, which illustrates the proper interaction model.

For more data intense formats, WAP seems like the right choice at the moment, even though the pricing models are often confusing (although much lower than for SMS/MMS.) From a user perspective sometimes it therefore makes more sense to stick with SMS/MMS of that particular reason. Submission of data can be made via SMS and/or MMS as the user is more comfortable. The setup of

the handsets for WAP and/or internet access is far from straightforward for the normal user, and the browsers are hard to locate on the handset. In addition, the access speeds via WAP are usually still fairly low, and WML, i.e. "mobile HTML", is interpreted/rendered differently on different cellphones. The need of a standardized rendering model on cellphone based browsers and a standardization as for multimedia files would definitely change the possibilities drastically. The Mobile 2.0 event November 6th, 2006, in San Francisco further emphasized that we are certainly not closer to achieving to a standardized rendering model on the handset. The same battles are fought as on the PC/laptop platform, and in some cases they are even worse as the market is only emerging and the players want to secure their market positions.

Today, the proper mobile approach due to the constraints on the mobile device therefore is to compliment mobile texting solutions with a cellphone client. The cellphone client might be interesting if you have well-defined audience, and thus have a well-defined collection of handsets. A more uncommon alternative is (or could be) to establish a partnership to a handset provider that is market dominant in the region of interest, even though it has some implications on the scalability of any project.

Cellphones are mobile and immediate by nature, and, when interacting with the web becomes interesting, the location of the user is interesting meta-data to collect. The complexities met are many, but two major complexities are the availability of the location data and the implications of privacy. The Where 2.0 conference in San Jose, June 2006 certainly emphasized that the availability of such data is very poor to completely absent. The privacy question is however the most crucial one. *Do we really want to open up the location data and track users? How can we secure that the data is not used in any way we do not want to?* This becomes specifically interesting looking at the emerging markets and the developing world, where you (too) often find political instability. This has some implications on the policy making level, but also on how we address the audience.

The cellular network constraints

Let's spend some time looking at the similarities and more importantly the differences between the web and the 'mobile' web. Steve Bratt, W3C CEO, said during his speech at the Mobile 2.0 event in San Francisco, November 6th, 2006 the mobile web today is in the same state as the World Wide Web was in 1994 – *too slow, still a walled garden, lack of interoperability, need of child protection and not always accessible*.

The problem is however more complex as the mobile web to some extent cannot be considered as a global information web. First of all remember I will not here address any of the issues with a information web itself, where questions such as how the huge amount of information is organized, how to access it and/or send it, and importantly who' should be setting up that infrastructure. Those questions are all relevant, but should be discussed elsewhere. Therefore, the definition of a global information web I would like to use here is:

> *If the interaction device of choice behaves and from a technology aspect can access the information web/network the same regardless of where on the network it tries to, you have a global information web/network.*

This is not the case today. The borders between countries are sometimes more present on the cellular networks than on the map. For instance it is impossible for my mother to send me an MMS from Sweden to the United States directly to my cellphone. *Isn't that amazing?* The situation only becomes worse in the emerging markets and developing world where you have many other contributing factors such as low-end handsets and poor cellphone infrastructure. Barriers between national cellular networks exist either due to policy reasons, or worse of technology reasons. The same handset will not behave the same at different locations in the "network"/web. Some people might call this a semantic discussion, but nevertheless it is an important issue as it deals with the consistency of the mobile web as well as the lack of standards. Global standards here would greatly improve the implementation of global cellphone services and create a mobile web that acts as the World Wide Web does today.

Another very important factor is the strong variation of pricing of base stations and other hardware between different countries. This is strongly inhibiting the creation of a global information web and more importantly makes the creation process of such unfair between different countries and it will many times affect the emerging markets and developing world badly.

The nature of the near future cellphone applications

Still a conceptual discussion on the features of the near future cellphone application is of course interesting and necessary. A big part of the global information web, whether we talk about the mobile or the World Wide Web, is to nurture existing and further develop connections between individuals around the globe. It was its true intention from the beginning by the World Wide Web inventors, and specifically Sir Tim Berners-Lee has spoken many times on this topic. Another essential part of the social media is to link adequately the real community with the virtual community, where the works by Clay Shirky are ever as relevant, and here cellphones will obviously play or should play an essential role, especially in the developing world where traditional internet access is rare. I below present four user scenarios to see what kind of applications we might see in the future and they are all focused on the developing world, but of course have relevance even in the developed world.

User case 1

A guy outside a store gives out flyers about a demonstration against local corruption. A person sees this, takes a picture with his/her cellphone and reports in via his/her cellphone to site A.

User case 2

After a car bomb blasts, a user takes a small cellphone video of the devastation and shares it instantaneously via a short movie clip taken via his/her camera cellphone and a few thoughts. Another user gets an MMS with the movie clip and sends in an SMS commenting the clip. A discussion starts in the virtual community both consisting of cellphone and online submitted comments. As the discussion moves along, more reports on the car bomb starts flowing in.

User case 3

A car gets stolen and the owner sends in a report of the event. Another user gets an update via SMS and reports seeing the car a few minutes earlier at location X. The story evolves and reports start flowing in about the stolen car. On the map inside the virtual community and/or cellphone clients/browsers, everyone can follow the location based reports, the users can follow it. It turns out that several cars have been stolen in the same area and a pattern emerges.

User case 4
A number of trucks of company Z are driving through a village and user D spots them and reacts on a mysterious smell and fluid dropping from the back of the trucks. More reports gets posted and a discussion begins on the web and finally an anonymous report comes in, probably from an employee in company Z, revealing that the trucks belong to company X, who in the cover of dark dumped some containers with chemical waste near village Y. A person suggests inside the virtual community a demonstration against this dumping should be organized outside company Z's head quarters in city A.

Concluding remarks

When *these issues – both on the handset, but most of all on the network side - are resolved* ***then*** *we might start to think of "one web", until then I think it is better to think of it as 'different webs yet interacting'. Regardless, cellphones will play an essential part in the future, and especially the exploding use of cellphones in the developing world will force this to happen.*

As for applications and generally speaking we will see a lot of social media cellphone applications emerge and cellphones will be used as interaction devices with the web, as well as, when the platform is ready, part of the World Wide Web.

Looking beyond and considering the presented user scenarios and the constraints previously presented, you notice many important questions in the future, which need to be addressed. The way to start the process of going into the right direction is to start to consider the five characteristics of any strategy – financial, technological, legal, management, organizational, user experience - which should be well-known, but too often seem like total surprises to people.

- Flexibility
- Stability
- Sustainability
- Maintainability
- Scalability

I will not comment on them here directly, but the main problems in the near future as I see it are the sustainability and maintainability. These two are of course connected, yet I will treat them as separate entities here. You will be forced to handle a number of different approaches in any mobile strategy which puts tremendous pressure on the management of the ventures as well as increased development costs, and the cost of maintainability becomes high. The increased development costs are essential to consider and directly leads us over to the sustainability. *How will you be able to create sustainable, healthy ventures?* High development costs are fine if you have a high revenue stream. It is tempting to use here the dominating online revenue stream i.e. advertising on the mobile solutions too. Yet no one has successfully implemented a business plan supported by advertising on the cellphone platform, especially since advertising in text messaging solutions are certainly not well-suited for advertising as it could easily irritate the user. Most likely we will, especially in the developing countries, see *hybrid business models* where you combine grants with normal revenue streams such as revenue sharing of the messages/data traffic sent with carriers or other third parties.

Therefore as always, the key for success will be to start to create **successful and sustainable** technology solutions which all fulfill **true** needs of **real** people. The solutions must further more be designed for the particular audience of interest, and be based on field knowledge to create the 'right' solution. This mentality needs to be present in all steps of the discussion, architecture and implementation of the future mobile web, and is extremely important especially in the emerging markets and developing world.

Short on the inthefieldONLINE.net

inthefieldONLINE.net thinks of cellphones as thin clients of a global network and thus interaction devices to the World Wide Web. The idea is to move the computational heavy aspect of the process to the better fit web server, and therefore optimize the solution for low-end cellphones. The solutions will be combined with more advanced solutions for regions where the handsets are better suited for it.

The idea is to provide *simple, cheap and easy maintainable tools* so that users that cannot connect to the internet still are able to do so with as simple techniques as possible. I have developed an information relay technology/process that allows users 'in-the-field' to submit information and multimedia content via a single SMS, MMS or email to multiple end information sources. The method facilitates the reporting of text, audio, pictures, and video updates directly to several Internet websites via any cellular phone.

The technology has primarily promoted participatory journalism such that the reporting and dissemination of news and information can occur to blogs and other contributory media websites as well as established news websites. It has been successfully tested in numerous countries such as Kenya, Ethiopia, Lebanon, Israel, India, and Sweden.

The biggest impact so far has been the blog created for citizens in Israel and Lebanon to report their experiences and thoughts via their cellphone during the recent conflict. The blog created a forum for people from all around the world to discuss and digest their experiences of the conflict and the reports from the people within Lebanon and Israel. It is a true example of the need to build friendships between citizens across borders and that technology based solutions here play an important role.

A friend of mine is using the technology to write his travel diary while working as a volunteer dentist in Kenya. He submits his entries via SMS and thereby stays in touch with his friends and family. Interesting enough, if some of his messages are delayed, he immediately gets a lot of SMS's from people asking him if he is okay. He doesn't need to reply with an SMS to everyone, and moreover, he can later on read his stories upon his return home. It is cost effective and easy for the user. I also think this is an interesting example of how you can use these technologies as new ways to communicate.