

Fighting Hunger with Information - Mashups in ICT4D Increase Accessibility of Vital Services

Florian Sturm, David Hauer, Thorsten Hampel, Andreas Hornich

Universität Wien, 1010 Wien, Austria

ABSTRACT

In recent years, the research field of Information and Communication Technologies for Development (ICT4D) has appeared. It deals with the benefits that are brought to people in lesser developed countries by access to ICTs, like easier access to information and easier communication.

The concept has found many supporters, and several new internet platforms dealing with various aspects of ICT4D have appeared. The platforms serve many people but operate relatively independent from each other and other useful services. Linking these platforms and services together would release a substantial added value.

Web 2.0 now provides the opportunity of mashups - to combine relevant information and user generated content with tools which enable distribution through various ways.

In this article, based on a prototype, the benefits of mashups in the context of ICT4D are put forward. Through the combination of manifold services, new qualities appear and the accessibility of vital services is increased.

For the purpose of the prototype presented, the data of a typical e-marketplace is simulated. The relevant data is made accessible in a visual and audible way, therefore the prototype gives people with limited access to computers and illiterate people the opportunity to utilize e-marketplaces and so benefit from them. It is shown how the combination of existing services render simple, inexpensive and highly efficient solutions for everyday problems possible.

INTRODUCTION

Since several years, the research area of Information and Communication Technology for Development (ICT4D) has come up with various new concepts for making ICTs accessible for the Third World Countries more easily. ICTs are technologies that enable people to communicate with each other and access information, via "old" technologies such as radio and TV, and "new" technologies such as cellular mobile telecommunication, computers or the Internet [1]. ICT4D deals now with the possibilities which these technologies create for inhabitants of lesser developed countries. The approach suggests that the technologies can foster economic growth and induce social changes, therefore ideally allowing lesser developed countries to leapfrog the industrial revolution and close the so called "digital divide". The World Bank stated already 1998 that they believe that ICT4D provide great opportunities for less developed countries in various sectors [2].

As there has been so much effort in this research area in the past 20 years, many platforms and services for various purposes were built up. Some of them have become successful and really improve the living conditions of the people who use them but most have not. For this reason it appears quite senseless to build another portal with similar functions. Enabling these services to communicate with each other might however be very well be an extraordinary step towards an added value. This reflects also the contemporary concept of Web 2.0 and Mashups which just aim at combining existing services.

For this prototype the data of a simulated e-marketplace database, which could be retrieved via screen scraping, is enhanced with services that represent the information in a visual and audible way.

E-marketplaces have become quite popular in less developed countries, as they offer often the only possibilities for farmers or fishermen in poor and rural areas to have access to a market and optimize their income. Offers and demand for products can be posted online and therefore be made accessible to a large amount of potential customers. These possibilities are of course limited for people which do not have the sufficient equipment or abilities.

With the prototype presented, the following segments of inhabitants of lesser developed

countries should be given the opportunity to utilize e-marketplaces and therefore benefit from them:

- people with limited access to computers
- illiterate people

THE CONCEPT

Generally a lot of services that help people with insufficient equipment or limited abilities to access the internet already exist. There are tools that transform web pages to be accessible via mobile phone, screen-readers for blind people and many more.

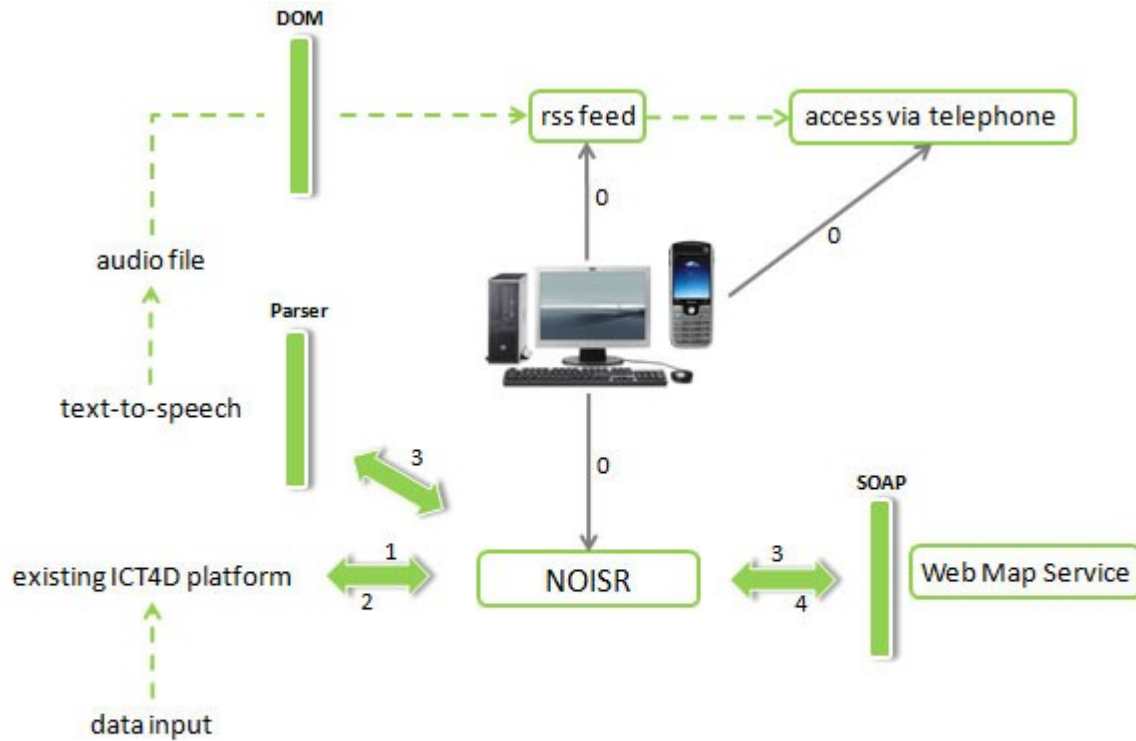
On the other hand, many platforms for various purposes, also in the area of ICT4D have been founded and have a big and active user community. There are e-marketplaces with a lot of features, blogs or databases just to name a few.

Taking into account these two premises, all the ingredients for a platform offering vital services for as many end-users as possible are already present. The only challenge is to combine these tools, which is attempted with the presented prototype NOISR (<http://t1169.greatnet.de/noisr/>).

By representing localized data of any kind in the Google Maps API, users are enabled to associate a clear form of visualization with it. Furthermore the possibilities provided by a powerful graphical representation are manifold. Using unambiguous signs and symbols, users can not only absorb a vast amount of information much faster than in writing, they do not even have to be literate.

On the other hand the conversion to speech is justified in a different kind of social disadvantage. Although in Europe, the United States and some parts of eastern Asia access to the World Wide Web is quite common, there exist plenty of regions where it is not. Regarding the underlying principle that information should be obtainable for everyone in order to create similar conditions for everybody, the conversion of data into spoken language does not only cross the natural inhibitions of illiteracy but also the not so natural limitation of absence of technological means. So by converting the spoken information into a podcast and subsequently providing it with a

telephone number a barrier between media is being torn down, which may very well provide information to a huge number of people who could not access it over the internet only.



- 0: The user accesses either the NOISR platform, the rss feed/podcast via computer or the spoken information via mobile phone.
- 1: The NOISR platform retrieves the data from existing ICT4D platforms.
- 2: The integrated ICT4D platforms provide the collected data to NOISR, where it is processed for further accessibility.
- 3: NOISR hands the localized data to the Web Map Service, where it is represented in a easily understandable way. Simultaneously the data is parsed and handed to the text-to-speech service. An audio file is being generated and subsequently converted to a rss feed. By publishing it, it gets available over telephone.
- 4: The Web Map Service provides the graphical representation, so that users may access a map on the NOISR platform.

Fig. 1 – NoisR - Concept

TECHNICAL IMPLEMENTATION

As already stated above, the technical focus of the presented prototype lies on integrating existing services to generate added value. For this project the concept of mashups is adapted. The utilized services are presented in the following. For some details of the prototype, for the purpose of simplicity, a local service was chosen instead of a service available in the internet.

XML Database

The underlying database was simulated for the prototype and as the representation language XML was chosen.

The reason for this is that XML can be generated out of any existing database. Even without an accessible interface, XML could be generated through screen-scraping. So in case this service should be implemented on top of some existing project there will not be additional creation of interfaces necessary.

Furthermore XML is the quasi-standard for Web 2.0 applications and wrapped in a SOAP message, the data could be provided through web-services.

Visualization

The offers in the database of the e-marketplace should be represented and visualized on the one hand geographically; on the other hand it should be easy to distinguish the product categories as well as the price differences.

For the visualization the well-known and often-mashed Google Maps was chosen though there are several other platforms which provide similar services (Virtual Earth, just to name the most prominent).

The visual representation and categorization was realized with self-created icons and a choice of background color dependent on simple x-Path queries comparing the prices.

Text-to-speech

The text-to-speech service in our prototype is realized with open source software provided on a local server. eSpeak is a compact speech synthesizer for English as well as 40 other languages. It is run as a command line program, providing multiple switches which enable the user to alternate voice, pitch, and speed among other things [3]. The service is hosted on an own server due to simplicity reasons.

There are several text-to-speech services available on the internet but mostly they are not for free and retrieving an mp3 file from their site is usually difficult.

However, once having created an mp3 file on the local server, it can easily be distributed through various means, such as podcasting or subsequently publishing it as a telephone number which can be called from everywhere.

Creating a podcast is an easy task which on the one hand could be automated easily, as several services exist for this purpose. On the other hand as it just resembles a certain XML-format - the RSS-format - it can also be assembled with a simple program as it is the case for this prototype. The feed is accessed by the user with a podcast-capable program which then loads and plays the audio files. There are two general benefits of making information accessible via podcast; it allows the subscription to relevant information and updates automatically if there is new information provided.

To make the information accessible via a phone number, the service Podlinez.com is utilized. It offers the possibility to give any podcast an American telephone number. The audible information available is, according to information on the page, updated regularly so that the up-to-dateness of the information is ensured [4]. Since the service can only be accessed manually and not yet by a web-service, this step of the prototype is not automated.

THE PROTOTYPE "NOISR"

The objective of the prototype NoisR (<http://t1169.greatnet.de/noisr/>) is to present an often publicized approach to use the synergetic effects of separate services, combining them in a very easy way. Consecutively NoisR is described in terms of design and functionality.



Fig. 2 – NoisR

Constraints

As already mentioned, for reasons of fast implementation of the prototype NoisR uses an independent xml-file for representing the location-based data in a tabular mode.

In order to test the application one may add a product along with an existing address to immediately access the updated graphical representation as well as the generated audio-file and podcast.

The audible data is right now statically available at the American telephone number +1 (712) 318-9440. It cannot be dynamically created, as the service Podlinez.com just offers a service for manual creation so far. Another problem is that this telephone number expires after time, so when this occurs a new manual request has to be carried out, which delivers another telephone number.

The service eSpeak is configured as an English male voice to date. Speed and pitch of the voice were optimized due to subjective judgement.

Usage



PRICE OVERVIEW

City	Address	Country	Product	Price	Change	Delete	Download Sound File
Mbour		Senegal	Corn	1.6	OK	Delete	Download Sound File
Mbour		Senegal	Rice	1.5	OK	Delete	Download Sound File
Bignona		The Gambia	Corn	3.7	OK	Delete	Download Sound File
Banjul		The Gambia	Fish	9.4	OK	Delete	Download Sound File
Kaolack		Senegal	Fish	7.5	OK	Delete	Download Sound File
Dakar		Senegal	Meat	25.7	OK	Delete	Download Sound File
Madiabel		Senegal	Meat	46.4	OK	Delete	Download Sound File
Sokone		Senegal	Rice	1.3	OK	Delete	Download Sound File

City	Address	Country	Product	Price	Save
			Corn		Add Product

VISUALIZATION

PODCAST

CALL

Listen By
Phone
+1 (712)
318-9440

Fig. 3 – NoisR – Main page

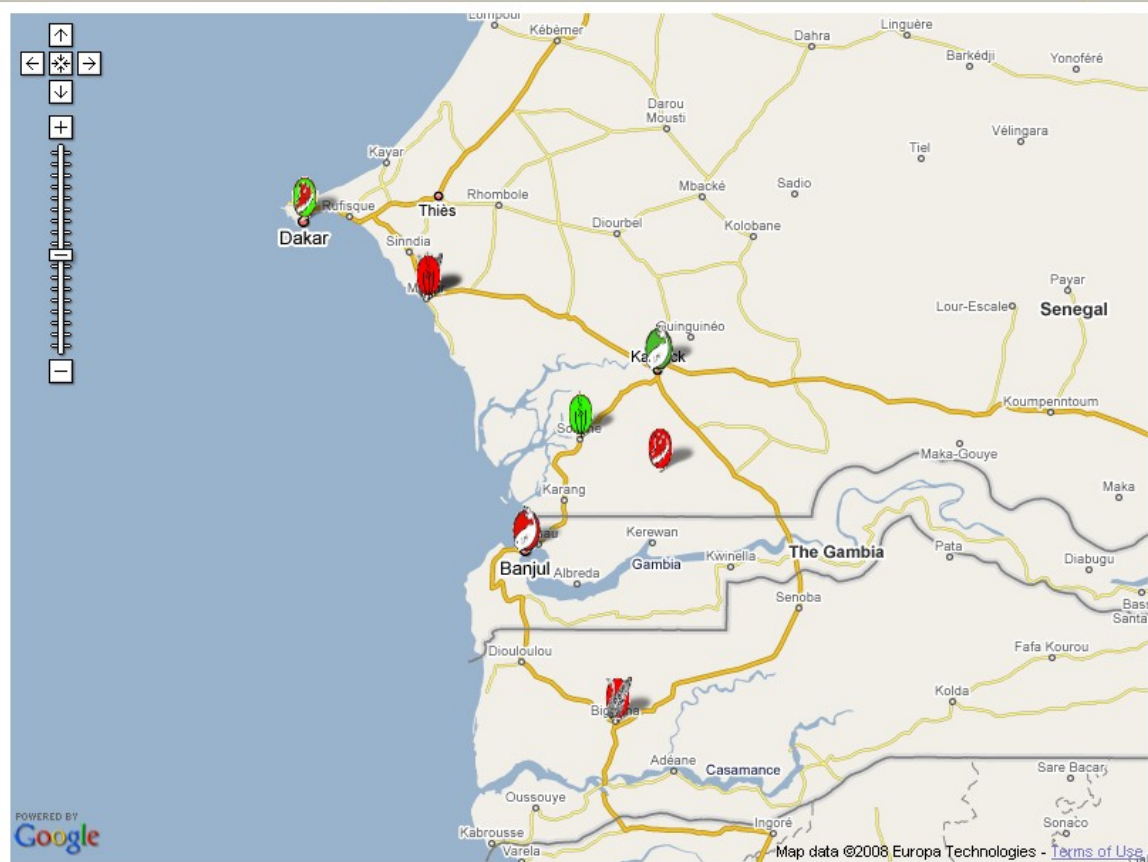


Fig. 4 – NoisR – Visualization

At NoisR the user accesses the service over the main page, which gives a tabular representation of the current offers contained in the database. The graphical visualization is accessed by a link in the main menu. A Google-Maps map section is opened and the available offers are displayed, distinguished by category and price.

The audio-service is invoked by adding a new item to the database. The information is read by one of eSpeak's computer voices and for every offer there is an mp3-file saved.

Afterward a rss-file referencing the mp3-files is created in order to include the new product in the podcast and subsequently on the telephone line. Once a podcast has been registered, there is no need for further updating of the telephone number, since the service is referencing on the podcast-file itself.

By representing the data graphically and distributing the offers via podcast and telephone, the

information can finally be seen and heard.

OTHER COMPARABLE SERVICES

Several other platforms provide different core-components of the presented prototype as services. From a SOA point of view the potential opportunity to combine some of their features ad hoc would be desirable. Hence what remains to be shown is that the present prototype can also be implemented using automated services only.

ReadTheWords

ReadTheWords (<http://www.readthewords.com>) is a service which offers part of the functionality of our prototype as a service. Its features include processing text from various sources like pdf, doc or html files into spoken language. It is explicitly prohibited to use the created text for commercial purposes or to distribute it.

The project is relatively new, as it was started in January 2008. Initially the target group was students with learning disabilities but the creators of ReadTheWords found out that their service could ease the life of many other people as well.

The platform claims to have sought out “programmers, technologies, and research departments from around the world” for the creation of the service and to always use the latest technology. Recent activity in the blogging sector of the page seems to confirm this statement.

Readthewords.com – currently in its Beta-stadium - is for free and seems to be continuously tested by many curious users [5].

Readspeaker

Readspeaker (<http://www.readspeaker.com/>) is the market leader of “voice on the web”-services in Europe. The company operates since 2001 and its’ target group are dyslexics and elderly people who suffer from degradation of sight.

The concerned documents are read by a human voice, which is why it may take several days to get back the desired audio-files. Since processing is not automated the customer is charged a fee.

Readspeaker offers different services for private users and NGOs and is used by several public organizations, like the English Department for Education, the Swedish Handicap Institute or the very renowned O'Reilly Radar blog. It can easily be included in every website [6].

Yahoo Maps

Yahoo Maps (<http://maps.yahoo.com>) is one of the countless competitors of the omnipresent web map service Google Maps. It generally provides similar functionality and also offers a public API which - for private purposes - can be utilized for free.

Users may look for locations or addresses which are then displayed either on a road map or on a map with satellite images. The resolution of the presented satellite images is comparable to Google Maps as both receive the majority of their data from similar providers.

Furthermore there also exist several rich internet applications with enhanced functionality for broadband users [7].

RELATED WORK

There are some platforms in the context of ICT4D which also try to combine several services to create an added value. The two presented in the following are considerably new and already quite known. Generally speaking, only services from well-known service providers like Google or Yahoo are integrated and there exist few, if any attempts to combine services from a similar context.

Tradenet

Tradenet.biz is an open source software product to manage information about various African markets. It is also an E-Marketplace the users can use as their personal platform to trade goods. It can be accessed in four different languages and currently there are eighteen African countries serviced. There exists extensive cooperation between the platform and the countries' mobile operators to keep the services cheap.

Tradenet.biz supports real time SMS uploads from markets, databases customized for

agricultural data, multi-currency price indexing and various other features. It is specifically designed to get market data for farmers.

The services all seem to be explicitly developed for that purpose, only an instance of Google Maps is integrated. As the user base already exists, the platform would be a perfect target for the integration of other services like the ones presented in this prototype.

Global Voices Online

Global Voices Online was founded in 2004 by several bloggers and is hosted by the “Berkman Center for Internet and Society” at Harvard Law School. On the portal several bloggers from often ignored parts of the world present their views on political or social events and daily life in their home countries.

Experienced and well-known bloggers from these regions are asked to keep track of the happenings and put them online. The resulting articles are then translated by a team of volunteers into several languages.

Global Voices Online uses an extensively high range of integrated services from other providers.

- Google Earth is used for displaying the location of blog entries on the world map.
- Videos on youtube, ku6.com, overstream.net, Google Video and other video providers can be integrated in a blog entry.
- The calendar for upcoming events is hosted in Google Calendar.
- Social bookmarking sites can be directly addressed from any blog entry.
- There are integrated podcasts of the entries.
- Photos from flickr.com can be appended.

CONCLUSION

For more than 20 years various organizations try to enhance the lives of inhabitants of lesser developed countries through the use of contemporary technology. Several platforms for this

purpose have been founded on the internet and hitherto operate relatively independent from each other. By introducing the prototype NoisR, the concept presented in this article demonstrates how a typical e-marketplace can be enhanced to increase its accessibility for a significant segment of a lesser developed countries' inhabitants. To achieve that, only services are utilized that already exist on the internet and which are free to use.

Certainly, the idea to visualize current information for illiterate people and to provide it over the telephone is not limited only to e-marketplaces or the concept of ICT4D in general. There are various possible implementations reaching from stock market information to party dates or the daily news update.

However, we believe that similar services can be of great benefit for society, especially in the context of ICT4D. Taking into consideration the spreading usage of mobile phones¹ and the great number of illiterate people² around the world, enhanced accessibility of information could very well lead to better inclusion of these individuals in market activities. Having the mobile phone bridge the gap between the literate and the illiterate, an increase in information perception, leading to more and more participation in everyday life, automatically addresses also the gap between the rich and the poor.

REFERENCES

1. [1] European Commission.: 2001. "What are ICTs?" Source: European Commission: Communication from the Commission to the Council and the European Parliament; Information and Communication Technologies in Development. The role of ICTs in EC development policy; Brussels 14.12.2001; COM (2001) 770 final; p.3. http://www.ecomaccess.com/iim/pdf/ict_en.pdf (accessed June 3, 2008)
2. [2] World Bank (1998): World Development Report. Washington DC.
3. [3] eSpeak. <http://espeak.sourceforge.net>, viewed June 4th, 2008.

¹ There were 285 million new subscribers in 2006 alone according to a study of Light Reading - http://www.lightreading.com/document.asp?doc_id=119439&page_number=1

² Due to a data sample of 39 African countries from the United Nations data service (data.un.org): 34% in 2003

4. [4] Podlinez. <http://podlinez.com/>, viewed June 6th, 2008.
5. [5] ReadTheWords. <http://readthewords.com/>, viewed June 11th, 2008.
6. [6] Readspeaker. <http://readspeaker.com/>, viewed June 11th, 2008.
7. [7] Yahoo Maps. <http://maps.yahoo.com/>, viewed June 11th, 2008.