This document is downloaded from the
Digital Open Access Repository of VTT

Title	Crowdsourcing accessibility related information from POI-destinations in Finland
Author(s)	Tarkiainen, Mikko; Bäck, Asta; Hulkkonen, Juha; Könkkölä, Kalle
Citation	Proceedings of the 18th World Congress on Intelligent Transport Systems. Orlando, FL, US, 16 - 20 Oct. 2011, 10 p.
Date	2011
Rights	Copyright © 2011 ITS America. Reprinted from Proceedings of the 18th World Congress on Intelligent Transport Systems. This article may be downloaded for personal use only

VTT
http://www.vtt.fi
P.O. box 1000
FI-02044 VTT
Finland

By using VTT Digital Open Access Repository you are bound by the following Terms & Conditions.

I have read and I understand the following statement:

This document is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of this document is not permitted, except duplication for research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered for sale.

CROWDSOURCING ACCESSIBILITY RELATED INFORMATION FROM POI-DESTINATIONS IN FINLAND

Mikko Tarkiainen, Asta Bäck
VTT
P.O.Box 1300, FI-33101 Tampere, Finland
+358-40-5399384, mikko.tarkiainen@vtt.fi

Juha Hulkkonen
Oy International Business Machines Ab
P.O.Box 265, FI-00101 Helsinki, Finland

Kalle Könkkölä
The Threshold Association
Siltasaarenkatu 4, FI-00530 Helsinki, Finland

ABSTRACT

The use of Social media is growing fast. The objective of the SosPromo project was to investigate the possibilities of Social Media tools and processes as a rapid way of information collection and sharing to enable and support the mobility of the selected user group, people with some movement reducing factor. The actual implementation in SosPromo-project focused on crowdsourcing accessibility information from Points Of Interest, POIs (e.g. restaurants, cafes, shops) especially in the Helsinki capital region in Finland. This information can be used for personalised journey planning especially with disabled or elderly users or person with temporary mobility restrictions e.g. when moving in a city with a small child in a push chair. The introduced SosPromo concept enables further information sharing between different user groups.

INTRODUCTION

The aim of the independent living philosophy is to ensure that all people have the freedom and opportunity to be able to do their daily activities may it be work, school, or leisure activities including those with disabilities. One of the important factors in independent living is equal access to the built environment. Information about the accessibility of built environment in Finland is currently gathered by city authorities with limited resources. Official accessibility data gathering aims at very detailed and precise information. The work is time consuming and information collectors may not always have the needed expertise or experience. Furthermore, too detailed information is not practical to utilise by end-users.

The Threshold Association (1) is a disability organization in Finland that has long experience in accessibility information collection and use. They have recognised the problem with currently available accessibility information and the difficulties in gathering the data. The acces-

sibility information must be simple, relevant and easy to use. Users also to utilise need many information sources when planning a journey or destination to visit. For instance, when you choose the place where you want to go, accessibility is only one motivation, e.g. the quality of food can also be absolutely important.
Besides city authorities there is no willingness to finance accessibility information collection. SosPromo project provided new approach for the Threshold Association by harnessing Social media into the accessibility data collection. Social media and crowdsourcing provide a new approach to collecting information: information is produced by individuals with real personal experience. This approach makes it possible to gather data quickly and extensively, if a large number of users can be involved in gathering the data.

CROWDSOURCING

Social media emerged and is exemplified by web based applications like Wikipedia, Flickr, delicious.com and YouTube. Most recently social networking sites like Twitter and Facebook in particular have gained most new users. What is common to these services is that users are in key role – users add and share content, and network with each other, and users can easily switch their role from passive viewers or readers to contributors, producers and communicators.

Social media can be defined with the help of its three key elements: content, communities and Web 2.0 (2). Content refers to photos, videos, status updates, tags, links and play-lists or anything that users create and share. Communities refer to the opportunities for people to communicate, network and collaborate. The term Web 2.0 (3) is used to refer to the easy-to-use technologies and applications that make this communication and content sharing possible for ordinary web users.

Social media has also been defined as a structural process where individuals and groups build common meaning with the help of content, communities and web based technologies through peer-to-peer production and produsage (production+usage) (4). Social media is thus more than a tool or service; it is about new ways of organising and enabling work with light weight collaboration and self-organisation.

Social media was first introduced to consumers to be used on their leisure time, with free and easy as important characteristics. The huge popularity raised interest also for utilising the same tools and processes for work related purposes in companies, and in public and third sector organisations for renewing their processes. This is understandable since one of the first popular social media applications was Wikipedia, an example of how an extensive encyclopaedia could be produced in a lightly organised way with volunteers.

This phenomenon of producing something valuable or creating new knowledge by combining the efforts has been called wisdom of the crowds (5). This can be achieved by aggregating and not averaging individual contributions. Important requirements for achieving this are diversity of opinions, independence, decentralisation and aggregation. (6)

The term crowdsourcing that was coined by Jeff Howe (7) He defines it as ‘the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call’. In the most

typical cases of crowdsourcing, the initiator also stands to benefit most of the results, and the participants mainly benefit through some monetary or other kind of reward or prize, and not so much of the actual end result.

Also Vukovic & al. (8) point out to these different dimensions of crowdsourcing, aggregating or competing. They use the term Wisdom of crowds when individual contributions are aggregated and combined into the final outcome. In these kinds of applications, the users need to be motivated to contribute even tough there may not be any direct benefit of the contribution. Motivation may be the future opportunity to utilise some of the contributions, or the user sees some benefit like gaining reputation or learning, or just happens to enjoy spending time with that activity (9). When the individual contributions complete, the chance to win a prize is often the motivating factor.

Recruiting and retaining users is an on-going challenge to all social media and crowdsourcing initiatives. According to Huberman (10) attention is the main currency in this kind of services. For example, an analysis of YouTube users revealed that the more attention a user's video gets, the more likely he or she is to publish more. The questions of what users actually do, how individual contributions are evaluated and combined, and how much manual this all requires. These are the classic challenges of in utilising crowdsourcing and wisdom of the crowd (11).

SosPromo application aims at collective knowledge, which is defined as development of information resources from a distributed pool of contributors. The application can also be categorised into the group of Web Mapping 2.0 area (12). Haklay & al. (12) see that the new role of users as information produces has changed the business models of geographic data and speeded up innovation and information gathering, but the users of information are faced with a new question of whether they can trust the data that is available to them.

CONCEPT

Open interfaces for computer hardware and software were factors behind the expansion of information technology from special purpose, custom made systems to general purpose applications in business and private use. Open public hardware standards made it possible to compose systems from commodity components. This dramatically reduced the cost of computer hardware. Layering and commercial licensing of computer software has enabled sharing of software development cost over large number of user organisations bringing down the cost of ownership to the level affordable to the masses. Instead of building new systems from scratch it became possible to build new systems on existing hardware and software layers (13).

Open source code challenged the software industry paradigm and exposed the industry to the potential of contributions from the voluntary and non-commercial developer communities – with new capabilities and specialisations built on top of the layers of technology developed by the commercial computer industry.

Social media combines the principles of standardisation, open interfaces, and complementary development for the content domain. Open access to public data for free use by citizens and developers is expected to create significant savings and benefits to the national economy e.g. in the UK and USA. In addition to reusing the existing data the same model can be used for

acquiring new data sets again to be reused and developed further by others. The term open data is often used to refer to systems where the data sets are open for user access and contributions. In SosPromo project we apply and test these fundamental ideas.

In SosPromo a hypothesis was defined as follows:
"Social media and crowdsourcing offer new possibilities for information gathering and sharing in daily life. Information can be collected with little effort on single users and transformed into a form which can be useful also for other user groups".

The main idea behind the project was defined in the service concept (see Figure 1). User groups can collect and share information in their own (social media, web) forums and in the background this information can be shared with other user groups that can benefit from it. Information sharing between different groups and other stakeholders (e.g. authorities) can be arranged for selected data. As a start this project implemented the concept only for one user group (mobility impaired) and sharing with other user and interest groups were left for future work.

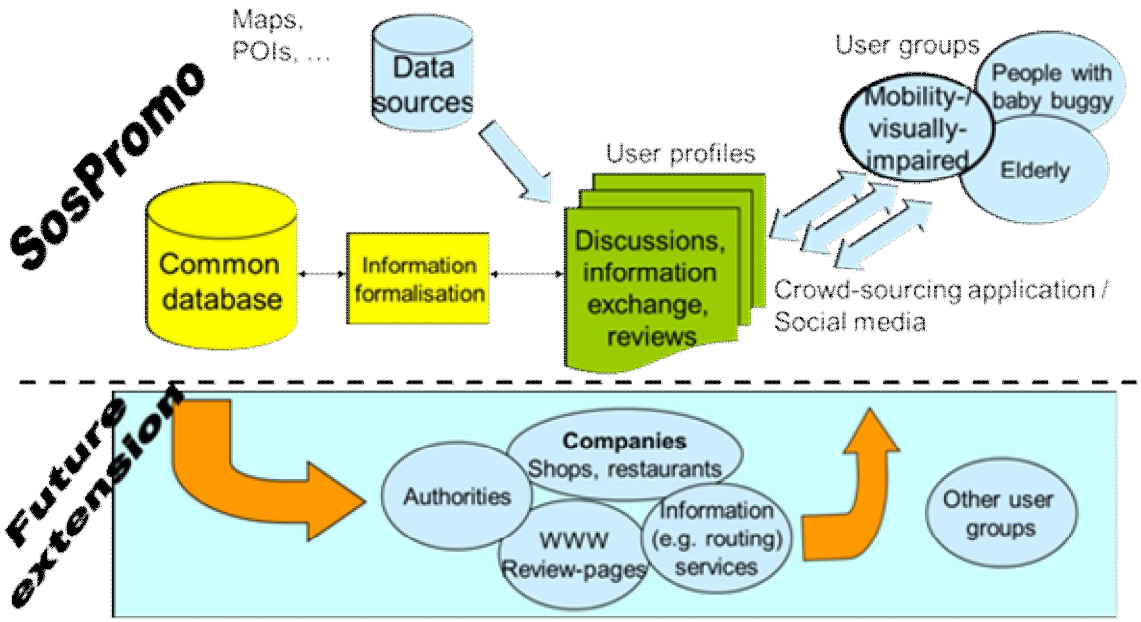

Figure 1. SosPromo service concept.

DATA COLLECTION DESIGN

Accessibility related information to be collected was defined together with The Threshold Association. The main idea was to enable both very simple (both positive and negative reviews) and extended data collection to end-users. Following features and information collection was implemented:

User information (in registration)

- Minimal information required: nick name, email address, password
- User can select optional viewpoint from which he/she is especially capable of reviewing accessibility

- § Accessible mobility environment; wheelchair user, user with a rollator, buggy/pushchair or on crutches, etc.
- § Accessible visual environment; poor sighted, blind
- § Accessible hearing environment; user with hearing assistive device, deaf

New (POI) target definition

- § Name, Address / position on a map (Google Maps available)
- § Information collected from following POI types:
  - § Restaurant / café
  - § Service / shop / shopping mall
  - § Tourist attraction / sights
  - § Entertainment / culture
  - § Sports venue / hall
  - § Station (transportation)
  - § Other public building

A general accessibility review (based on his/her own experience)

- § Accessible / Barrier free
- § Minor barriers
- § Major barriers

Optionally detailed review from following viewpoints (based on his/her own experience)

- § Accessible mobility environment (entrance door/steps/ramp/hand rail, elevator, toilet, …)
- § Accessible visual environment (signposts, lighting, collision/falling danger, …)
- § Accessible hearing environment (echoes, background noise, induction loop, …)

Other features:

- Target search
- Photo uploading for support accessibility reviews

Information about user's viewpoint of accessibility of reviewing does not imply that a specific user has the selected disability. This kind of information collection of personal data is restricted in Finland. The main idea behind the accessibility viewpoint is that users may have ability of see accessibility related issues from a certain perspective, e.g. if user sometimes moves with a person with wheelchair or some hearing impairment. This information can also be changed easily if for example user starts to push buggy after becoming a parent. The selection of a viewpoint was planned to be utilised later for filtering the given reviews for similar user groups. For example, if a restaurant is barrier free for a wheelchair user it can be estimated to be good also for e.g. user with a child in a pushchair.

SERVICE IMPLEMENTATION AND USE

The implementation of the service was done in two stages. First, the crowdsourcing web application was implemented which could be used with any browser. The data was collected to a database, which was easy to integrate to the web server. This web application was utilised to get data collection started and to study the first response and feedback from the test users in the autumn 2010. After successful feedback from the first web service, the mobile version of the service was designed and implemented in the summer 2011.

Service Implementation

The first crowdsourcing application was implemented as server-side software with PHP programming language with following features:

- The users are provided with an HTML forms and Google Maps based user interface to select POI, fill in new POI and to review the accessibility
- The collected data is stored in MySQL database with SQL queries
- Web-application can be used with any browser that supports javascript (PC, laptop, tablet, smartphone etc.)
- Any web server supporting PHP and MySQL

The crowdsourcing application and POI reviews with photos were integrated to Finland for All (www.suomikaikille.fi) web-site, which offers accessible tourist information in Finland, see Figure 2. The Finland for All service is also operated by The Threshold Association. After the Sopromo project The Threshold Association continues to further develop and manage the crowdsourcing service.

Typical usage scenario of the crowdsourcing application:
*User **visits a café** for a first time and **notices some accessibility problems** in the entrance. The most accessible entrance is not easy to find. User **takes some photos** from the entrance and manages to get into the café. While drinking a coffee he opens the laptop and goes to "**Can I get there?**" service **to give an accessibility review of the café**.*
*In the service he **scrolls the map view** and notices that this café has not been previously review in the service. He **clicks the map and gets the address** for the new target and **writes the name and selects the POI-type**. He also inputs the web-page of the cafe and submits the information.*
*After defining the café in to the service he starts to give an accessibility review. First a **general review** is given with **free text based his personal view and experience** in the cafe. He **ranks the café barrier free** and describes in the text some hints for other users how to find the most accessible entrance. He also **uploads the photos** of the entrance. As he has some extra time he decides to give also more **detailed accessible mobility environment review** of the café. He fills the form by selecting options from the lists and filling some text fields and submits the review.*
*While having the coffee he also utilises **the search** in suomikaikille.fi –pages to find nearby accessible museum. He finds two interesting museums and checks **the summaries of given general reviews**. He selects the first one with mainly barrier free reviews and reads a few more detailed reviews and decides to go there next.*

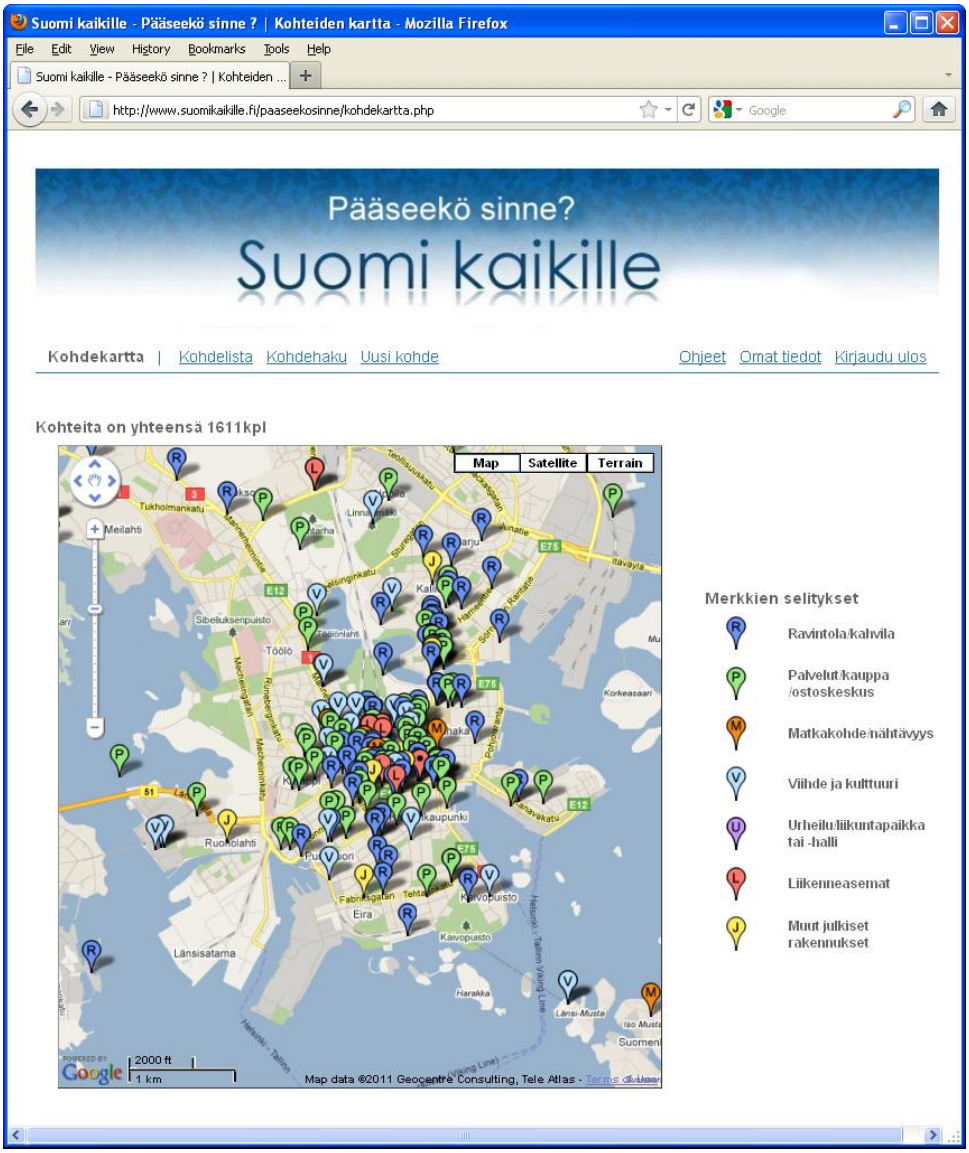

Figure 2. Pääseekösinne.fi map view with reviewed POIs in Helsinki.

Service Usage

The hypothesis was tested by defining and implementing a crowdsourcing web-application. In the autumn 2010, the project set-up a new crowdsourcing web application for gathering accessibility information. A data collection pilot with around 30 members of the Threshold Association was conducted to test the hypothesis. A user study was done in the pilot phase and the service got good feedback and was considered easy to use and the information gathered was very useful for the end-users. Especially information gathered by disabled users based on their own experience got very positive feedback and this was something new for the users. Hypothesis was therefore partly confirmed as this study implemented the service for only one user group.

The crowdsourcing web service was launched in spring 2011 and it is currently available only in Finnish at www.pääseekösinne.fi. (engl. Can I get there?). English translation of the service is scheduled for autumn 2011. After the launch the service was mainly advertised to the

members of the Threshold Association. In June 2011 there are about 260 users and the number of reviewed POIs is over 1600.
The whole development process has been implemented closely with disabled users of this service. It is important because users will be also producers of information. POI reviews from users increased the scope of the original Finland for All service by bringing information also from restaurants, cafes, shops etc. Furthermore, concrete experience-based reviews from the users gave new insight into the limited accessibility data that was available in the service. Users also trust more accessibility information of peers than any others.

In the first discussions with city authorities the service has raised a lot of interest. As pilot the Threshold Association have started collect accessibility information to the service together with city of Tampere. During this year first 200 POIs in Tampere will be reviewed. Disabled people in Tampere will do the prioritization of the reviewed places.

Development Plans

The mobile version of the service was designed and implemented by Haltu Ltd. (14) in summer 2011. At the time of writing this paper, the mobile version of the service is under final testing. The mobile version will be first available on Android smart phones. It will provide both crowdsourcing (add new POIs and reviews) and browse collected information on map view (POIs, reviews, filter POI types). It will enable users to look for nearby accessible places on-the-move, see Figure 3.

Figure 3. Pääseekösinne.fi mobile (Android) version map view.

In addition to mobile version wider use of social media with the crowdsourcing application was identified during the project. Including social media features offer a lot of potential for

making the service more interesting, adding motivation to contribute with more information and making the service more known. In the future development the following features could be implemented:

- Marketing service via Social media networks by utilising "Follow us on Twitter, Facebook, etc."
- A profile page for each user with recognition for contributions to the database
  - Makes it also possible to support networking among users
- Enable easy comment or like a review (refer Facebook)

CONCLUSIONS

SosPromo project investigated the possibilities of Social media and especially crowdsourcing as a rapid way of information collection for a user group with focused information needs. The actual implementation in SosPromo-project focused on crowdsourcing accessibility information from Points Of Interest, POIs (e.g. restaurants, cafes, shops) in Finland. This information can be used for personalised journey planning especially with disabled or elderly users or person with temporary mobility restrictions. The introduced SosPromo concept enables information sharing between different user groups. In the first feedback from the users have been very positive and discussions with city authorities the service has raised a lot of interest. The success of the service is yet to be seen when the mobile version will be published to larger audience. Information sharing with other user groups is for future work.

ACKNOWLEDGEMENT

SosPromo project was funded by IBM Shared University Research (SUR) Award (15)

REFERENCES

(1) The Threshold Association, Available at http://www.kynnys.fi/kynnys/english.html

(2) Ahlqvist, T., Bäck, A., Heinonen, S. and Halonen, M. (2010). Road-mapping the societal transformation potential of social media. Foresight Vol.12, No 5, pp. 3–26.

(3) O'Reilly, T. (2005). What is Web 2.0 – Design patterns and business models for the next generation of software. O'Reilly blog post 30.9.2005. Available at http://oreilly.com/web2/archive/what-is-web-20.html

(4) Erkkola, J. (2008). Sosiaalisen median käsitteestä. Helsinki University of Arts and Design. Medialab. (In Finnish) Available at http://mlab.taik.fi/pdf/ma_final_thesis/2008_erkkola_jussi-pekka.pdf

(5) Surowiecki, J. (2004). The Wisdom of Crowds: Why the Many Are Smarter Than the Few. Aba-cus. ISBN-10: 0349116059. 320 pp.

(6) Brabham, D. (2008) Crowdsourcing as a Model for Problem Solving - An Introduction and Cases. Convergence: The International Journal of Research into New Media Technologies Sage Publications. Vol 14(1): 75–90. DOI: 10.1177/1354856507084420

(7) Howe, J. (2006). The Rise of Crowdsourcing. Wired 14.06. Available at http://www.wired.com/wired/archive/14.06/crowds.html

(8) Vukovic, M. & Bartolini, C. (2010): Towards a Research Agenda for Enterprise Crowdsourcing. in T. Margaria and B. Steffen (Eds.): ISoLA 2010, Part I, LNCS 6415, pp. 425–434, 2010. © Springer-Verlag Berlin Heidelberg 2010.

(9) Nov, O. (2007) What motivates Wikipedians? Communications of the ACM, Vol. 50 No. 11, pp. 60-4.

(10) Huberman, B. (2008) Crowdsourcing and attention. Computer Vol: 41 Issue: 11 ISSN: 0018-9162 Date: 11/2008 Pages: 103 - 105

(11) Benkler, Y. (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press. ISBN-10: 0300110561. 528 pp. Available at http://cyber.law.harvard.edu/wealth_of_networks/Main_Page

(12) Haklay, M., Singleton, A. & Parker, C. (2008) Web Mapping 2.0: The Neogeography of the GeoWeb. Geography Compass 2/6 (2008): 2011-2039.

(13) Messerschmitt David G and Szyperski C, "Software Ecosystem, Understanding an indispensable Technology and Industry, the MIT Press, Cambridge Massachusetts, 2003

(14) Haltu Ltd, Available at http://haltu.fi/en/index.html

(15) IBM Shared University Research Awards , Available at http://www.ibm.com/developerworks/university/sur/