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Author(s)	Bäck, Asta; Vainikainen, Sari
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Contents

A word from the Guest Editor

Caj Södergård
VTT - Technical Research Centre of Finland, Espoo

E-mail: Caj.Sodergard@vtt.fi

Content technologies provide tools for processing content to be delivered via any media to the target audience. These tools are applied in numerous ways in media production. Research into content technologies is very active and opens new possibilities to improve production efficiency as well as to enhance the user experience and thereby the business value of media products and services.

This thematic issue focuses on several applications of content technologies. All papers address the user, and the ability to objectively measure and predict the responses various content causes in users is a much needed tool for the media professional. An emerging application proposed in this issue helps journalists find interesting topics for articles from the excessive information available on the internet. Another class of applications dealt with here is recommending content to the users. Relevant recommendations motivate the user to visit and spend time on a web service. Recommenders are therefore important in designing attractive - and monetizable - digital services. As a consequence, this technology is found in many services recommending media items such as music, books, television programmes and news articles. The papers on recommenders in this issue cover the three main methods in the field - content-based, knowledge-based and collaborative - and they bring new perspectives to all three. One such novel perspective which has been evaluated in user studies is that of a portable personal profile.

Most of the included papers are outcomes of the Finnish *Next Media* research program (www.nextmedia.fi) of Digile Oy. Next Media has run from 2010 through 2013 with the participation of 57 companies and eight research organisations. The volume of the program has been substantial; annually around 80 person years with half of the work done by companies and half by research partners. The program has three foci: e-reading, personal media day, and hyperlocal. The papers in this issue represent only a small part of the results of Next Media. As an example, during 2012 the program produced 101 reports, most of which are available on the web.

Even if this thematic issue is centred on work done within the Finnish Next Media program, content technologies are of course studied in many other places around the world. The paper by NTNU in Norway presented here is just one example. Computer and information technology departments at universities and research institutes often pursue content related topics ranging from multimedia "big data" analysis to multimodal user interfaces and user experience. In the upcoming EU Horizon 2020 program, "Content technologies and information management" is a major topic covering eight challenges. This will keep the theme for this thematic issue in the forefront of European research during the years to come.

Caj Södergård, guest editor of this issue of JMTR, holds a doctoral degree in Information Technologies from the Helsinki University of Technology. After some years in industry, he has held positions at VTT as researcher, senior researcher, team manager and technology manager. His work has resulted in several patents and products used in the media field. Currently Caj Södergård is Permanent Research Professor in Digital Media Technologies at VTT.

Portable profiles and recommendation based media services: will users embrace them?

Asta Bäck and Sari Vainikainen

VTT Technical Research Centre of Finland
Vuorimiehentie 3
P. O. Box 1000
FIN-02044 VTT, Finland

E-mails: asta.back@vtt.fi
          sari.vainikainen@vtt.fi

Abstract

User data and user profiles are very important in current web based business models and applications. Advertising revenue is to a large extent generated based on implicit and explicit user data. We propose the use of semantic, portable and user-controllable profiles to capture and model user data that can be used for personalising media services and particularly for making recommendations.

In this paper, we present results from four user tests where users created semantic profiles and received personalised recommendations based on these profiles. We have studied users' expectations and requirements for profile portability as well as how users have experienced the creation of a semantic profile using different data sources. We have also studied how users experienced recommendation based media services in connection with user-controlled interest profiles. In all four test cases, users have created the profiles and received the recommendations using the prototypes we have developed. User feedback was gathered through interviews and web surveys.

Users welcomed the idea of being able to control their profile data but they also had questions and concerns about privacy if the profile is shared between services. Users had dual concerns about the recommendations: some users were afraid of a too limited view if the service only relies on the user's profile; some users were afraid of being overwhelmed by too many recommendations.

Keywords: user profiles, portable profiles, media services, recommendations, semantic web technologies, linked data

1. Introduction

1.1 Background

User data has become the driving force of web based services, where the knowledge of user behaviour and interests is being turned into revenues by linking advertisers to potential customers. Google and Facebook with their free end user services and refined tools for advertisers are the prime examples of this model. From the end user point of view, free services still come with a price: every user activity is logged and analysed and the user has little influence on and knowledge of what data is stored about her. From the business perspective, the big players get a huge advantage over smaller ones, as they can accumulate versatile data about consumers and use this information to generate advertising revenue.

An alternative approach to user data has been proposed by several initiatives, such as the VRM project at Harvard (Project VRM, n.d.), and the World Economic Forum (World Economic Forum, 2013) as well as the British midata initiative (GOV.UK, 2013).

The core idea of these initiatives is that the business model with personal data is turned upside down: the users are made into owners of their own data and given the opportunity to offer this data to various service providers if and when they see value in sharing their data.

Users are not the only ones to benefit from this: rich portable profiles would give smaller players the opportunity to personalise their offering to users and in this way make their services more attractive and relevant to users.

The vision of user controlled personal data is both promising and challenging. First of all, the potential amount of personal data is almost unlimited, as can be concluded from the following categorisation (World Economic Forum, 2011):

1. Personal Attribute Data:
   Data about the attributes of an individual;

2. Volunteered Data:
   Data created and explicitly shared by individuals.
   (e.g., social network profiles);

3. Observed Data:
   Data captured by recording actions of the individuals, such as click streams and transactions or location data when using cell phones;

4. Inferred Data:
   Data about individuals, based on the analysis of personal, volunteered and/or observed information.

Many questions arise. Would people be willing to manage their data and share it with various service providers? Are companies ready to change the way they acquire and manage user data? In this new model, the main competitive edge of a company would be the skills and methods to utilise the data that the user offers, not the ownership of the data.

We have approached user controllable personal data using the concept of portable semantic user-controlled interest profiles, and we have implemented a Semantic Portable Profile Platform (SP3) for this purpose. Using semantic web technologies and linked data it is possible to enrich and share profile information across services so that the services will understand the profiles in a similar manner. Linked data can also be used to enrich the user profile information with additional relevant information which means that small amounts of data can be used for making relevant personalisation and recommendations.

Others have also started to explore these opportunities. Kay and Kummerfeld (2013) have proposed the scrutinability of one's user model as a way to increase the quality of personalisation and user experienced trust towards a recommendation and personalisation system. They particularly look at long-term user models that accumulate during months and years of using a particular application, but they do not address the issue of portability.

Bojars et al. (2008) have addressed the technical aspects of transferring user data between social networking applications and proposed a semantic web technologies based solution utilising the FOAF (Friend-of-A-Friend)[1] and SIOC (Semantically Interlinked Online Communities)[2] vocabularies. Orlandi, Breslin and Passant (2012) propose a methodology for automatic creation and aggregation of interoperable and multi-domain user profiles of interest using semantic technologies such as linked data. They combine expressions of interests from multiple social media sites and rank the interests based on their frequencies in different data sources in order to make inferences concerning the relative importance of different interests.

In our method, we also utilise data from social media services in creating the profile but our focus is on the combination of creating a profile and utilising it in media recommendations. Heitmann et al. (2010) address the problem of preserving user privacy while integrating multiple information sources and present an architecture for privacy-enabled user profile portability based on existing standards with a use case from the e-Health domain.

Portable semantic interest profiles would make it easy for media companies to offer various kinds of personalised services, most of all personalised recommendations.

Recommendations are seen as an increasingly important part of many web based services. They are mainly used to reduce the effort required from the user to find items that are most likely to interest them and to reduce the information overload (Liang, Lai and Ku, 2006).

Recommendations are often studied by looking at the precision of the recommendation algorithms but, in real life applications, many other aspects play a role in how the users will experience the recommendations and what their impact is on the whole usage experience of a recommendation service (Knijnenburg et al., 2012; Konstantin and Riedl, 2012).

We have created a number of applications that use semantic user profiles for generating recommendations in order to study various aspects of the topic. In this paper, we will present our results relating to profile portability from the end users' point of view: what are users' expectations and requirements for profile portability and how do they experience the creation of a semantic profile using different data sources.

Our main use case for the portable profiles has been recommendations. Recommendations are an important application area for profiles and they give the test users a practical example of how the profiles can be utilised. In this paper, we report on how users have experienced recommendation based media services in connection with user-controlled interest profiles.

We first present our framework for semantic portable profiles. We then present the cases where semantic profiles have been tested with working prototypes and test users.

We will also present our results relating to profile creation - what kind of profiles users created in the different cases and their experiences of profile creation, acceptance of the concept of portable profile, and views on recommendation based services.

2. Framework and methods

2.1 The semantic portable profile platform

Our Semantic Portable Profile Platform (SP3)[3] supports creating, managing and utilising semantic portable user profiles (Figure 1). The platform consists of tools and methods that allow users to create a semantic interest profile either manually or by importing their data from external social media services.

The platform includes methods for semantic enrichment of metadata, and for linking semantic interests, context and content metadata to make recommendations.

The word portability refers to the opportunity of third parties to utilize the user profile if the user gives his or her acceptance using OAuth (Open Standard for Web Authorisation)[4].
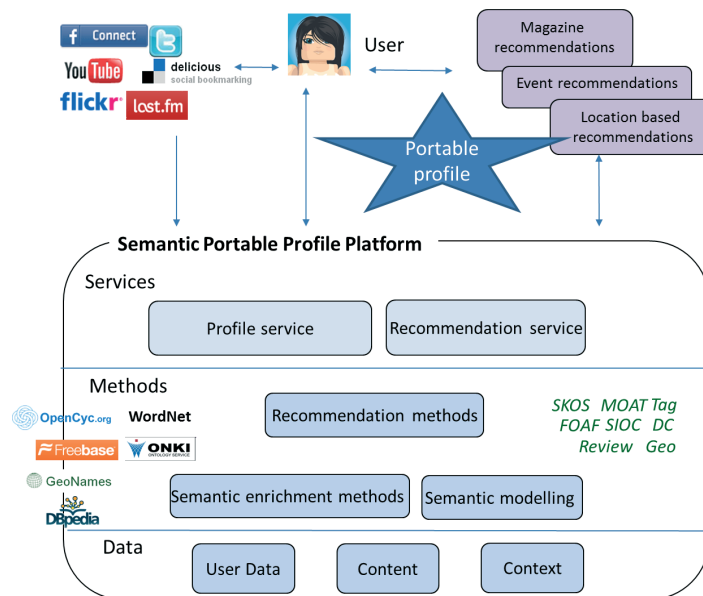

Figure 1: Semantic Portable Profile Platform (SP3)

The profile data is available via REST API[5] in JSON (JavaScript Object Notation)[6] or XML (Extensible Markup Language)[7] format. The user data is also available in RDF (Resource Description Framework)[8].

The user model has been defined reusing concepts and properties from the following ontologies: FOAF, vcard[9], geo[10], Review[11], tags[12], SCOT[13] and DC (Dublin Core), consisting of Dublin Core Metadata Element Set[14] and DCMI Metadata Terms[15]. The content model additionally uses MOAT (Meaning of a Tag Ontology)[16] and SKOS (Simple Knowledge Organization System)[17].

A semantic interest profile consists of items that are defined as a label with text and a URI (Universal Resource Identifier)[18] that is linked to a concept in a linked data dataset.

The user can link his/her interests manually to their semantic meanings using the available tagging widget: after the user has typed the first three characters of a concept name, suggestions will be fetched from selected ontology vocabularies and shown to the user (Figure 2). When the user selects one of the suggested meanings, it will be included in the profile as a Linked Open Data URI.
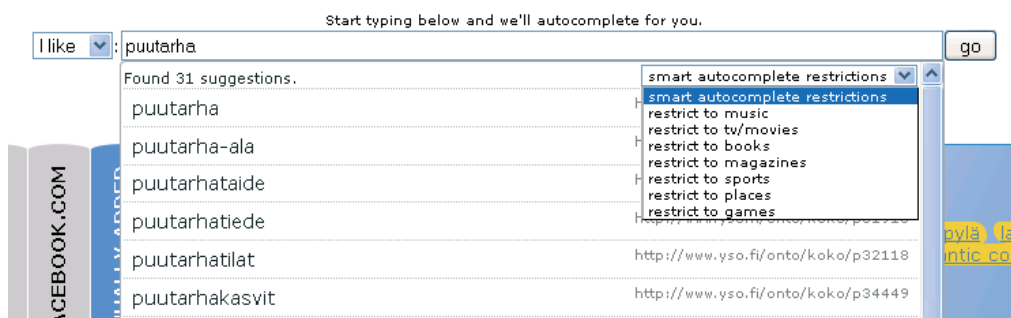

Figure 2: Semantic tagging widget for profile creation with automatic suggestions from semantic databases

The widget can be configured to use one or several ontologies or their subsets in any combination. The profile may also include items that are not linked to a semantic meaning. It is also possible to import data from a user's accounts in social media services, such as Delicious, Flickr, YouTube, Last.fm, Facebook and Twitter, to reduce the manual effort of profile creation. The data may consist of demographic information, tags or lists of favourite items, depending on the service.

The platform analyses the imported data and finds the most likely semantic meaning of the found concepts. The results are shown to the user who can correct the meaning, if needed. The user can also modify the results in the same way as manually created interests: indicate the strength of the interest (love, like, hate), or to remove them from the profile.

2.2 Test cases

We have tested semantic profile creation and the concept of portable profiles as well as recommendation based services in the four main cases: magazine recommendations, event recommendations (two separate cases), and videos and TV programmes emphasising location information in making recommendations. A summary of the tests performed is presented in Table 1.

The magazine recommendations case was investigated online. Test users were invited by email: 337 persons created a profile for themselves and 119 of them completed the entire user test by filling out the final questionnaire. Users created their profiles using our semantic widget where they could either select the suggested semantic concepts or write in any words to describe their interest. The profile creation form contained eleven category fields encouraging users to report many different matters, from interests to dreams and problems. Some examples were given to help users understand what kind of input was expected. The option of linking to social media services such as Delicious and YouTube was available but it was not used by many. After completing the profile, users were shown a list of recommended magazine articles. The users were asked to look at the recommended articles and rate how well they matched their interests.

Event recommendations case I was a study carried out as a laboratory test with 15 test users. As a first step, the concept of the service independent profile and the event recommendation service were explained to the users and they were given ten minutes to familiarize themselves with the actual event service. After this, each test user created an interest profile using our semantic tagging widget which included four fields: interests, favourite music, favourite movies and favourite books. The users could enter either free text or the semantic concepts suggested on the basis of the Finnish KOKO ontology of the Finnish Ontology Library Service ONKI[19]

as well as the Freebase[20] and Geonames[21] databases. It was possible to import tags from Delicious, YouTube, Flickr and Last.fm but, like in the magazine case, only few test users did so. Each user received 20 recommendations based on their profiles and were asked to rate the relevance of the recommendations. Finally, they filled out a separate feedback questionnaire about the service and profile concepts and profile creation.

Event recommendation Case II was based on a prototype consisting of a mobile phone and an HbbTV (Hybrid Broadcast Broadband TV) event application for showing recommendations. The profiles were created on the profile service web page. Both recommendation applications used the same user profile and the EvenemaX[22] event database containing 1 500 events. In addition to the interests registered in the profile, also the locations of the events and of the user were taken into consideration in making recommendations. Users could rate the recommendations and event information and indicate which events they were planning to attend. They could also see which events their friends were going to attend. We had four test users.

In the *location based recommendation* case, an iPhone application, called Mediatutka (Media radar, in English), was developed and tested. As the first step in the Mediatutka development process we gathered input from potential users in the Owela[23] online co-creation environment (Friedrich, 2013). Three sections were available: one with seven predefined discussion topics, one with four user stories and one for open ideation.

During the three weeks long co-creation period, end users proposed 17 new ideas or started new discussion topics. In total, 426 comments were written in the discussions. 74 users (64 end users, 6 developers and 4 researchers) participated in ideation and discussion. These Owela participants were different from those who tested the actual Mediatutka application.

The implemented Mediatutka app generates personalised recommendations and notifications out of the available content pool. In our tests, the content consisted of TV program data from skimm.tv[24], Stadi.TV's[25] local, citizen-made video clips, and information of new videos from the HelMet)[26] library service. Only Stadi.TV videos could be watched immediately on the phone; skimm.tv recommendations dealt with TV programmes to be broadcast in near future. HelMet videos are in physical format and they need to be fetched from a library; an alert was sent to the user when he or she was closer than 2 km from a public library from where a video matching his or her interests could be borrowed.

As the first step when starting to use the Mediatutka application, users log in with their Facebook credentials and their profile data is imported from their Facebook accounts.

After that, they can add more interests manually. Mediatutka gives recommendations to the user with a single click of a button and also sends location-sensitive alerts in near-real-time.

Recommendations and notifications are generated based on user created semantic profiles, user-made ratings of the earlier recommended content and the user's current location. There were 17 test users of the application.

Table 1: The cases where recommendation based media services and the concept of portable profile were tested

Case name	Case description	Profile creation	Testing
Magazine article recommendations	Recommendations were made out of 606 magazine articles originally from 12 magazines from Sanoma Magazines based on user created profiles and manually created content metadata.	Online test. Users created the profiles on their own either by using any words or by choosing words that were linked to a semantic database after typing initial letters. Importing data from Delicious and YouTube was offered but used only by very few. Users were encouraged to report many different things like in a friendship book, from interests and dreams to problems.	337 users created a profile; 119 of them completed the whole user study. Recruited by email.
Event recommendations I	Events from EvenemaX event database. Recommended out of 1 500 entries based on user created profiles and text index of event descriptions.	Laboratory test. Users created their profile online and received as a result 20 event recommendations. Users were asked to express interests as well as favourite music, films and books. These could be expressed as any words or by selecting suggested items after typing initial letters.	15 users.
Event recommendations II	Event recommendations from EvenemaX event database.	Profiles were created on a separate web page (any words + semantic suggestions based on the first typed letters). Facebook import available. Four weeks' test period with events from an event database. Focus group sessions before and after the test period. Owela feedback during the test period. Also an HbbTV event recommendation application was laboratory tested.	Four test users.
Mobile profile creation and location based recommendations and notifications	Mediatutka, an app that gives personalised recommendations and location specific notifications out of 1 200 Stadi.TV videos, 140 HelMet videos and 3 300 TV programmes from skimm.tv during the test period. All steps from profile creation and viewing recommendations using one mobile app.	Profile data is imported from Facebook and additional interests may be added manually and linked to semantic concepts. 167 Facebook interests were analysed; on an average 7 interests per user. Half of the test users (13/26) added interests also manually (100 interests, or 7.7 interests/user).	Initial concept and use case co-development in the Owela online environment (64 users). Mediatutka application testing: 26 users installed the application and logged in at least once. 17 provided feedback after the test period of two weeks.

The majority of our test users have been young adults, with a female majority. In the magazine article recommendation case, the age distribution was fairly wide from 18 to over 64, but the majority was fairly young with 58% of the participants under 35 years of age. Three of the 119 test persons were male. In the event recommendation case I, all 15 test users were between 18 and 23 years old; ten women and five men. In the event recommendation case II, all four test users were young men in their early twenties. In the Mediatutka application user test, 65% of the test users were under 35 years of age; 12 women and five men.

Out of 64 the Owela co-development phase participants, 47% were women and 53% men. Their age range was from 20 to 74 with only 23% being under 39 years of age.

3. Results

3.1 Users profiles and profile creation

In the magazine article recommendation case, 337 user profiles with 4 892 interests were created (14.5 inte-

rests/user). Almost two thirds (64%) of the added interests were linked to an ontology, but there were also free text interests in the profiles without semantic linking even though such a link would clearly have been

available. 'I'm interested in', 'I spend a lot of time with' and 'Important to me', were the categories of most entries. Each of the eleven categories received at least 200 entries. Some users had not realised that a comma was needed to separate interests from each other and had produced by mistake very long words with many interests combined. Some interests had been impossible to describe with only one tag; e.g. child's problems at school; more time for myself. This type of interests came up in categories concerned with dreams or problems in the user's life.

User assessments of the profile creation were given on a five step scale from +2 (very positive) to -2 (very negative) with the following results:

- 55 % of the users experienced the profile creation as very or fairly easy,

- 65 % indicated that finding the correct term among the suggested terms worked very or fairly well,

- 59 % considered the semantic tag suggestions very or fairly useful.

In the free text comments, some users complained about having been offered several concepts with the same title and not knowing which one to use. Free text comments also revealed some problems and misunderstandings related to the automatic suggestions: one user had understood that the terms represented the available content, which was not the case as the available semantic databases included a huge number of concepts - much more than what was available in the magazine articles of the test.

In the event recommendation case I, only four fields were available in the profile creation widget. Regardless of that, the number of expressed interests was practically the same in both cases: 15.7 interests/user in the event recommendations case I and 14.5 in the magazine case.

The event profile creation form guided users to give more specific information, since they were asked to tell about their favourite music, movies and books. Users did mention specific artists and items but, regardless of that, the most popular tags were comedy, dance, music, and pop music. Many identical interests were mentioned in both cases, as can be seen in Table 2.

In the first tests, only very few participants utilised the opportunity to bring in data from their social media accounts. A big obstacle was that very few had accounts in the supported services (del.icio.us, last.fm, flickr.com and youtube.com). This was changed when we introduced the opportunity to link to Facebook.

The event recommendation case II was the first one with the Facebook option. The four test users of the case created 7, 11, 13, and 39 interests respectively for their profiles. Two of them used the opportunity to import data from Facebook and the largest numbers of interests resulted from Facebook import. Users hesitated to connect their Facebook accounts. They were worried about the application posting messages on their Facebook wall and about their contact information spreading to advertisers. They also wanted to be in strict control of what is published on their wall.

Table 2: Interests that were given by users in two cases: the magazines and event recommendation case I

Animals	Languages	Riding
Art	**Literature**	**Sports**
Baking	Making food	Stand-up comedy
Dancing	**Music**	**Summer**
Fashion	Nature	Swimming
Movies	**Photography**	**Theatre**
Furnishing	Pilates	Traveling
Gym, exercise	**Psychology**	**Zumba**
Internet	Reading	

The test users created their profiles on the web page of our profile service. This was experienced as inconvenient because the recommendations were available on the mobile phone:

"I could use those interests if they were integrated into the application, so that it would not be necessary to go separately to the web page to type them in, feels laborious. And if there were enough events. We were maybe a bit too specific in our choices [of interests] and the app did not find such events."

The recommendations shown via the HbbTV application were generated with the help of the same portable profile as for the mobile app and this helped test users to better understand the idea and value of the profile portability.

In the initial co-creation phase for the Mediatutka application, carried out in Owela, users discussed automatic data sources and updates to the profile. Users were more positive about importing their Facebook data than about letting the app analyse their browsing history. Many users expressed their concern of Facebook being able to keep track and collect information about their web browsing:

"I understood that I can decide myself whether I import my Facebook likes or not. I'm not worried about that. Apps that I use with Facebook login, will become 'under the control' of Facebook, and I do not like that Facebook follows me everywhere."

"It is OK to log in with Facebook, but it should be possible that Facebook would not get information of what I do on other web pages."

In the Mediatutka user test, data from Facebook was transferred automatically when the user logged in with

his or her Facebook credentials. During the test, 167 Facebook interests were linked to their semantic meanings and added to the user profiles (7.3 interests/user). Half of the test users also added interests manually: 100 interests in total or 7.7 interests/user.

The interests imported from Facebook consisted mostly of proper names such as names of public persons, from politicians to artists and sportsmen, names of movies, TV programmes, actors or directors, and names of locations (Figure 3).

Person	Location	Music genre	Organisation	Music artist
Anton Corbijn	Khatmandu	Folk music	The City School	Jukka Leppilampi
The Stig	Pasila	Blues	Wikileaks	Glenn Miller
Zooey Deschanel	Suomenlinna		TechCrunch	Patricia Kaas
Paolo Coelho	Vantaa	**TV Show**	Wikileaks	
Barack Obama	Kuopio	The Simsons	TED	
Banksy	Columbia Road market	True Blood	Helsinki University of Technology	
Lady Gaga	Vihti	Seinfeld		
Chetan Bhagat		Airwolf		

Figure 3: Examples of interests that were extracted out of the Mediatutka test users' Facebook data

3.2 Portable profile service concept

The concept of portable profiles - being able to create and manage one's own interest profile and to use it in different services when the users wants to do so - was well received by the magazine case test users (as presented in Figure 4):

- 64% regarded the service concept as very or fairly interesting,
- 57% regarded the service concept as very or fairly useful, and
- 47%, considered it very or fairly probable that they would use such a service if it was available.

Free text comments revealed worries about privacy and security. Also the potential misuse of the profile, for example, for direct marketing, worried some test users. Some users also expressed concerns about how much work it would require to create and maintain the profile. Similar concerns were expressed in both event recommendation cases. These test users suggested that the application would learn their interests based on which events they have attended and which events and event categories they mostly browse. This would reduce the effort needed to create and maintain the profile.

Regarding sharing the profile, users suggested that it should be possible to offer only a selected part of the profile to a new service for making recommendations.
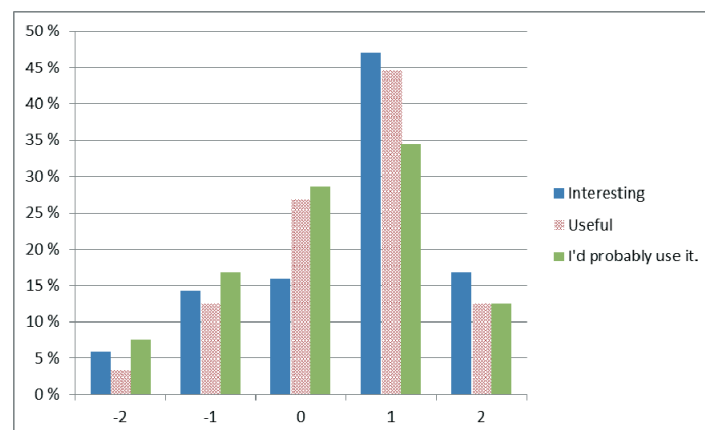

Figure 4: The opinions of 119 test users in the Magazine recommendation case regarding claims about the profile service. Main question: How do you feel about a profile that you could maintain in one service and use in different services to get personalised content recommendations. Scale: -2 = completely disagree; -1 = partly disagree; 0 = neither agree nor disagree; 1 = partly agree; 2 = completely agree

This would lower the threshold for sharing personal data with a new service. Also, in the Mediatutka co-design phase using Owela, dividing the profile into different levels of security was proposed as a solution to better manage the use of the service, particularly if the profile is connected to the user's real identity. Owela users were worried about their privacy and about controlling their data successfully:

"I could try a portable profile, particularly if controlling my data (profile, and use of web) has been solved well."

"In principle, using the same username and password would make life easy and ideally one would need only one set of credentials, but in practice I'm distrustful of transferring data between services. Also, of all the data that services collect about their users, often without the users realising it."

Users were worried about revealing too much information about themselves by mistake:

"I'm scared of the concept of a portable profile, so that more people would know more about me. Even though I would decide myself where and what will be transferred, I would at some point click the wrong button, and there goes my profile somewhere again."

It was also suggested that the profile service should keep a detailed log of who had accessed the user data and when. The possibility to remove all personal data from the service was also mentioned as an important requirement.

3.3 Recommendation based service concepts

Our tests of recommendations in connection with different types of media content have revealed both some common and some application specific features and requirements.

In the magazine case, users could access the articles only via the recommendation list. In the free text comments, users suggested introducing search as well as browsing by category:

"It was nice to be able to read articles, but one could choose which one to read if they had been categorised somehow."

Test users also expressed conflicting concerns about a recommendation based service: some worried that they would be faced with information overflow with all the recommendations, whereas others were concerned that they would miss some interesting content if the content was only available through personalized recommendations.

Despite these concerns, 63% of the magazine case test users experienced it to be very or fairly fun to explore articles based on their personal profiles (Figure 5). 61% of the responders found the concept of an article recommendation service to be very or fairly interesting (Figure 6).

Magazine articles and event information are of very different nature. Magazine articles are often read alone for solitary entertainment or to get some general information and new ideas on varied topics, whereas event information is mostly needed for planning future activities.

Finding information on interesting future events is a search task and an event recommendation service clearly competes with other ways of getting information.

Test users mentioned online search, traditional channels such as newspapers and posters, and hints from friends and family as important sources of event information. Also event ticketing agencies and event organisers' web pages were mentioned as important data sources.

Figure 5:
Answers to the question: How fun was it to explore magazine articles based on your profile? (N=103)
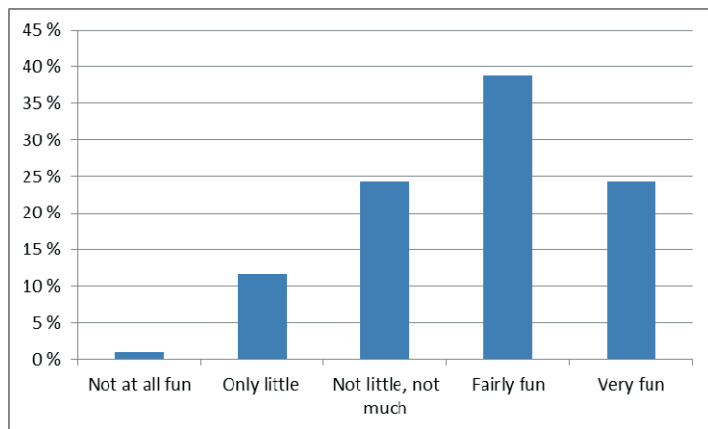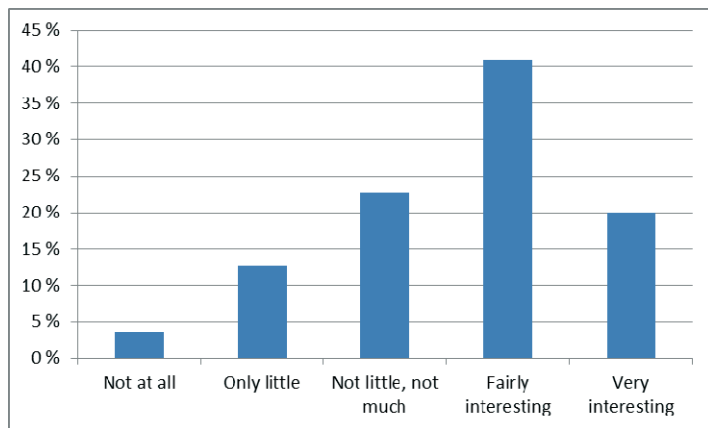

Figure 6:
Answers to the question: How interesting do you find a service that recommends articles to you based on your interests? (N=110)

Even though finding event information has more the nature of a task to be performed than of entertainment, based on the brief experience with the TV application for event recommendations in case II, the test users saw event information as potentially entertaining. If and when high quality, professional videos relating to events were available, it could be relaxing to browse them at home through the TV:

> *"This is actually pretty handy, looks practical and it would actually be pretty handy to search, for example weekend activities."*

Similarly to in the magazine case, event case test users did not want to rely only on recommendations, but expressed the need to be able to search and filter events actively by themselves. In the event case II, there was already a location filter but the users wanted to have more opportunities than that for filtering.

Users proposed additional services such as alerts of future events, reminders of events that the user has expressed interest in, and information about additional services needed when going to an event.

Particularly, once the user has found an interesting event, information about various kinds of additional services and alerts are welcome. Several test users expressed their interest also in being alerted about interesting events in advance. For example, an 18-year old secondary high school student said:

> *"it would be good to have recommendations about concerts well in advance".*

One of the test users wished that only events that match his interests really well are recommended to him. According to him, it is better to show nothing than recommendations that are only loosely related to his interests.

Since going to events is a social activity, an event recommendation application would need to be able to take into consideration the profiles of several persons. The social features of the app were highly appreciated by the test users:

> *"That "friends" view is really good."*

4. Discussion

User data and user profiles are key factors in web based business that offers personalised recommendations and even more so when developing personalised digital services. We have created a prototype of a profile service that lets users create and maintain their profiles for use in different media services. In our tests, users created their profiles by manually registering interests and by importing their data from various social media services.

Deciding about going to an event with friends often requires communication and this should be easy and flexible to arrange.

Easy sharing through Facebook was suggested by one test user in case II. Our test users did not, however, wish everything be open to their friends but wanted to have the opportunity to keep some events private.

A specific requirement relating to events is that the service needs to include information of all events in the geographical area that the service specifies as its coverage. Users appreciate being able to be certain that the data covers all relevant events and that they need not look for event information from additional sources.

In the initial co-creation phase for the Mediatutka application, automatic interest based notifications were discussed. An easy way to control how recommendations and alerts are received was of high priority. As in earlier cases, users were afraid of getting a too narrow view of the world if they followed matters only via personalised recommendations. Some users even questioned the value of profile based recommendations:

> *"I see no added value. Besides, it is extremely limited if, based on the profile, the radio would every day play the same songs."*

In the actual Mediatutka user test, many users welcomed the idea of location based recommendations. Taking the recommendations where the user moves provides a new dimension to recommending content and several test users found it enjoyable. Particularly those persons who use public transport are given the opportunity to explore recommendations on the move via their mobile devices.

> *"Push notification based on my location is a good feature which I used a lot when on the move (bus, metro)."*

> *"The basic idea is good. When on the move in the city, I would be glad to keep on an app that tells me of topical things around me."*

Persons with a tight schedule and/or driving their own car or bicycle appreciate getting their recommendations and alerts just before starting a trip and not during it.

Most user profiles in our tests consisted of 10 to 20 interests. This is a fairly small number, but still, it was enough to give users a practical experience of profile creation and utilisation in connection with recommendations. Profiles could be expanded and enriched with the help of linked data to give enough information for making recommendations. Users welcomed the idea of being able to control their data but they had many

questions and doubts as to whether the data can be controlled and privacy maintained well enough also in practice. Users were afraid that they would by mistake reveal too much information. We could also see that some users wished that the profile would be updated automatically based on their actions. This indicates a willingness to let the service gather their data as long as there is clear benefit to the user.

The barrier to sharing profile data without any connection to the real identity is, of course, lower than sharing with identity, but in practice anonymity is difficult to maintain (Kobsa, 2007; Narayanan and Shmatikov, 2008.). This problem is emphasised by the increased use of mobile devices with location tracking capacities and social networking information. These types of information make anonymity an even harder goal to reach (Toch, Wang and Cranor, 2012). If the user proposed solution of sharing only a selected part of the profile will be implemented, simplicity and ease of use must be key design goals.

Users were doubtful about security particularly when data is shared between services. People's discomfort with being monitored in their web usage became clear also in connection with Facebook: several users had the impression that Facebook is tracking their web usage everywhere where the Facebook login is used and this has caused resentment. In our cases, importing interests and data from Facebook more acceptable than that Facebook would collect information on the person's web usage.

People's lack of trust in the current ways of handling user-related private data is well grounded considering the recent news of widespread data surveillance and data mining activities, not only by advertising companies but also by governments. News like this contributes to increased awareness of problems with online privacy and we can expect growing suspicion towards gathering and sharing of personal information. On the other hand, awareness of privacy issues creates a demand for systems that offer good control of personal data. A user controlled profile is only one part of the big puzzle and the entire life cycle of user data should be made transparent enough to encourage users to share their data for purposes that they regard as valuable.

The data that people provide when creating their profiles is very much determined by the way that the information is asked for. General questions produce general interests. Recommendations can be based on general interests, but in order to be able to make really matching recommendations it is necessary to know specific information about the user's interests. For example, instead of the general interest of movies, the genre of movies that the user prefers or which specific movies represent the user's preferences particularly well, are very useful. The Facebook data obtained contained

much information on specific interests. Contextual information, location in our last case, offered a new dimension to take into account in the recommendations and this was well received by our test users.

The possibility of modifying the profile must be well connected to the services that use the profile. Adding and updating one's profile is most motivating in connection to a real case where the profile is being utilised. In practice, building the portable profile step by step with specific application areas in mind is a practical and feasible way to create a portable, multi-purpose profile.

A limitation of our study is that profile portability could only be partially evaluated by users since in each case the profile was only used in one service and users did not get the true experience of using the same user-controlled profile in different services. Additional research relating to portability should address this issue and should, in particular, focus on the privacy and sharing aspects.

Recommendations can be used with many types of media content and information. Depending on the type of content or information that will be recommended, requirements for the recommendations vary: the requirements on correctness and relevance of the recommendation are particularly high when items deal more with information than entertainment and when the user has a clear idea of what he or she is looking for (Liang, Lai and Ku, 2006).

The interest related data of our cases is only part of the data that is included in a larger vision of user owned data (World Economic Forum, 2013; GOV.UK, 2013) where the aim is to give the access to various kinds of transaction and consumption data as well. If and when these initiatives lead to wide-spread adoption and users are willing to share this data, there will be very rich data also for making media related recommendations. A rich user model is also a prerequisite for the next generation of user-centric recommendation systems, as envisioned by Martin et al. (2011).

The user need for having good control was strong in all our cases. It was clear in relation to the profile creation and also as to how the user can access media content. A related issue is the fear of being overwhelmed which came up in connection to magazine recommendation and notifications. The user experience of recommendation based services depends on how the whole service has been built (Knijnenburg et al., 2012). In the magazine case, the users wanted to have different ways of exploring the available content and not only to access it via their profile even though they also enjoyed this type of access. This is one indication of how the users want to be able to control their media consumption and not to be led by only the profile and recommendation algorithms.

5. Conclusion

We have here presented results of user tests of semantic profiles and semantic recommendation services in four different cases. Our cases have produced a number of findings that can be used as guidelines when developing applications that need user profiles and offer recommendations.

As expected, people are concerned about their privacy and data security and this needs to be addressed very carefully when taking the concept of a portable profile further. It is important to consider profile creation, partial profile sharing and most typical services using the profile as a whole: the profile content should support the intended services and users should feel comfortable about sharing their data. When raw data for profile creation is imported automatically, these aspects need to be taken into consideration in analysing and enriching the data. Presenting the data for the user to review and finalise is one way of giving users good control.

Recommendations are and will remain an important element in various types of media and information services. Users expect accurate recommendations, but accuracy is only one of the aspects that is needed to give a good user experience. Some users are afraid of missing something if a great deal of content is accessible only via recommendations; some are afraid of being overwhelmed by too many recommendations and notifications. Both these fears need to be taken into consideration when designing recommendation based applications.

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