

Services as Materials: Using Mashups for Research

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ABSTRACT

Using existing services as development and research materials can greatly reduce development burdens. However, using mashups and existing services has consequences that go beyond the technical realm. We present our ongoing experience with developing and promoting a mobile mash-up implemented in the mobile web browser: Spotisquare. Spotisquare is a mash-up of the location-based service foursquare and music streaming service Spotify. We discuss advantages and tradeoffs of using existing services and the mobile mash-up process, including interaction model choices, as well as validity and representational issues.

Author Keywords Services as Materials, Materiality, Research in the Large, Wide distribution, Mashups

ACM Classification Keywords H.m Miscellaneous.

General Terms

Experimentation, Human Factors

INTRODUCTION

A few years ago two of the authors were involved in building Push!Music, a mobile application that allowed music tracks to move between users' devices using ad-hoc radio connections [5]. To test this concept we had to not only write the software for a specific platform, but also buy expensive handheld computers with Wi-Fi and loan them to test subjects to use them instead of their regular mp3 players. This meant we could only have about 10 users at a time; achieving 'critical mass' was impossible. Current technology however makes it possible to develop new mobile services by mash-ups of existing components or services. Many of which in addition can be run on a common platform, namely the browser. This negates the need for native apps for every platform; useful, as even the iPhone only has a 3% market share. This offers great possibilities for researchers to quickly implement mobile concepts that take advantage of features such as the user's location and existing social networks with relative ease [7].

We here describe our experiences developing and distributing Spotisquare, a mash-up that lets users share music by adding music playlists to places by combining foursquare, a location-based service (foursquare.com), and

Spotify, a music streaming service (spotify.com). The project aimed to answer questions on people's relationships to places and media, music sharing and as an exploration in social, locative media concepts suitable for wide deployment. However, using existing services as materials in the creation of a research application results in issues beyond technical implementation consequences. We discuss the Spotisquare mash-up process and its distribution, as well as practical tradeoffs and potential validity considerations in using these existing services to generate a new service for research purposes.

EXAMPLE CASE: SPOTISQUARE

The term mash-up generally refers to new applications that are created by combining existing web services using public APIs [6]. While generally thought of as web services, current mobile handsets enable mash-ups to extend beyond just web pages. Mobile phones today come equipped with sensors that previously required custom hardware, and are connected to other devices, as well as vast networks of software resources, social contacts, and other data. Mobile mash-ups can now be used to quickly implement research concepts for mobile consumer devices, take advantage of existing infrastructure, and potentially reach critical mass very quickly by using existing user bases.

To investigate the potential and tradeoffs of mash-ups for research we developed Spotisquare. Our Spotisquare mash-up lets users connect Spotify playlists with foursquare venues. The idea is to allow users to collaboratively create the musical personality of a venue, but also to allow users to find out what music is playing at a venue. The service consists of a mobile web app and a webpage to connect music to places (Fig 1). Rather than just building an interesting service, Spotisquare allows us to explore multiple research goals in parallel. We get to explore locative media on a large scale, in this case focusing on music, building on our previous work including Push!Music [5]. In addition, we also investigate how rapid development and wide distribution of mobile services ('research in the large' [2,3]) affect both the user experience and research results.

Choosing Spotify & Foursquare

Various reasons made foursquare and Spotify viable options as parts of a mash-up to implement our service concept. *Foursquare* is a location-based social network. Its users share their location with others by 'checking-in' to user-created *venues*. While there are a few services similar

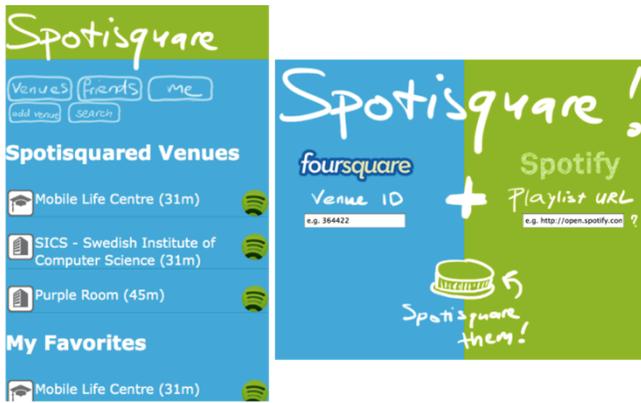


Figure 1. Left: m.spotisquare.com mobile web app. Green icons indicate venues with playlist. Right: connector webpage to connect playlists to venues.

to foursquare, we considered it a good choice for our purposes because of its growing popularity, large number of venues and its feature-rich API. *Spotify* is a popular music streaming service available for both desktop and mobile phones. Users can share and (co-)create playlists of music from Spotify's library. Spotify allows sharing playlists through regular URI links outside of their own application, making it suitable for our mash-up purposes.

Steps for implementation

To achieve Spotisquare, we had to both offer users a way to discover venues with a playlist and for them to connect playlists to venues themselves (Spotisquare *connector*).

Spotisquare is implemented as a mobile web application (m.spotisquare.com) running on virtually any mobile phone with a web browser. The web app is a full Foursquare client, with added functionality that shows 'spotisquared' venues. As in the regular Foursquare app, users can check-in to venues, find out where friends are, create venues, add tips, etc. The added functionality is that the app shows an icon telling users whether or not there is a Spotify playlist connected to a venue (Fig 1, left). If the venue has a playlist, opening the venue will display a link to open the Spotify playlist. The link goes to a web page with a specific MIME-type that is recognized by the phone to open it in the Spotify application on the device.

Connector: Because there is no way to get a Spotify link from mobile Spotify clients, it is not possible to connect a playlist to a venue from a mobile phone. Instead, to connect a venue and a playlist we created a web page where users can enter a Foursquare venue ID and a (ideally collaborative) Spotify playlist URL (Fig 1, right). The pair is stored in a database that is looked up when the info about a venue is loaded in the Spotisquare mobile web app.

The web app is written in pure HTML/CSS/Javascript using the jQuery library (jquery.com). Data is requested and rendered by modifying the web page elements, using some of the built-in graphical effects from jQuery such as blending. Communicating with Foursquare is done using XMLHttpRequest (XHR) in Javascript. Using XHR, data

cannot be requested from any other server than the server the script is loaded. Thus the web client cannot communicate directly with the Foursquare APIs. Instead, API calls are relayed through our own server. The benefit of this however is that we can add information to the data received from the Foursquare server. In our case we add information about Spotify playlists for each venue with an associated Spotify playlist.

Promotion, resulting usage and 'large scale'

Spotisquare was released to the public using a 'branded' dedicated website (www.spotisquare.com). It was promoted using a dedicated Twitter account, our personal Twitter accounts and Facebook posts. A Spotisquare link was re-tweeted by the official Foursquare twitter account (>60k followers at that time). It was also featured on the official third party app page on foursquare.com. Four weeks after the release the mobile web app had been tried by 1008 unique Foursquare accounts, generating in average 12 API calls (i.e. users on average clicked on 12 'pages' within the app). 75 venue/playlist connections had been made on the spotisquare.com website. The Spotisquare website was visited 5787 times during this period. Visitor numbers declined over time; over a half year later the number of 'spotisquared' venues with a playlist had reached (only) 120 and slightly over 1600 users had tried the mobile app. While these numbers would be large in a small trial, for a wide-scale deployment it shows that while thousands of people found the site interesting enough to 'check out', only one fifth of them decided to actually try the web app, and only a limited set of them added content in the form of a spotisquared venue. We do not know whether this is caused by particularities of our mashup, or can be generalized. A number of factors however could have played a role. While 'consuming' a local playlist would not be very time consuming, actually adding a playlist did require some skill and effort. Having to go to the regular Spotisquare website and using the 'connector' may have been confusing. In addition, adding a playlist does take some thought (and perhaps, inspiration) on which venue and music to connect. Using the service to a complete extent would also require a paid Spotify account, a foursquare account, and the technical ability to pull links out of both to connect a playlist URI and a venue ID. It is also not unlikely people were just 'checking out' the Spotisquare concept, rather than actually wanting to produce or consume content themselves.

Similarly, while we know that the top categories of 'spotisquared' venues (foursquare venues are categorized in pre-defined types by end-users) were offices (29%), homes (16%), and schools/colleges/universities (8%), nightlife (8%), shops (8%), 'other' (8%), arts & entertainment (7%) and homes (7%), we do not know whether this is due to the specifics of our mashup and the demographics of the people trying out the service. While we can hypothesize, we still need small scale, qualitative investigation of why this is the case. Rather than focusing on such and other locative media

aspects, we here would like to discuss a number of issues that arise when using existing services for research.

(MOBILE) MASH-UPS & SERVICES AS MATERIALS

Generally, research on mash-ups has focused on tools to enable end-users or developers to more easily develop their own applications or combine data from different services [e.g. 1,8,12]. Using mashups for research purposes however also means using existing services as materials. This materiality goes beyond just the technical aspects of the mashup process. Recently, ways to allow developers to better understand their ‘immaterial materials’ [9,11]. A broader discussion has also been emerging surrounding the materiality of digital media and information technology [4] and the arguable inseparability between the technical and the social [9]. Dourish and Mazmanian [4] for example in the context of simulation techniques also discuss how the new availability of such materials open up new possibilities for researchers. We argue a discussion is necessary within the community surrounding not only the technical issues in developing mashups, but also the social and organizational issues surrounding choosing existing platforms and services for research projects. A number of issues stood out during our experiences with Spotsquare:

Functionality Using existing services and their APIs results in a number of tradeoffs. While implementation might be easier (although issues can certainly occur [8]), there may be a tension between desired functionality and the features of an API. In addition, API changes have to be monitored, and service downtime will also affect your service. Services are not nice Lego bricks that fit together, you need to ‘tape them together’, and the resulting (web) mashup might not offer the ideal user experience a researcher or developer might be after. In our case for example, while Spotsquare could be used to check in to foursquare, this did mean that users would have to switch from their regular app to our mobile web app. Listening to a Spotsquare playlist in addition required opening Spotify, an extra step in finding out which music had been attached to a place.

Content limitations Using other services also can both extend and limit the available content. While the foursquare API and music URI allowed us to benefit from the content already available, there are limits to the content users can add. Not only might a desired song or artist be missing in Spotify, or a location absent from the foursquare database, the conceptual models used by a service might not match. Users adding their own sounds and music would not be possible in our case, and there are certain norms to which foursquare venues ‘should’ or ‘should not’ exist.

Existing user bases Content issues stood out mostly when conducting a small scale evaluation in the form of a small-scale ‘music walk’ organized by a local library. Locals had been asked to prepare a playlist for a number of locations (analyzed separately), after which two music walks were conducted with library personnel and local citizens

arguably not part of the core demographic of foursquare and Spotify users. Explicitly branding a mashup as consisting of certain known services, can also lead to the new service being understood better by people who know the existing services. Using existing services might also require subscriptions, or at least user accounts to (all) services involved. Our users needed both a foursquare account and a paid Spotify account as using the mobile Spotify client requires such an account. At time of release, foursquare was available worldwide, but in the early adopter phase, with most users being male. In addition, Spotify was only available in a limited set of countries. All of these factors may lead to a very specific demographic trying out the service and potentially skewed research results.

Service as a social and organizational material While we did not experience any pushback and instead got positive reactions and even active support (e.g. in terms of promotion) from the services being mashed up, this might not always be the case. The businesses behind services used in a mashup may have their own goals not necessarily matching those of the researchers and developers. Building a research app on top of their services, does to a certain extent make you dependent on their strategies and decisions. Businesses might change their direction or might limit access to their API’s and data. In turn, people might also (accidentally or not) get the perception that the business behind services endorse or have even built the mashup, perhaps resulting in a certain responsibility in providing a good user experience.

Branding Using two relatively well-known and ‘hot’ services, also meant we garnered some attention on social media from ‘tech aficionados’. Comments were made on the ‘hype’ quality of the service, which was useful in spreading the service via social media. Unexpectedly we were for example also asked whether we wanted to participate in a startup event and explain our business plan. This may also lead to researchers being perceived as ‘fanboys’ or as promoting a specific service, something that has to be considered when presenting a service in a research context. Using services such as Twitter or Facebook for various projects, or building on top of them is increasing common practice in research projects. Some of the issues above might have been amplified by explicitly branding Spotsquare as a mashup of two existing services, however even when using services as ‘invisible infrastructure’ it is worth for researchers to think about such issues and their strategies dealing with them. Interestingly, while promotion for the service appeared successful in garnering attention for the project, it did not result in large-scale data; only 120 playlists were added. While the effort invested on our part in promoting the service and getting users was smaller than many recruitment efforts for in-depth qualitative studies, researchers do have to consider that while their widely distributed mashup may garner attention, they might not always collect the large datasets they might expect. The

mashup was very useful and well-worth the effort for us in exploring the concept of local music and gaining a deeper understanding of the design space. It also provided us with very useful experiences in public releases and opened various doors due to the attention for the concept. However, for a deeper understanding of locative media production and consumption, users motivations and local experiences, follow-up studies are still necessary.

DISCUSSION & CONCLUSION

Our experience with Spotisquare shows that by minor efforts combining two popular services and some minimal promotion investment, it is possible to investigate usage ‘in the wild’ in ways impossible for earlier research concepts such as our Push!Music [5]. Using existing APIs and services however does result in tradeoffs, limiting functionality to what APIs allow and for example necessitating users to use a separate webpage to connect playlists to places. Long-term usage by ‘participants’, rather than just trying out a service is not a guarantee. Nor is it always possible to identify who participants have been and collect data that goes beyond the surface of created content. The wide deployment has resulted in interesting insights on building on existing services, but will necessitate additional study efforts to gain more insight in locative media aspects, which are currently ongoing. The challenge for researchers is now to deal with such tradeoffs and to pick and mix from mobile web services and social networks without sacrificing research goals.

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