StallTalk: Graffiti, Toilets, and Anonymous Location Based Micro Blogging

Jonathan Friedman
2120 Campus Drive
Evanston, IL 60208
Northwestern University
friedmanj@u.northwestern.edu

Michael S. Horn
2120 Campus Drive
Evanston, IL 60208
Northwestern University
michael-horn@northwestern.edu

CHI'12, May 5–10, 2012, Austin, Texas, USA.

Abstract
The ways in which we leave graffiti have not changed much in thousands of years. Humans have felt the need to anonymously leave messages to one another for centuries. In this paper, we introduce StallTalk (www.stalltalk.info), an anonymous location-based micro blogging website that uses QR codes posted in bathroom stalls. StallTalk allows users to leave digital graffiti on bathroom walls without actually causing permanent damage. Users scan the QR codes, which are unique to each stall, and write short messages to each other. We deployed StallTalk in over 500 locations and have had almost 9,000 unique visitors to our website.

Author Keywords
Location-based micro blog; graffiti; QR codes; toilets; bathrooms

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Figure 1. A QR code that links to Stallatalk (Scan it!)

Introduction: Sit Down, This Might Take A While

Graffiti has existed as a medium to anonymously express thoughts and emotions for a long time, from pre-historic cave paintings and pictographs, to spray paint and marker pens commonly used today. Graffiti is used to convey social and political commentary, simple words of thought, marking territory etc; while the tools have changed over time, it seems the underlying appeal of graffiti remains unchanged [2].

The act of anonymous writing on bathroom walls is a psychological release for people, allowing them to critique what they see around them without being held accountable [7]. This phenomenon has taken hold in the virtual world as well—4chan, known primarily as an anonymous group, and Reddit, which has formal rules enforcing anonymity, have become some of the largest communities on the Internet [8]. Yet despite the advance of anonymous digital communities, humans have still been constrained to leaving graffiti in the physical world by indelibly marking an object or surface. Some would argue that this process is inherent to graffiti, i.e. "tagging" a building is to claim it as your own. Yet, we believe that the traditional model of graffiti, specifically bathroom graffiti, can be turned on its head by bringing the bathroom stall into the digital era. Projects such as Sms Slingshot [13], MobiSpray [11], and DigiGraff [9] have begun to transfer graffiti into the digital realm, but none have tested digital graffiti on a large scale. We created StallTalk, a location-based micro blogging service, to explore the combination of bathroom humor, micro blogging, and digital graffiti in the bathroom space.

StallTalk was started at Northwestern University by a group of bathroom experts and avid toilet users, but quickly gained wider attention, making the front page of the popular technology website Hacker News in June 2012. Currently, StallTalk has had almost 9,000 unique visitors and has active users from both the United States and Europe.

Although tongue-and-cheek in nature, we believe that we are the first to advance the idea of a location-based micro blog. Gaonkar [6] has defined the "micro blog" as media that takes advantage of phone based sensors. Other commercial organizations, such as Foursquare or BriteKite [5] and research projects such as GeoLife2.0 [14], have proposed ideas of location-based social networks as well, but we argue that these systems are inherently different than ours. They have what we call an "Internet to location mapping" (which means that the user self reports, or opts into a location on the Internet). Our system, which uses QR codes to map the physical world to the Internet, does not allow the user to post on the website unless he or she is physically at the location of our QR code. We are revisiting the traditional model of the World Wide Web as a location-less channel of distribution (as the infamous web activist Julian Assange[1] describes) in a new way with StallTalk.

How It Works: System Biology

The StallTalk platform explores the concept of creating a link from the physical to the digital world. We printed over 500 QR codes, each with a unique ID number, and posted them in bathroom stalls around the Chicagoland area. The highest concentration of stickers is on the Northwestern University campus, but there are also stickers randomly posted around the Florida State

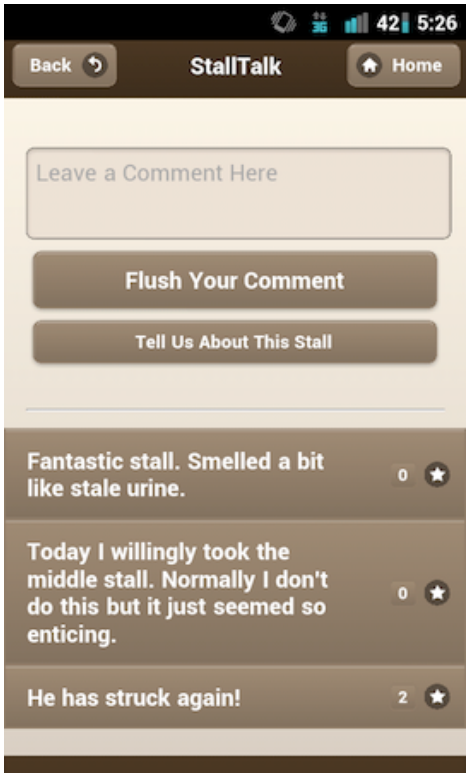

Figure 3. A view from the mobile version of a stall and some example posts.

University Campus, as well as several airports, restaurants, and bars.

When users scan the QR code in a bathroom, it takes them to a link (e.g. www.stalltalk.info/poopstations/15286) that is a unique "forum" for a specific stall. Users cannot gain access to that forum by any other means. We do several checks on the size of the screen and the user agent to send the browser to a separate, different desktop site if the user is not on a mobile device (where they cannot post). There is nothing preventing people from entering random numbers in the URL from a mobile device and spamming the forums, but we have not seen this behavior so far.

Stickers

Each sticker was printed as a 3x3 inch black and white QR code with no logo or branding of any kind. We hypothesized that the constant stare of a blank sticker would entice people in the bathroom to scan the stickers without potentially knowing what the system was. We felt that many people have become desensitized to embellished QR-codes, which tend to be advertisements. Many users scanned the system, and posted questions asking other users what the system was used for. We will elaborate on this behavior in the next section.

Site Features and Design

The users are able to see the "Top Comments" on the website, as ranked by the number of likes that a specific post received. Users are also able to view the most recent comments on the forum worldwide by going to the "Recent Posts" section. The desktop version of the website has a utility that allows users to

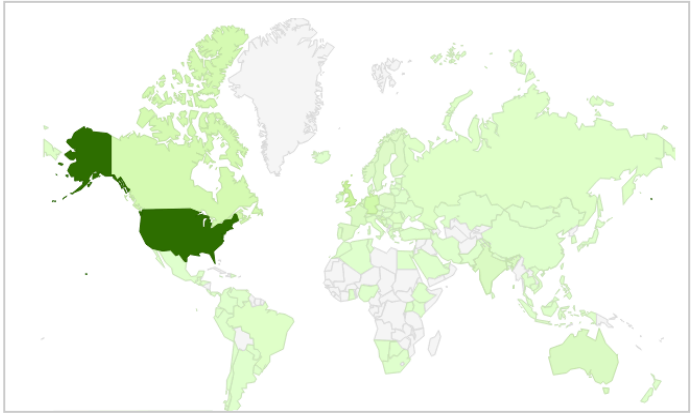

Figure 2. Density map of users by location (Darker is more dense)

print out their own stickers. Each time the utility is used, the user receives 5 new stickers. We place no limit on the number of times a user can post (although we do checks on the number of posts in a given time period to prevent spamming).

Over the several months that we worked on the project, we built the StallTalk system twice. Our initial test version was built in php, jQuery mobile, and mysql. When we realized that the system was becoming more popular than we expected, we switched to the Ruby on Rails framework (with PostgreSQL) using Twitter Bootstrap for the desktop design, and jQuery mobile for the mobile design.

StallTalk in Use

In this section we describe how StallTalk has been used since its launch. We will first start with a more quantified description of our data, and then move into a qualitative evaluation of the posts. After reviewing the log data, we found that over 140 stalls are actively

"Since writing on bathroom walls is not done for critical acclaim, nor financial rewards, it is the purest form of art." – Anonymous StallTalk User

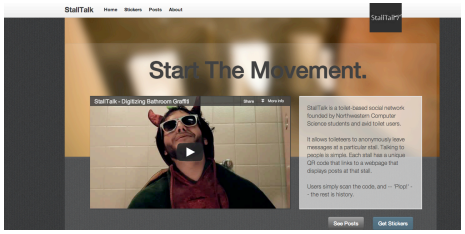

Figure 4. The StallTalk desktop site.

used. There have been over 700 posts from users over the lifetime of the project, which has run over 8 months to date. The current website will only show around 300 posts, as some of the posts from the older version of the website have not been migrated. We found an average of 39 likes per post. By location, 57% of our traffic is from the United States, with about 7% coming from the United Kingdom. It proved difficult to estimate the typical lifespan of a forum, as we could not prove if a sticker was removed or users had stopped posting because they lost interest. Many times, users would put new stickers in the location of an old sticker that had been removed, further complicating our stall lifespan estimates.

Top Posts

Currently, the top comment is "Orlando International Airport" with over 290 likes. The second most popular post is "I just pooped unobtainanium" with over 190 likes. We have no hypothesis as to why the top post is so popular other than that the authors have no sense of humor.

Ego-Less Graffiti

As a general trend, it was interesting to see that most of the posts were not "Ego-based graffiti"[12] (they were not the traditional "tags" that one would see on a normal bathroom stall). There were only 7 "X was here posts" in the entire dataset. This supports the hypothesis that one StallTalk user suggested: "*Since writing on bathroom walls is not done for critical acclaim, nor financial rewards, it is the purest form of art.*" An interesting branch of further research would be to compare the physical graffiti at each stall to the digital graffiti on each StallTalk forum to see if they follow this type of divergence.

Post Classifications

We classified the posts as belonging to one or more groups that we felt were significant. The groups are shown in Table 1. Many of the posts belonged to several of these categories, but we noticed that a large number posts treated the bathroom stall as a confessional. This is in line with Bernstein's research on 4chan, where 19% of posts were either sharing personal information or asking questions [3].

We also found that many users simply posted "Hi" or asked the other users what the forum was about. Posts such as "Hey!", "Waddup", "This is awesome!", and "Wtf is this?" were very common on the board, and were classified as greetings.

Classification	**Count**
Advice	2
Blog-like	21
Greetings	24
References to current events	25
Non-English	29
Location specific posts	33
Direct communication	53
Confessional posts	121
Dirty jokes	157

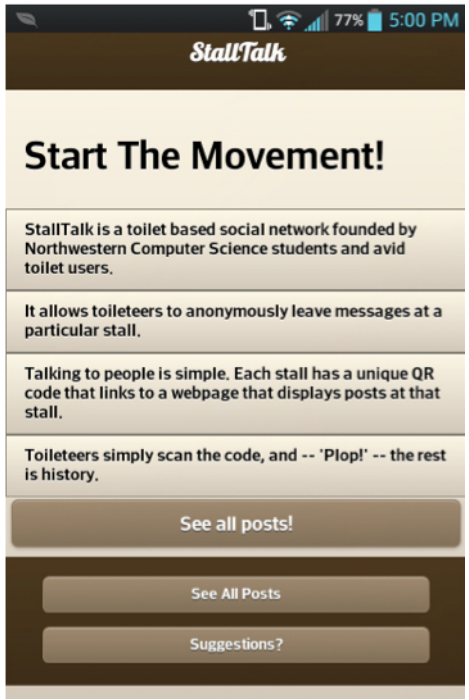

Figure 5. The StallTalk mobile homepage

Table 1. Types of Posts

Blog-Like Posts
Blog-like posts, as we define them, were submitted by the same person (we believe) about similar topics. There was no simple way for us to verify that these posts were actually posted by the same person given the anonymous data we collected, but we felt the writing style remained the same throughout our groupings. Several individuals kept a log of the quality of bathrooms that he visited and rated them. Some of these "reviews" were actually surprisingly thorough: "Bathroom a little cramped, fumes linger in stalls for a little too long. TP pretty rough on the bum. Otherwise nice, quick, clean poo and good height for the toilet. 5/10." Some users rated bathrooms on a one to ten scale, while others used a "A+", "A", "A-", etc scale.

Location Specific Posts
Many of the location specific posts were also part of the blog-like posts, as many of the latter would talk about the specific traits of the location or bathroom. Other location specific posts would talk about the building that the bathroom was in or the proximity of the bathroom to other areas of the building (for example, how close the bathroom was to study rooms in a library, and if people could hear what was happening in the bathroom from outside).

Direct Communication With Other Users
Direct communication between users consisted of four types: answering questions about what StallTalk is, inside jokes between friends, story games, and the Catpain Poop Log Feud (which we will talk about in its own section). Many users came to a stall, which had no prior posts on it, and simply asked what the QR code did. It is not uncommon for other users to answer with a description of what one would use the site for. Other times, users would try to change the subject of a specific stall and make the content less about bathroom humor: "*Just because you all are sitting on a toilet right now does not mean you have to talk about poop. Lets get some creativity up in this loaf."* Largely, these posts where unsuccessful.

The most interesting form of direct communication is a game that appeared on the site. It appears to be a story game where different users write different parts of the stories. A good example is this post: "*Ok. Hummingbirds were fighting over the grape. One accidently pecks the other in the heart and gets a shovel to bury the evidence... Your turn. Continue the story with the following: a needle thread and helium balloon.*" The story game only consisted of a few posts by different individuals, but showed that users were interested in interacting with others in an anonymous way that went beyond jokes.

Some users who spoke German and Dutch downloaded stickers from the website and began using the site with their roommates and friends. These two groups of users had the most direct contact with each other as they went out of their way to introduce the site to their friend groups and homes. Although none of our team speaks German or Dutch, it seems the content was similar in its crudeness to the posts in English: "*Eine Auszeit vom lernen auf der Toilette. UniBib Köln,"* which roughly translates to "*A break from learning on the toilet*" in English.

Confessional Posts

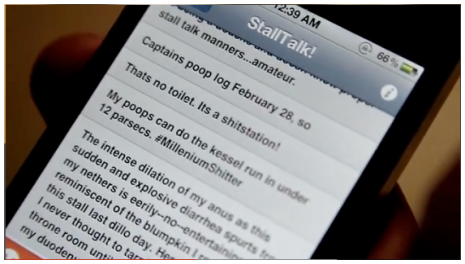

Figure 6. The Old StallTalk system.

Confessional posts were the most surprising type of post that we found on StallTalk. Most of the confessions were a pseudo-humorous type of post where someone would reveal a disgusting fact about their bathroom experience. Some less controversial examples are: "*I have the most bizarre and nostalgic relationship with the smell of this bathroom*", "*Ugh Ive [sic] been holding this in way too long, and now its 10pm. Where did my life go?*", and "*Today I willingly took the middle stall. Normally I don't do this but it just seemed so enticing*". All of these examples are confessions about the user's experience with the bathroom or something that is bathroom related. Many of these types of confessions are not incredibly surprising given the nature of StallTalk. Yet, what did surprise us were confessions about non-bathroom related material. For example, the post "*So I just cheated the [] out of an Econ final. Had to tell someone....*" is not related to bathroom material at all, but personal events.

Dirty Jokes

Dirty jokes were the most prevalent type of post that we encountered on StallTalk. The jokes ranged from typical scatological humor to more subtle "themed" jokes. Several users started making movie and music references that were mixed with poop-based humor. For example, Star Wars was apparently popular among the users. Other references were to the Terminator series, Narnia, Don McLean (Bye, Bye Miss American Pie…), Ewan McGregor, Bill Clinton, Stanley Kubrick (Poopbrick), Batman, Whitney Houston, and Shakespeare. We will leave it up to the reader to make up his or her own dirty jokes on these subjects.

Captain Poop and His Arch Nemesis

One of the largest interactions between two (or more) individuals were the blog posts by an anonymous user who called himself "Captain Poop" and his Nemesis (The Nemesis has an expletive in his name, so we will refer to him as Captain Poop Nemesis for the purposes of this paper). The feud started when Captain Poop started leaving daily posts about the daily happenings on a fictional spaceship. "*Captains poop log: stall date 20120501. […]"* Many of his posts were centered on the daily happenings of the ship. For example, the Captain becomes "clogged up" and the first mate is forced to take over duty. The last post of this nature ends with monsters attacking and the entire crew is lost.

Number of Visits	Number of People
7	64
8	49
9-14	150
15-25	97
26-50	83
51-100	67
101-200	12

Table 2. The distribution of StallTalk users.

After Captain Poop posted several log entries to StallTalk, his Nemesis quickly established himself in a new forum: "*Hello all! And welcome to this prestigious forum! My name is captain poop [Nemesis] and I will be the director of conversations!*" Shortly after, Captain Poop Nemesis started insulting the "real" Captain Poop, as well as started doing diary entries similar to those of Captain Poop's. Nemesis was able to post a couple of logs before the "real" Captain Poop noticed. This

Figure 7. A passionate StallTalk user (from our Youtube video)

created a small feud on the StallTalk forums, where they traded pot shots and insults. Captain Poop Nemesis even accused Captain Poop of stealing his idea and plagiarizing his content. For unknown reasons, both users stopped posting after some time, and the feud dissolved.

The Nitty Gritty Of StallTalk: Practical Considerations

There were many practical considerations that we had to take into account when designing StallTalk so that it would ultimately be successful. Some of these decisions were factors that unintentionally led to the decreasing activity of StallTalk as the project continued.

Our first design consideration was a compromise; we knew that we wanted to explore location-based micro blogs. A central principle of this type of interaction is the direction of its logical mapping: from the physical world to the digital one. This meant that we needed to install some sort of hardware at each location that could serve a real world marker into the digital realm. We could not use a check-in system because the mappings of these systems are from the digital world to the physical.

On the other hand, we wanted to test our system on a large scale. This meant that cost was a significant factor in choosing the physical marker to use. We briefly considered using several technologies for our markers: Near Field Communication (NFC), Bar Codes, QR Codes, and traditional wireless systems. More traditional wireless systems were immediately ruled out due to costs, as were NFC systems (we also felt that NFC technology was not pervasive enough in cell phones currently). We ended up choosing QR codes over bar codes both because we felt that QR codes had a stronger affordance for phone scanning than bar codes, and that curious users were more likely to scan a QR code in a bathroom stall than a barcode in a bathroom stall.

We also found that QR codes were the most cost effective option in terms of mass production. The low cost of QR code stickers–8 cents per 3X3 inch sticker–enabled us to test StallTalk on a large scale. Making the QR codes printable at home (made available through our website) in addition to the ones that we distributed allowed StallTalk to tap into network effects.

Cleaning Staff

An unexpected problem arose when we started testing StallTalk around the Chicagoland area: cleaning staff worked very hard to remove the stickers if they were placed in obvious places. This meant that the lifetime of an individual stall was normally relatively short lived. People we gave stickers to would continue to repost the stickers in stalls, but that meant that the scanner would take the user to a different forum than was linked to at that location previously.

Upon noticing that the Northwestern cleaning staff was removing our stickers, we contacted the university to try to gain a special exception for our stickers. By this time, StallTalk had gained so much popularity on campus that students started posting their own stickers in private residences, and in places where it was accepted for students to post bulletins in stalls.

For future research, we investigated the idea of using static cling stickers so that cleaning staff could easily remove our stickers (or potentially even leave our stickers on the wall since they would see that they are easily removable). Although the cost is an important

factor in enabling the success of our project, we found that switching to static cling paper would not significantly raise the price. Furthermore, while users can print stickers from our website, it seems that only the stickers that we printed and distributed to volunteers appeared in public places. Our next printing will use static cling instead of stickers (although we fear that people will steal the stickers and take them home).

Scaling StallTalk

As noted before, we initially tried to keep track of the location of each sticker by hand. As passionate StallTalk users volunteered to help us "Start The Movement" by putting stickers in their homes and distributing stickers for us, we found that keeping track of locations by hand was impossible. We solved this problem of scale by adding a "Poop and Tell" section to our mobile site. This allowed the users to optionally tell us where the stall was located. Currently, 12 users have chosen to indicate the location of our stickers. Through this method, we were able to know that our German users were located in the city of Cologne.

Gender Bias

As a final consideration, the StallTalk team, and most of our volunteers were male. This had a significant impact on the locations of where we could place the stickers. Although we were able to put a small amount of stickers in female bathrooms (under 10), the majority of stickers were placed in male bathrooms. This means that most of our users were male (we assume). Although the novelty of a toilet based social network plays to male immaturity, we would have liked to see how the social network played out with a more evenly distributed audience. This is a potential avenue for further study.

Some Serious Nincompoopery

Although StallTalk is comical in nature, we believe that we are the first to introduce the concept of a location-based micro blog. There are several other systems that are similar, but are different in important ways. For example, Foursquare, BriteKite, and other companies are all trying to create "location-based" social networks. We do not argue that these are not location-based, but rather that the logical mapping of these networks are different than ours. First, these software programs are opt-in, which means you report your location status to the program by searching a list of nearby locations found by GPS. This means that the location is software defined and that the logical mapping of the program is the digital world to real world. In StallTalk, the user does not report their location to the system. The QR code stores all the data that the system needs to correctly link the user to the correct forum. This means that the mapping is direct from the physical world to the digital world. (Although the user can optionally report their semantic location to us though the system that we described in the previous section, this data is for research purposes and not part of the actual system.)

We believe that this distinction is very important for several reasons. In practice, it does not allow users to switch between forums unless they physically go to the location of the sticker and scan it (Although there is nothing preventing a user from scanning a code once and saving the URL, we found that this behavior was minimal from the usage patterns we saw). This practical consideration also has perceived effects on the users. When the user is forced to associate the physical location of the sticker with the digital representation of the website, then they perceive the website differently

than if there was no physical association because the nature of the interaction is different. In a traditional website, the user starts in the digital world, and ends in the digital world. With StallTalk, the user starts interacting with the system in the physical world, making the website appear to be "located" at the stall itself. We are bridging the digital location metaphor of the Internet with the physical world.

Another important distinction between our system and others is how we treat users. Because other location-based systems are commercial (such as foursquare), it is not in their interest to keep users anonymous. StallTalk on the other hand, does not force users to create or have an account to post—anyone can post any number of times. This creates a unique environment that other systems cannot replicate due to the fact they are not anonymous systems. StallTalk allows users to express ideas or opinions that are not typically posted on mainstream location based social networks because they are afraid of what their peers or society will think of them [7]. This hypothesis is consistent with our data.

The closest thing that we can find to our definition of a location based micro blog is the StickyBits system. Although the system did allow users to leave comments at a specific location, it also allowed for audio clips and other media tied to a specific location that does not fit the traditional definition of a micro blog such as Twitter. We did learn an important lesson from the StickyBits system, as it failed as a commercial venture, and is no longer in existence. StickyBits used a bar code sticker, and also allowed the stickers to be placed anywhere. This confused users, as bar codes don't have the affordance that they should be scanned with a phone. Furthermore, users did not want to scan random bar codes around the world—they needed, in our opinion, more guidance in terms of what type of content should be posted.

Conclusion

StallTalk pushes the limits in terms of what we consider graffiti and what we consider a social network. The authors believe that there are several more serious applications that can be studied from the technology behind StallTalk—location-based communities where the mapping is from the physical world to the digital one and users cannot opt into a location. These can be centered on any location such as a coffee shop, restaurant, or tourist destination. These communities could exist as a way for people who frequent specific places to interact with each other in a novel way.

Instead of focusing on users who frequent a specific place, we could also use the technology to focus on places that are high traffic and public. These could be doctors' offices waiting rooms, bus and train stations, taxis, or movie theaters. In this scenario, the focus is less on communities and more on continuing the digital graffiti concept that we introduced with StallTalk.

StallTalk is a novel, but essential experiment that combines physical location with digital interaction. In its quest for real world significance, Facebook recently published a video that illuminates how social networks are like chairs, as both chairs and Facebook connect people [4]. Whether it is through sharing innovative ideas, spontaneous anecdotes, or bathroom jokes, the rapid expansion of social media is a manifestation of the human desire to be part of something greater. The Facebook analogy compares a digital creation to a real world object, but is taken one step further by StallTalk, falling somewhere between the chair and Facebook on

the spectrum of physicality. Capitalizing on humanity's desire to explore new avenues of communication, StallTalk helps connect people using both physical and digital means.

Acknowledgements

We thank all the passionate StallTalkians, and all publications support and staff, who wrote and provided helpful comments on previous versions of this document. We would like to especially thank Daniel Daks, Taylor Culbertson, Colton Dillion, and Kashif Malik for their toilet humor, sticker distribution, and helping to create the StallTalk video.

References

[1] Assange. A Cryptographic Call to Arms http://cryptome.org/2012/12/assange-crypto-arms.htm. Accessed: January 4, 2013.

[2] Baird, J. A., & Taylor, C. (eds.). *Ancient graffiti in context*. Routledge, 2010.

[3] Bernstein, M., Monroy-Hernández, A., Harry, D., André, P., Panovich, K., & Vargas, G. (2011). *International AAAI Conference on Weblogs and Social Media*.

[4] Facebook. The Things That Connect Us. http://www.youtube.com/watch?v=c7SjvLceXgU Accessed: January 5, 2013

[5] Foursquare. https://foursquare.com/. Accessed: January 4, 2013.

[6] Gonkar, S., li, J., Choudhury, R.R., Cox, L., & Schmidt, A. Micro-Blog: Sharing and Querying Content Through Mobile Phones and Social Participation. In *Proc. MobiSys'08*. ACM, 2008.

[7] Gonos, G., Mulkern, V., & Poushinsky, N. (1976). Anonymous Expression: A Structural View of Graffiti. *The Journal of American Folklore*, 89, 351, pp. 40-48

[8] Manjoo. The Great and Powerful Reddit. http://www.slate.com/articles/technology/technology/2012/01/reddit_how_the_site_went_from_a_second_tier_aggregator_to_the_web_s_unstoppable_force_.html. Accessed: January 4, 2013.

[9] McGookin, D., Brewster, S., & Christov, G. "DigiGraff: considering graffiti as a location based social network." In *Proc. CHI'2012*. ACM, 2012.

[10] Sausman, J. Sharma, K., Samoylov, A., Regli, S., Tremoulet, P., Stibler, K. (2012). Digital Graffiti: An Augmented Reality Solution for Environment Marking. In V.G. Duffy (ed.) *Advances in Human Aspects of Healthcare.*

[11] Scheible, J., & Ojala, T. MobiSpray: mobile phone as virtual spray can for painting BIG anytime anywhere on anything. *Leonardo 42*, 4 (2009): 332-341.

[12] Taylor, M. Does Urban Art Deter Graffiti Proliferation? – *Urban Art and Graffiti Papers from the British Criminology Conference,* 9: (2009) pp. 57-70.

[13] Vr/Urban http://www.vrurban.org/smslingshot.html. Accessed: January 3, 2013.

[14] Zheng, Y., Chen, Y., Xie, X., & Ma, W-Y. GeoLife2.0: A Location-Based Social Networking Service. In *Proc. Mobile Data Management: Systems, Services, and Middleware*, IEEE (2009).