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## Digital social interactions in the city: Reflecting on location based social media.

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### 1. Introduction

In this paper we discuss how digital interactions are increasingly interwoven with spaces and places in urban settings and how such interactions are mediated by and in turn shape the technologies that facilitate them. We will focus on the understanding of interactions using location based social media (particularly Foursquare) as a way to reflect on issues of technological support to human activities, and on the relationship between code, digital agency and the physical world.

Whether purposely built for mobile devices and with a focus on location (e.g. Foursquare; Swarm), or simply features of other social media platforms that rely on location data such as Facebook Places, various location based social networks (LBSN) increasingly mediate social and interpersonal interactions in urban settings. Essential technological infrastructure that enables such interaction is the possibility of linking data to particular places by means of devices capable of detecting their own location by means of Global Positioning System (GPS) or other mechanisms. On the basis of such infrastructure, however, location based social media user activities take different forms: from “checking-in” (e.g. users register their presence at a particular venue), to linking location data to digital content to be then shared on social media, to gameplay associated with occupying a location and performing certain activities there. The form of sharing these activities socially with contacts and other fellow users is also constrained by the platform: e.g. for example a photograph with location information; or presence at a location with associated content; or a map of movements and check-ins, etc.

Such practices become coded into the system, representing both the log and content of social interactions, as well as the location to which they relate. Therefore a digital “cloud” of social interactions becomes embedded into the physical reality of a city, of its neighbourhoods, public places, cafés, transportation hubs and any other locations identified by social media users (by user-initiated “check-ins” or by the content that generated, such as photographs or textual recommendations and tips), and by the tools they use (for example, through automatic geo-tagging). Conversely, the code determining a platform’s interaction and functionality is continuously changed to reflect user activities and feedback, and to implement design decisions on how location based social media services work.

Among others, two sets of issues surrounding this topic are emerging that we wish to investigate further: firstly, examining how such localised interactions in physical spaces are triggering and feeding back into the algorithms and infrastructures provided by the software - how are various location-based social media platforms framing people's perceptions and identifications of locations? How is code both facilitating and scaffolding a set of social interactions relating to various spatial configurations in physical spaces?

Secondly, we are interested in the *rematerialisation* of such cloud of interactions in the physical world: how are physical spaces and places affected by their digital counterparts and by the activities that people conduct on LBSN? There are already occurrences of the rematerialisation of digital presence and interactions in the physical world: for example, venue owners displaying badges on the premises that tell

customers about their online presence (on platforms such as Tripadvisor, Booking.com, etc.). Foursquare includes “specials” (discounts and freebies) that business owners can use for attracting customers. In Europe, there is relatively little awareness regarding Foursquare and few businesses engage with it (and it is not yet clear if the latest version of the software will have replaced these with advertising). However, these are limited representations. Could LBSN interactions in relation to a venue be made somehow more perceivable and/or tangible in the physical world by the way in which certain environments are designed? Could the presence and interactions that are encoded in LBSN software shape more distinctively the physicality and materiality of places?

Overall, it is an open question whether this would be useful or meaningful, and whether it could have implications beyond technology design: for example, should new approaches to urban planning and environmental design become concerned with accommodating and facilitating these social interactions as they do so by supporting in-presence, analogue ones?

In the following sections we will attempt to define and discuss these issues surrounding LBSN activities, drawing both from human-computer interaction literature on physical/digital interactions using location based social media and from empirical studies of location based social media use that we have conducted in two cities.

## *2. Location-based social media: identifying interactions*

Since the introduction of LBSN commercial platforms and services in the mid-2000s, a number of studies have been conducted within Human-Computer Interaction and social computing examining how these are used by various groups of users (Eagle and Pentland, 2005; Barkhuus et al., 2008). One of the main focuses of such work (and arguably one of the most popular LBSN worldwide) has been Foursquare: a mobile app launched to the public in 2009, Foursquare counts over 50 million registered users worldwide, with approximately 50% of them based within the United States<sup>1</sup>.

While the core interaction offered by the service remains to this day that of linking digital activities to a particular place or commercial venue, the Foursquare layout and the way it operates have changed significantly since its public launch. Users can register their presence at a venue by checking in. Photographs could also be uploaded when doing so, and comments and tips added to a particular venue. Initially, Foursquare incorporated a game-like element, where users would gain points whenever they checked in at particular places and could become “mayor” of a certain place by checking in repeatedly there over time. They could also gain “badges” by achieving a certain number of check-ins in venues of a certain kind (e.g. airports, bars, bookshops, etc.) or by completing particular tasks (e.g. checking in at movie screenings). Users’ check in performance would be compared to that of their contacts, although they could compete for a venue’s mayorship against any other Foursquare user. Both badges and point scoring features have been phased out of the system in 2014 as part of a major re-development of the platform. The remaining activities that the service supported have been split into two separate apps, a re-designed Foursquare and a new app called Swarm<sup>2</sup>: Foursquare now functions as a venue-finding and recommendation app only - e.g. it helps users locate places of interest near them in

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<sup>1</sup> <https://foursquare.com/about>

<sup>2</sup> <http://blog.foursquare.com/post/85232472353/mayorships-and-more-how-swarm-is-going-to-make-your>

various categories (food, shopping, sights, etc.), to “like” a place thus marking it as a favourite, and to read and add tips and recommendations about a place. The platform can also be used by owners of venues registered on Foursquare for promotions, marketing, etc<sup>3</sup>. On the other hand, all the interactions relating to broadcasting one’s location to contacts and gaining recognition for it are now supported by Swarm, an app where each user interacts only with direct contacts. Swarm supports some new activities, such as planning outings to particular venues involving contacts, and profile personalisation by means of digital “stickers” that can be freely added. On Swarm it is no longer possible for a user to see who else is checked in at a particular venue, unless one of their contacts is. Activity on both Swarm and Foursquare can also be shared on other social media platforms, such as Facebook and Twitter.

While usage of the new Foursquare/Swarm platform is yet to be studied in-depth, human-computer interaction researchers have explored the previous incarnations of the app for a number of years. Such studies have extended earlier work examining practices of and motivations for social location sharing (Barkhuus et al., 2008), and have focused on various aspects of Foursquare usage, notably the types of interactions that people perform on the app, how users manage their visibility, reputation and privacy, and how they explore physical spaces in connection with the app. We will now examine such findings in greater detail.

In their empirical study of checking in behaviour, Lindquist et al. (2011) identified a set of motivations as to why people decide not only to interact with the app at a particular venue (e.g. finding the venue on Foursquare, reading content associated to it), but also to broadcast their presence to their followers (e.g. checking in). First of all, people check in not only for social motivations, but also for personal ones, such as keeping an account of their own movements, of the places they visit and how often. However, the social motivations are more frequent and more articulate. A set relates to communication and coordination with friends and family: the desire to share personal information on their life at a distance with contacts, and –in return- to see where friends have been. Often Foursquare is used as a way to coordinate meetings and other activities with friends. Another set of motivations relates to the wider Foursquare community: people enjoy discovering new people frequenting similar venues to oneself, and reading their tips and recommendations. In some cases people check in at a venue just before they leave it for safety reasons – leaving a “false trail” and avoiding potential stalkers. As for the decision regarding which places to check in at, people make distinctions between routine and non-routine places: some decide not to check in at routine places because they are seen as boring, and instead checking in at places that are seen as “special” or “exciting” (e.g. a large event, entertainment venues, etc.). Others check in at routine places either to gain points on Foursquare or because they were bored and decided to check in for something to do. Other considerations are made by users when deciding to check in at private places, such as a private residence or their own home: there are privacy concerns regarding revealing such locations, and people often refrain from checking in at somebody’s home in order to keep its location private. Checking in at one’s own home is often done as a way to tell friends that they are home safely, or available to receive calls or visits.

Interestingly, privacy concerns also come into play when deciding not to check in at certain public venues, such as at the doctor’s, at the bank, etc. Moreover, impression management concerns emerge in these decisions as well: for example deciding not to check in at a fast food restaurant because it would make a bad impression on friends

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<sup>3</sup> <http://business.foursquare.com/>

and family (Lindquist et al., 2011).

The aspects of privacy, self-presentation were further explored by Cramer et al. (2011) who particularly focused on and the performative effects of checking in. They identified instances of *purpose-driven* (Tang et al., 2011) motivations (similar to those detailed by Lindquist et al. 2011) such as obtaining discounts, discovering new places, gaming purposes (e.g. gaining a mayorship), as a personal bookmark, diversion/amusement when bored. Instances of *Social-driven* (Tang et al., 2011) check-ins were motivated by networking with friends, endorsing/recommending a venue to friends, but also wanting to learn about the people who frequent a venue (e.g. the Mayor) who are unknown to them in real life.

However, Cramer et al. observe how LBSN activity goes beyond the two categories of *purpose-driven* and *social-driven* check-ins (Tang et al., 2011). Their data shows instances driven, for example, by self-presentation, lifestyle choices and identity. Self-presentation requires a finer understanding of the audience that a check-in will be shared with. Furthermore, Cramer et al. examine the perspective of the audience at the receiving end of check-ins: people saw check-ins from friends as a way to obtain recommendations on things to do and places to visit, or as a motivation to attend an event or visit a venue. They were also annoyed by friends who checked in all too frequently (thus sending repeated notifications to their contacts), and/or without a clear motivation (Cramer et al., 2011).

Cramer et al. observe how motivations can change for every single instance of check in (and for each venue), and that certain motivations can sometimes be in conflict with others: for example, wanting to check in for the purpose of gaining gaming points might contrast the motivation of not wanting to annoy others with too many check-in notifications (Cramer et al., 2011).

Guha and Birnholtz (2013) have delved further into the ways in which people think about location sharing and its effects on how impressions are formed and managed. They identify a blurring between public and private sphere of life when sharing a location and viewing a check-in: for example, one's presence at certain places is kept private (e.g. the gym) although such places are strictly speaking public. On the other hand, certain places are private (e.g. a friend's home), however people make the decision to check in there and to reveal its location all the same (e.g. there is a party going on). Such decisions are usually made on the basis of how visible the user thinks the check in will be: people are careful as to how certain contacts might perceive their behaviour, and also as to how certain check-ins might create tensions within their friends network. An example of this is checking into a restaurant in order to claim a discount but, at the same time, broadcasting to the social circle about being out at a time when it could be inappropriate.

Tensions might also arise when sharing one's location could be perceived in different ways by different groups of contacts (e.g. a friend vs. a parent), and these are often the reasons behind the social media "regrets" discussed by Patil et al. (2012)

Guha and Birnholtz have also detailed certain "tricks" or "cheats" that people employ for various purposes when sharing their location through LBSN, such as checking in at locations where someone is not in order to make a better impression. They call one phenomenon "check-in transience" linked to the fact that Foursquare displays in its newsfeed to users only the latest location where their contacts have checked in. People who don't want their "real" last check in displayed for too long on their contacts' newsfeed will check in somewhere else immediately so that the friends will see that latter check in (Guha and Birnholtz, 2013).

Overall, participants in Guha and Birnholtz's study admitted to making judgments on people they do not know well in real life based on their check-ins (e.g. which coffee shop they visit frequently, etc.), and therefore are very sensitive about how they themselves present themselves to and are perceived by their network of contacts.

All these studies have highlighted the many privacy concerns surrounding LBSN interactions. Users tend to be aware of them, particularly regarding residential privacy (Jin et al., 2012), and decide to risk risky exposure only in particular circumstances. Other work has shown how publicly available information on Foursquare such as mayorships and tips can be enough to infer the home city of a user, despite caution in location sharing (Pontes et al., 2012).

Foursquare public data has also been used as part of other developments, for example recommendation systems, such as algorithms for predicting which tips will attract more attention on Foursquare and for supporting the creation of more effective marketing strategies on LBSN (Vasconcelos et al., 2014), and models combining cellular data and LBSN activity to infer the types of activities in neighbourhoods and urban centres and to aid urban planning and management (Noulas et al., 2013).

The findings of this small but in-depth set of studies reveal people's use of LBSN and the motivations and strategies behind it. In relation to the issues we are focusing on in this paper, we have already seen instances of the complex relationship between the system (its code and other components such as the database logging user-generated content) and people's interactions, and how the two shape one another. One example of this is users being careful about the last location they check in at because it is the one that the software will keep displaying until a new one is shared. Furthermore, in our summary we have mentioned examples whereby real-world spaces and places are physically and socially altered by virtue of LBSN interactions (for example a house party that people join after seeing their friends' check-ins).

However, many issues remain to be studied. The playful and game-like aspects of LBSN platforms and their connection to real-world spaces are yet unexplored, although other location based social gaming practices have been studied in depth (O'Hara, 2008; Neustaedter et al. 2013). More crucial to overcome, in our opinion, is the limited attention that has been paid to the way in which LBSN contribute to the way places are made, lived and reconfigured. While other technological platforms have been investigated in terms of how they mediate understanding of and attachment to real world environments (Farnham et al., 2009; Bentley et al., 2012; Scellato et al. 2011), existing HCI work on LBSN focuses mainly on individual practices, but often without focusing on the actual locales in relation to which they occur.

It is important to pay attention to the way venues, neighbourhoods and cities are lived and perceived by virtue of the cloud of digital interactions and data that is tied to them: do LBSN activities impact on place attachment? Or on the way an area is discovered, explored and navigated?

We have attempted to address some of these issues in two small-scale studies of LBSN interactions via Foursquare in Limerick and Sheffield. We will now describe our empirical explorations and the main findings arising from them.

### *3. Studying Foursquare Use in Two Cities*

The existing studies of Foursquare we have discussed in the previous section employed a methodology consisting of surveys and interviews. For our study, we have combined a series of interviews with online observations of social media interactions on Foursquare.

The most extensive part of our study (comprising of online observations and interviews) has been focused on Limerick, a regional city in the Mid-West of Ireland. A second part of the study consists of online observations only, and focused on Foursquare use in Sheffield, a regional city in South Yorkshire (UK).

We conducted on line observation of 15 Limerick venues – every month since October 2012 and of 10 Sheffield venues every month since December 2012. We chose similar venues for observation in both cities so that we could compare online activity at location that held similar purposes. The venues included: public markets, museums, train and bus stations, public parks, university buildings, cafés, shopping malls, pubs and restaurants, cinemas, theatres and sporting venues. The observation consisted of monitoring mayorships and check-ins and the addition of content (photos, tips, etc.) for each venue. These data were documented through notes and screenshots.

The semi-structured interviews of the Limerick Foursquare users were conducted between October 2012 and May 2013 and involved 12 participants: 8 interviewees were based in Limerick, the others coming frequently to the city on business and pleasure visits. We combined the interviews with on line observation of the accounts of the participants for 2-week periods.

In their check-ins, our participants expressed support for a new business, shared wi-fi access details at venues and provided information on how to find hidden gems in the city. Check-ins also were used to signal personal availability ("I am at work", "I am in town", "I am out of town"). People checked in at certain venues for one-off or particularly significant happenings (such as performances, conferences, sport events, etc.), similarly to what has been observed in previous work. However, many of the users we observed checked in regularly at a familiar place, where the purpose of checking in was not only broadcasting any exceptional or "exciting" occurrence (e.g. an event, or an unexpected meeting) that might occur, but also for describing the day's mood, or ongoing activities.

Motivations for using Foursquare that emerged from our study echo to a large extent the findings from previous studies: there are personal motivations as well as social motivations underlying the decision to check in and provide content. As the respondents to our interviews included business people in the 40-60 year old age bracket (whereas the participants in previous studies were mainly university students), we saw a number of motivations connected to professional activities and not only to socialization and lifestyle. For example, people checked in to endorse a good venue for business meetings, as well as for informal get-togethers. Another example is that checking in at home signals one's non-availability for work matters. An additional motivation that we noted in our observations is civic activism: people check in to broadcast that they are doing something good for their city, encouraging others to join in.

In answer to our interview questions, participants thus explained their motivations to check in: "*going to places so that I feel I own them*"; "*when I do check in – I spot people that I know*", "*tell someone I'm up, tell someone I'm moving*".

Our online observations gave us insights on how spaces and places become represented on LBSN in a way that previous work had not highlighted.

Activities associated to particular venues can be surprising, or provide insights on a certain space that would not be obvious by looking at the venue description, nor by visiting that location in real life. For example, in Limerick the Stella Ballroom is classified on Foursquare as a historic site and not simply as an entertainment venue (it

is now used as bingo hall), and many check-ins refer to the fact that it is currently the venue for an exhibition on the history of Limerick ballrooms. In Sheffield, many check-ins and tips at the train station refer to socializing, as one of Sheffield's most popular pubs is located there and many people check-in at the station, rather than at the pub venue.

Popular venues attract many check-ins and user-generated content. Their representation on Foursquare depicts their busy atmosphere. For example, the Milk Market in Limerick is a hub of LBSN activity on Saturdays (the day the full market is held), where people check-in as it is “the place to be” on market days, and where friends tend also to converge. In that case, checking-in is also a way to see if other friends have arrived yet. Foursquare activity at this location peaks at weekends, thus the venue’s “cloud” of interactions fluctuates significantly on different days. A similar example in Sheffield, albeit within a different temporal frame, is the Crucible Theatre: while attracting a steady flow of LBSN interactions throughout the year mainly by theatre enthusiasts, it becomes a veritable hub during April when the World Snooker Championship is held there. Indeed, the majority of tips left by users are updated during that period and refer to the tournament, rather than to the regular theatrical season.

Foursquare venues can also collect a trail of banter and “private” messages between people in the form of a venue tip, for example between regular frequenters battling for a mayorship. In this case, the tips are used not to provide information for the larger Foursquare community, but as a way to foster the connection between particular users. The gaming aspect also gave rise in a “proliferation” of Foursquare venues: as users could create new venues, an increased granularity can be observed in places where sub-locations can be identified (for example, a particular platform at the train station) – created by users in order to be first to check in and obtain points.

Our online observations also gave us insights on the content that users create for particular venues. Photos have a variety of subjects and purposes: for example, photos uploaded to the Absolute Hotel in Limerick illustrate events taking place there (such as conferences and business meetings), food that people recommend to order at the hotel restaurant, or various corners of the building and the view from it. This content represents a place from multiple points of view: its structural characteristics, but also the activities taking place there and the people frequenting it. Photographic content can also take up a “recommendation” function similar to that of tips (e.g. which food is particularly good at the hotel’s restaurant).

Our study looked at two different cities and we were thus able to compare Foursquare interactions in both settings. While there were many similarities between them, some differences could also be noted. Probably due to the significant difference in geographical size and size of population between the two cities, in Sheffield (the larger of the two) the Foursquare user group is much larger than Limerick, however there appear to be weaker ties between users overall (e.g. number of interactions between users), with some tight “packs” of friends interacting with each other on Foursquare but likely knowing each other well in real life. More Sheffield businesses use LBSN, with venues offering special deals, discounts, freebies, etc. This goes alongside a more “lifestyle” oriented use of tips, which are mainly directed to a “general” audience with recommendations for good nights out, etc. The use of Foursquare in this case is more similar to services such as Tripadvisor mobile and Yelp. In Limerick, the overall smaller community of Foursquare users translates in more frequent informal interactions between people (both real-life friends and strangers).

#### *4. Discussion*

The insights on Foursquare use from both previous work and from our study that we have presented pose a number of issues for discussion regarding the relationship between the system, its users and the locations it connects to.

First of all, there is a complex relationship between how the system is shaped by user interactions and user-generated content and, conversely, how people's activities are mediated and shaped by the system's functionalities and architecture. When a system like Foursquare is released, selected functionalities are included in the code and they shape the practices of the early adopters and trendsetters. Initially, they play by the rules to see what the new platform can do for them. As the user base diversifies, new practices appear – not originally intended, but afforded by the code. Users exploiting the fact that Foursquare displays only the last check-in on friends' newsfeed by checking-in at a “safe” venue is an example of this, either in order to emphasize their visibility at a location that they want others to notice, or to hide their presence somewhere else. The owners of the system can choose to close loopholes (for example, by not allowing check-ins at faraway locations<sup>4</sup>) or to actually support the new practices by including them in the next version of the code. Very often, innovations introduced top-down via new versions of the code are met with resistance by frequent users, as their current practices are disrupted. These have to go through a whole new sense-making cycle and appropriate the new version by altering their practices<sup>5</sup>.

Not only the activities that the code enables, but how they are enacted is another aspect that reciprocally shapes interactions: the code is designed for a specific context and so are the ways that content production is enabled. For example, Foursquare labels textual contributions as “tips”. However, as Foursquare is trying to move into the niche market occupied by Yelp, it becomes obvious that Foursquare's tips are not actual reviews and couldn't be used as such. Users leave tips such as the amount in coins you need for parking in a specific place, menu recommendations such as “Try the chowder”, which aren't actual reviews. The field name “tips” instilled a specific user behaviour – this illustrates how the design choices influence the content contributed by users.

From a different perspective, Foursquare makes the content generated by its user base available for new uses through the Foursquare APIs<sup>6</sup>. All kind of mash-ups have been created to take advantage of the already generated data. They extend the Foursquare code and extend the opportunities for interaction. Therefore, there is an interesting tension between the possibilities and the constraints offered by the platform, from the point of view of “regulated” use and of appropriation.

As well as the relationship between the users and the platform, there are important issues to flag regarding the relationship between people and specific places that is now mediated by LBSN. LBSN such as Foursquare extend some of the possibilities that real-world locations offer people to link to others, to take advantage of what a place offers, or to find privacy and quiet. The relationship between a person and a specific place is made more visible by the encoding of LBSN interaction on a platform such as Foursquare. Furthermore, such relationship is also extended by the

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<sup>4</sup> See the practice of “jumping”, where users check in at locations without being physically present, in order to gain badges that are only available at distant locales (Halegoua et al., 2014).

<sup>5</sup> See instances of negative reactions to the Foursquare/Swarm innovation here: <https://www.facebook.com/foursquare/posts/10152042714611073>

<sup>6</sup> <https://developer.foursquare.com/overview/>

possibility of novel forms of digital interactions, such as sharing recommendations among strangers. The platform also makes visible a community relationship to a place, and its importance in an urban environment: examples of this are the Milk Market on a Saturday, and a rugby game in Thomond Park stadium for Limerick, and the World Snooker Championship at the Crucible Theatre in April and the December Christmas Village at the Peace Gardens for Sheffield.

While other researchers emphasized the potential for coordination created by check-ins, our findings show that awareness of who else is (or was) in the same public place is an important element and it is interpreted as a recommendation for the place itself. Moreover, the digital “buzz” around a venue (many check-ins, many tips and photographs) is an endorsement of that place’s importance for the community. Users get a glimpse into their contacts’ favourite places and their trajectories. Awareness of events going on in the city is another interesting element that is a sort of side-product of Foursquare.

Through these visible “clouds” of interaction, Foursquare and other LBSN platforms make navigating an unknown neighbourhood or area less daunting. The code facilitates the creation of content in the form of Foursquare venues, check-ins, photos and tips. The Foursquare venues in a city constitute a crowdsourced map of places - that most of the times is very different from an official tourist/visitor map. The users’ check-in preferences shape each city’s list of venues that both users and non-users can consult for finding a good place for a specific purpose: coffee, wi-fi access, etc.

The existence of LBSN such as Foursquare has the potential to change the way people navigate a city, making new places familiar – particularly if they know that their friends have been there, and allowing discovery and sharing. Such an overlay over the physical city is completely invisible to non-users. It can change the perception of a place radically, just because it is being frequented by friends; their digital traces can be perceived.

This connects to the issue of “rematerialisation” – of whether the web of digital interactions enabled by the code can be made visible, or perceivable in real-world places, either for LBSN non-users or for users by means others than the app. There are already instances where certain venues’ connection to LBSN is made visible, for example by displaying signs about Foursquare membership in the physical space. However, there is much more happening in digital form that is only available to the app users: being able to see photos, tips and comments, as well as the names of their Foursquare friends who have checked in there. Check-ins by friends, tips and photos make a new place feel familiar, allow users to see how it looked like when it was very crowded, or when a specific event took place, or how a particular dish looked like. We think it is an important issue to be further developed by human-computer interaction researchers whether new digital technologies (such as ambient or tangible media) could be employed to enable some of these interactions in a way that is less confined to a device (the mobile phone) and more embedded into the materiality of the environment. Furthermore, this is connected to issues of physicality and performativity in interaction. The practice of checking in when arriving at a venue is often frowned upon by some people that happen to accompany a user – as well as being considered socially unacceptable in certain locations/circumstances. The refined planning that users conduct in order to make the check-in performance acceptable or discreet is linked also to their awareness of the visibility of this action to a general “audience”, beyond one’s social circle (Guha and Birnholtz, 2013). Making check-ins and other LBSN possible by means of other devices would require careful consideration of aspects of social visibility and acceptability of such practices.

Venues interested in collecting visitor data could be possibly interested to provide a check-in device at the entrance that would allow automated check in – if this type of permission is chosen -, or allow check-in by simply approaching the mobile phone to a physical badge near the entrance or when ordering or paying the bill, in return for specials (discounts and freebies). More novel solutions could be imagined to provide tangible ways to conduct such activities or to represent them

### *5. Conclusions*

In this paper we have reflected on people's interactions with a popular location-based social media platform – Foursquare – and on how such interactions are entwined with the code that enables them, with other users, and with the real world spaces and places that they are linked to. We have presented a summary of findings emerging from an existing body of human-computer interaction research on Foursquare, and we have integrated these with the results from a study of Foursquare use that we have conducted in two cities. In our study, we wished to characterise more the relationship between LBSN interactions and the city they occur in, so to extend previous work and to address a gap in human-computer interaction research that is only been partially filled (Silva et al., 2013). Finally, we have highlighted some issues for further discussion, particularly on the relationship between the cloud of LBSN interaction and the real world places they occur in, and on how code enables, shapes and is in turn shaped by users' activities and instances of system appropriation. In-depth studies of other location-based digital activities such as turfing and geocaching and their ties with the materiality of the city have shed light on such certain digital practices can be better supported (Neustaedter et al., 2013): deeper understanding of such dynamics in LBSN can lead to novel contributions in this respect.

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