

# Augmented reality in urban places: contested content and the duplicity of code

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With the increasing prevalence of both geographically referenced information and the code through which it is regulated, digital augmentations of place will become increasingly important in everyday, lived geographies. Through two detailed explorations of 'augmented realities', this paper provides a broad overview of not only the ways that those augmented realities matter, but also the complex and often duplicitous manner that code and content can congeal in our experiences of augmented places. Because the re-makings of our spatial experiences and interactions are increasingly influenced through the ways in which content and code are fixed, ordered, stabilised and contested, this paper places a focus on how power, as mediated through technological artefacts, code and content, helps to produce place. Specifically, it demonstrates there are four key ways in which power is manifested in augmented realities: two performed largely by social actors, distributed power and communication power; and two enacted primarily via software, code power and timeless power. The paper concludes by calling for redoubled attention to both the layerings of content and the duplicity and ephemerality of code in shaping the uneven and power-laden practices of representations and the experiences of place augmentations in urban places.

**Key words** augmented reality; place; information; code; Internet; Estonia

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Revised manuscript received 11 May 2012

Amid the buzz and clatter of Dublin's Temple Bar, Natasha checks her phone; she is getting hungry, and Stan should be here already. Maybe he has lost his phone? Or did he turn it off to save on roaming charges? It was over one hour ago that he used Facebook to check in at the café near their hotel. All of a sudden, a Twitter notification pops up from Stan: *'waiting for @natasha\_tcd at Ha'penny Bridge #watchingtheLiffeyflowby.'* Typical Stan!, Natasha thinks: right time, but wrong place.

Natasha pulls up Google Maps on her phone, types in 'Ha'penny Bridge,' and impatiently waits for the results. 'Not enough signal strength here' she thinks as she walks down the street in search for a better connection. After only a dozen steps she has full signal strength and repeats the search. She sees that 'Ha'penny Bridge is only a couple of minutes' walk away even if she takes the longer route past Eamonn Doran's, a bar with a geo-tagged Wikipedia article that notes that the Cranberries used to play there. She is a huge music fan and can't resist the detour. As Natasha inspects the façade of the bar and reviews the list of musicians who played there, she simultaneously has to dodge the crowds walking by. 'Have they no respect!', she thinks and instantly laughs at herself for criticizing people's ignorance of a history she's only just learning herself.

Before moving on, she notices a sponsored ad on her phone for a restaurant called Yamamori Sushi just on the other side of the river near Ha'penny Bridge. Clicking on

the restaurant, she sees that it has sixty-six reviews, most of which are glowing and hopefully not just from the owner's friends. Looks like a good place! Oblivious to the 'Grand Opening – Half Price Sushi' banner posted on the hopeful storefront of a different restaurant across the street, Natasha hurries over to meet the increasingly anxious Stan (he's already sent three texts asking where she is) hoping that he is in the mood for sushi.

## Constructing augmented realities

As the above vignette illustrates, everyday life in urban places is increasingly experienced in conjunction with, and produced by, digital and coded information. While not an all pervasive cloud that is ubiquitously accessible to all, these annotations about places are imbricated with other sensory inputs into the urban experience. The specific forms that these mediations take – the processes and politics in and through which content and code work socially and spatially – are complex and multifaceted. Content and code are implicated not only in the (re)production of discrete spaces of surveillance and mobility such as airports and international borders (Dodge and Kitchin 2004), but more fundamentally mediate the everyday practices of urban life, subtly shaping senses of place as particular interpretations of events and locations are foregrounded or side-lined.

The recent rapid growth in both virtual representations of place and the expanding availability of technologies to access those representations calls upon scholars to examine the ways in which virtual representations of place, in conjunction with myriad other layerings and discourses, are implicated in the production and experiences of places as augmented realities. We use the term *augmented reality* in reference to the indeterminate, unstable, context dependent and multiple realities brought into being through the subjective coming-togethers in time and space of material and virtual experience, as illustrated in the opening passage (see also Graham and Zook forthcoming). In other words: augmented reality is the material/virtual nexus mediated through technology, information and code, and enacted in specific and individualised space/time configurations.

In order to understand how places become augmented realities, this article builds on two key areas of scholarship: the rich vein of work that deals with the politics of spatial representations and the power of maps, and the more recent efforts in geography to understand how software helps shape spatial experiences. Our critical overview of these literatures argues that much of the contemporary, urban experience cannot be understood without paying attention to the blending of content, code and place, and seeks to draw these fields of scholarship into more sustained conversation. We highlight the coming-together of content, code and place by outlining a framework for examining some of the ways in which the power of digitally augmented mappings work to produce place. It is important to point out that we conceptualise maps and spatial representations as contested and multivocal processes that reflect and produce power relations rather than simply reveal knowledge (Kitchin and Dodge 2007, 332). In other words, spatial representations are part of a 'discourse of power, which both enables and abridges possibilities for people to act' (Crampton 2001, 236).

More specifically, we offer a heuristic four-part typology of the power relations emerging from social practices that enact augmented realities. The first two dimensions emphasise the increasingly distributed production and consumption spaces of digital geographic knowledge – what in the context of classic cartography Harley delineates as power relations largely 'external to maps and mapping' (1989, 12). The latter two dimensions refer to power that, to borrow Harley's phrasing once more, 'usually passes unnoticed' (1989, 13) of augmented realities to confer legitimacy on representations: the silent naturalness of the map's authoritative representation. Here we emphasise the largely unseen role of software and time in the production of what are often speciously viewed as democratic and of-the-moment digital rep-

resentations. We term these four dimensions: *distributed power* and *communication power* in reference to the social production of augmented realities; and *code power* and *timeless power* to emphasise the taken-for-granted processes enacted through code. Our goal in developing this framework is to situate emerging augmented realities and digital mappings within the analytical purview of broader critical geographical concern with the power of cartographic representation.

Our argument calls attention to the power-laden social-technological processes and relations by which geographically referenced content acquires a persuasive rhetoric of authority, and thus the *duplicity* of code in naturalising the uneven production and consumption practices of representations of urban places (Allen 2003). The case of spatial data, especially the increase in data generated by users and consumers, provides opportunities to look 'behind the screens' of digital representations at the social and algorithmic processes that translate multiple claims to meanings into augmented realities.

## Digital content and code in urban places

Rather than envisioning ontologically distinct constructs of cyberspace and material space popular in the 1990s, we need to recognise that 'virtual' and material spaces have always been inextricably linked (Firmino and Duarte 2010; Graham 2010 2011a; Nagenborg *et al.* 2010). We urge a broadened and socio-spatially nuanced concept of augmented realities that emphasises the potent ways in which virtual information – in particular, geographically referenced content – intersects and helps shape the relationships that undergird our lived geographies. While augmentation by information – music, paper maps, advertisements and stories – is nothing new, the visual, interactive, real-time nature of digital augmentations offer a fundamentally new way of interacting with, moving through and enacting place. Likewise, even though these augmented realities manifest wherever these intersections occur, the uneven densities of geocoded content (Graham and Zook 2011) make cities the sites at which the power relations behind this process are most apparent: hence the urban focus of the empirical cases presented here.

The trend toward digital augmentation can be traced via three successive moments in the development of Internet practices and technologies:

- 1 *The move towards the mobile Web.* Mobile devices are far more ubiquitous (about two-thirds of all people on the planet now use a mobile phone) than desktop computers and are used more often for data access than for phone calls (Wortham 2010). Of the world's four billion mobile phones

over one billion are smartphones, and even more have some form of Internet connectivity. As a result, web access has become largely untethered from a fixed physical location with mobile information access increasingly tied to local and everyday contexts (Amin *et al.* 2009).

- 2 *The growth of authorship.* Assigned a range of monikers ranging from Web 2.0 to user-generated content to volunteered geographic information (Elwood 2008a 2008b; Goodchild 2007; Graham 2010; Ritzer and Jurgenson 2010; Zook and Graham 2007), this phenomenon describes the growing amount of information created by non-experts and freely shared on the open Web. Wikipedia is the most visible example, but thousands of other projects share a similar open model resulting in a previously inconceivable mass of information – albeit much of it still rooted in traditional centres of economic and political power (Graham 2011b).<sup>1</sup>
- 3 *The emergence of a geospatial Web (or ‘geoweb’).* The third movement is based on geocoding of Web content to specific parts of the earth surface driven by a combination of automatic and user generated efforts and resulting in a growing body of content with specific spatial references (Turner 2006). This corpus of geocoded content is increasing utilised with a majority of Internet users (in the North) performing at least one Internet search a day (Fox 2008), conducting more than half of searches for local information via a mobile device (Microsoft 2011) and with the majority of Internet-users judging web content to be a highly reliable source for local information (Rosenstiel *et al.* 2011).

The coming-together of these three moments make augmented content a central facet of everyday urban life and it changed the social processes and relations through which content about places is produced and consumed. Although places have long been represented via asynchronous, analogue augmentations, emerging digital augmentations offer a means of place-making that is infinitely more malleable and dynamic than those that existed previously (see Westlund *et al.* 2011). Digital representations such as Wikipedia articles, Urbanspoon reviews and Google’s Street View offer a flexibility of scope and access that tightly weave them into the social fabric of cities including qualitatively different ways of experiencing cities such as mobile games (Gordon and Souza e Silva 2011). Frequently such practices entail dynamic, arguably more immersive and haptic reading performances (relative to analogue augmentations) via infinitely malleable, touchscreen interfaces (Kingsbury and Jones 2009; Verhoeff 2009), as well as a blurring

of the boundaries between content authorship and consumption.

Given these changes, there is an urgent need to develop frameworks for analysing the processes and powers of code and content in the reshaping of urban geographies: a task we take up here. However, before engaging with the issue of power we first examine existing scholarship on the role of geographic content and representation in shaping how place is enacted, as well as more recent work on how software helps bring specific types of space into being. By drawing on these two broad bodies of work, we are able to develop a more comprehensive framework for understanding the power relations associated with the production and enacting of place via augmented realities.

### *Content and augmented realities*

Geographers and cartographers have long argued that representations of space are not neutral but entail power-laden stabilisations of understanding (Pickles 2004). As Harley argues

Once embedded in the published text the lines on the map acquire an authority that may be hard to dislodge. Maps are authoritarian images. Without our being aware of it maps can reinforce and legitimate the status quo. (1989, 14)

The power embedded in mapping digital content is no less significant, especially given the fundamental ways in which digital content is now imbricated with the material, and imaginary stuff of everyday life. This argument echoes existing approaches to understanding representations of place such as a genealogy of the landscape conception (Cosgrove 2003; Schein 1997) in which particular representations are products of (and in turn affirmative of) particular sets of social relations. For example, the emergence of landscape as ‘a way of seeing’ from the capitalist transition in 16th-century Europe means that it entails a particular kind of visibility (Cosgrove 1984): the socially constructed, assertive claims to meaning that position the viewer in a particular and largely fixed relation to the scene surveyed.

In contrast, and following Kitchin and Dodge’s (2007) argument on rethinking maps, we posit that the geospatial digital content stabilised within augmented realities is much less coherent or fixed for two reasons. First, as noted by Wood *et al.* (2010), the complexity of knowledge production within maps as activists provide counter mappings to hegemonic representations of places (see also Elwood 2008a). The practices, ranging from social organisation to software code, that enact augmented realities make it very difficult for a single entity to overlay a fixed digital representation onto a particular place. New content is constantly made available (often by users) and is increasingly reflective of real-time events rather than

time-lagged indices of 5–10 years ago with the ‘now’ a privileged aspect of an increasingly ephemeral collection of content.<sup>2</sup> The second instability is that the organisation of geospatial digital content – social recommendations (e.g. Facebook), wikis (e.g. Wikipedia) and software algorithms (e.g. Google search results) – has enjoyed wide use online precisely because of its adaptability. Systems of social recommendation employ personal connections to populate ever-changing content in news feeds; wikis are open to edits from anyone and quickly reflect new developments; and search engines harvest dynamic network metrics from the Internet in order to shape a fluid organisation of rankings indicative of the changing content of Web materials.

Even if the authorship and organisation of geospatial digital content were fixed, it remains that the representation of places has no ontological security. In other words, augmented realities are not immutable mobiles; they are always ‘of-the-moment, brought into being through practices (embodied, social, technical), *always* remade every time they are engaged with’ (Kitchin and Dodge 2007, 335). There is thus no such thing as *an* augmented reality. Rather, there are augmented realities that are enacted and practised in contingent and relational ways. Instead of simply capturing specific digital layers of place as objects of analysis, the geospatial content enacted in augmented reality is necessarily spatially, temporally and personally context-dependent. Thus, closely examining the specific ways in which augmented realities are brought into being and mediated is a key task. Of particular interest is the organisational role played by software (or code) in the construction of representation. Just as content may appear as an innocent depiction, so code (when it is noticed at all) is perceived as a neutral platform enabling augmented realities simply and unproblematically to come into being. This taken-for-granted façade or duplicity belies code’s power to sort and shape the urban places of the 21st century.

### *Unpacking the duplicity of code*

A key way in which to challenge the duplicity of code is tied to the distinction, drawn by Dodge and Kitchin (2005), between ‘code/space’ and ‘coded space’: that is, between code/spaces in which ‘code *dominates* the production of space’ (original emphasis; 2005, 198) and ‘coded space’ in which code is part of, but incidental to, the production of space. As a heuristic continuum, rather than a deterministic binary, the distinction highlights qualitative differences between spaces in which code is more-or-less central to the calling-into-being of spaces. The distinction is useful in emphasising how code acts in more-or-less visible ways, sometimes contingent upon other coded processes and infrastructures, to produce or ‘transduce’

space via continuously ‘reiterated digital practices that create space anew’ (Wilson 2011). This is even more relevant given that, as Thrift and French (2002) point out, few, if any, aspects of contemporary urban and economic infrastructure are *not* ultimately reliant upon, or in part produced by, code.

Code delimits behaviour in a number of contexts – from requiring adherence to accepted procedures at electronic checkouts to pre-screening ‘risky’ airline passengers – and engendering behaviours so mundane as to go unquestioned, until the code ‘fails’ via an error or unexpected rupture. But its action is more subtle than simple compulsion because code does not deterministically produce space, but works through broader ‘technologies of power’ (Foucault 1988, 18) deployed in the management of bodies and populations. In the case of airport security, for example, code becomes part of an ensemble of tactics through which ‘power is actually deployed’ (Rose-Redwood 2006, 474), both in the production of the law-abiding, global traveller and in the biopolitical totalisation of a statistically known travelling public.

We argue, in line with Budd and Adey (2009), that it is precisely the invisibility of code and the ambivalence of its authorship that make its deployment unnoticed and its operation so hegemonic. Although code must continuously be enacted in order to work in the world, a generalised lack of awareness and engagement arguably alienates citizens from coding as a ‘key source of creative power’ (Dodge *et al.* 2009, 1284). Drawing on the analogy of a modern car in all of its black-boxed, software complexity, Rob van Kranenburg argues that because maintaining such a vehicle is now impossible for a driver without access to expensive, proprietary electronic diagnosis equipment,

you have lost more than your ability to fix your own car, you have lost the very belief in a situation in which there are no professional garages, no just in time logistics. [People] become helpless very soon, as they have no clue how to operate what is ‘running in the background’, let alone fix things if they go wrong. As such, [this background of code] presumes a totalising, anti-democratic logic. (2008, 23)

Van Kranenburg’s account of the colonisation of minds by code, however, ignores the social nature of code, and thus its inherent transformatory potential. While the duplicity of code lies (in part) in its appearance of neutrality and its complex and technically impenetrable nature, code never simply ‘is’ as it appears to be. Rather code’s effects are felt in its reiterative combination with other spaces, situated actors and material places. Power is not a property of code, or of the map, contained within it or working unidirectionally through it. The contemporary coded map is part of a more social and general ‘discourse of

power, which both enables and abridges possibilities for people to act' (Crampton 2001, 236).

Thus, in this paper we consider how code blends content and place for particular individuals at particular times with particular attention paid to the discursive, institutional and temporal/spatial contexts of production and consumption of the resulting representations. The opacity of code, and inequalities in methods and modes of access ultimately mean that there can never be any sort of objectively observable realities within augmented realities and that digital representations of place are neither innocent nor universal. The algorithmic and social spaces of user-generated spatial data provide an important arena in which to examine the character of the uneven and power-laden practices through which digital representations of place are authored, ordered and momentarily stabilised in the production of augmented realities.

### Power through content creation and code

All spatial representations are both the products and producers of specific configurations of power relations (Allen 2003; Harley 1989; Pickles 2004), and thus a key question is whether the ways power in augmented reality is constructed and exercised is novel. Critical geographers have long since rejected the so-called communication model of cartography where the dichotomy between cartographer and map user is bridged by the map object itself, communicating information to the latter more-or-less successfully (i.e. completely) (Montello 2002). But the situated nature of map users and cartographers alike was a major concern of cartographic scholars working within this tradition. Indeed, the cartographer/map/map-user model in reality entailed complex communication models in which cognitive abilities and belief systems of the map user and cartographer determined the type and accuracy of knowledge communicated (Koláčný 1969). Such cognitive approaches remain the concern of cartographic practitioners – and designers/cartographers of mobile location-based applications are no less interested than their paper/GIS-based predecessors in determining the 'best' ways to present data toward particular goals (see Rehr *et al.* 2012).

Our account of power in augmented realities draws on the Harleian tradition of cartographic critique in asserting the contingent and incomplete nature of the map as socially constructed and embedded discourse. While Harley cannot have anticipated the emerging geoweb phenomenon, we nevertheless draw attention to the prescience of his anti-foundationalist, Foucault-infused accounts of cartographic power (Crampton 2001). His insistence, for example, of breaking down the categorical distinction between propaganda maps

and other (truthful) maps represents a necessary first step towards recognising that all maps – including digital, crowd-sourced maps – are products of and productive of, social relations and associated power relations. Building upon Harley's foray, cartographic scholars have further developed the critique of the notion of a unitary author of a map imposing a vision on a reader without resistance and emphasised the situated and contingent process by which representations are constructed by tracing the 'genealogy of power discourses' associated with maps (Crampton 2001, 243).

Particularly in the case of crowd-sourced mappings, it makes less sense to think in terms of authorial intent than in terms of the work maps do in producing particular kinds of subjects (Wood *et al.* 2010). In such an approach, while power is productive – of mapping subjects from amateur cartographers (Wilson 2011) to casual breadcrumbers 'checking in' at locations throughout the day – it is not inherently oppressive or negative (Elwood *et al.* 2012). Indeed, in the case of user-generated mappings we note the broadening of mapping publics with access to modes of cartographic representation *and* a marked socio-spatial unevenness obscured by a veneer of democratisation. As such it is important to carefully think through the overlapping ways power relations are differentially manifest over time and space through digital augmentation. We suggest four kinds of power that manifest in the coming-together of material and virtual spatialities: first via primarily social actors in the cases of *distributed power* and *communication power*, and second via the action of software in the cases of *code power* and *timeless power*. While these categories are separated by dynamic and porous boundaries, they provide a useful heuristic for understanding some of the ways in which power is enacted within augmented realities.

#### *Distributed power*

As noted earlier, much of online geospatial content can be traced back to decentralised and user-generated initiatives. For example, Dublin's Ha'penny Bridge is represented as: a Wikipedia article; myriad mentions of the bridge on Twitter; multiple photos uploaded to Flickr and Picasa; and YouTube videos of the bridge created by tourists, just to name a few. Some argue that this explosion in user-generated content fundamentally challenges traditional gatekeepers of knowledge (Shirky 2010) and potentially gives voice to any of the two billion people online. While this libertarian vision of technological equality is attractive, reality falls far short of it (Graham 2010; Graham and Zook 2011). For example, user-generated content is characterised not only by occasional unreliability and poor quality (e.g. Carr 2007), but also the potential for relatively untraceable manipulation of

representations of place such as the CIA editing Wikipedia articles about Iran (Fildes 2007).

Of more concern, however, is that the reliance upon a volunteer labour force means that a majority of the world's population are excluded from the technologies and connectivity needed to create content about place: a group dubbed by Manuel Castells (1998) as the 'fourth-world'. In short, some people are simply better positioned and hence more likely to engage in content production because of their available resources (i.e. access to information technologies and greater amounts of free time). Less obvious, but equally important, is that even among those with time and access, only a small minority tend to engage in the production of geospatial content (Crutcher and Zook 2009). Research has shown that the internal technical and social structures of content platforms such as Wikipedia privilege some contributors over others, e.g. the cultural convention of a relatively aggressive style in arguments has privileged the work of men over women (O'Neil 2009). This results in a relatively small group of people authoring representations in augmented reality (Glott *et al.* 2010) and a correspondingly high power to influence representations of places.

While access to this group is relatively open compared with historical practice, it does not mean that its representations are neutral or even draw from stakeholders relevant to the topic at hand. Moreover, despite its promise, the distributed power of user-generated content also makes it extremely challenging to understand what the embedded biases in content are, and to work to address them (Boulton 2010). And at its most extreme, the expectation within distributed power that because everyone can contribute all voices will be heard could lead to a depoliticisation of geospatial content. The expectation that all viewpoints contribute to the production and reproduction of spatial representation is belied by disproportional power wielded by those with the time, inclination, education, resources and network positionalities necessary to make their ideas visible.

### Communication power

Because Geocoded content about material places is the central way in which augmented realities are brought into being, so the ability to filter or prioritise content creates considerable power to claim or stabilise particular visions of place. This communication power is enacted in two principle ways. First is the power that comes with the ability to effectively use channels of communication to promote a specific goal of representation. In Castells' (2008, 47) formulation of communication power, this is the role played by 'programmers' who continually program and reprogram the goals of any particular network, in this case

the networks of authorship behind geocoded content. A particularly important limitation of programming in communication power is the assumption of a common language. Content in Estonian, for instance, is meaningless for most Thais and thus places can have separate (and conflicting) representations in either language. Moreover, smaller linguistic groups would have less communication power relative to *lingua franca*s such as English, which have the ability to create much more visible representations.

The second aspect of communication power is the ability to not only create and interpret content, but also to recirculate, repackage and even contest it: Castells' notion of the 'switchers'. Without an ongoing nurturing of attention – via (re)linking, (re)blogging, (re)tweeting – any bit of geospatial information can be deprioritised in the dynamic remaking of augmented reality. It takes not only well-networked connections to give visibility to particular bits of information, but also the ability to package information in a way appealing to those that are most likely to circulate it. Furthermore, on jointly authored platforms (such as Wikipedia) there is a need to not just create information, but also to continuously justify its existence to others that might seek to dismiss it as irrelevant. For instance, Kenyan Wikipedia editors created an English-language article about a popular Kenyan superhero Makmende. Since Western gatekeepers had never heard of Makmende, the article was repeatedly deleted until the international press used the case as an example of the encyclopaedia's bias (Zuckerman 2010).

Communication power thus allows certain people and groups to filter and promote the representation and circulation of a stabilised meaning of place. It provides a way for some information to be amplified and other information to fade from the spotlights of attention. Rather than simply being blank spots on a map – *terra incognita* – the representations of place turn on the constellation of programming and switching power of those tied to its network with the power to enact and re-enact content.

### Code power

There is a rich vein of scholarship exploring the power of code to regulate conduct ranging from fixed rules governing actions (e.g. Lessig 1999) to performative acts that rely on both human and technological rituals (Chun 2008a). In reference to space, Graham (2005) argues that we now move through software-sorted geographies: landscapes that are often shaped, formed and mediated by invisible lines of code. Dodge and Kitchin (2005) illustrate that the technicity of code (its power to influence action) is able to influence our spatial experiences and actions through processes of transduction (constant remaking and re-enactions).

Within the context of digital representations of material places, the apparently straightforward relationship between content sought and content displayed is usually mediated by complex software algorithms that tailor information based on the interactions of several factors. Perhaps the best known ranking algorithm for ordering online content is Google's PageRank, which calculates the relative importance of Web content based on the hyperlinked structure of the Internet. Specifically, the PageRank of a given digital object depends on both the frequency and the source of incoming hyperlinks from other Web sites, and in this way reflects the communication power of the programmers and switchers behind content. Moreover, because Google continuously tracks the hyperlink structures of the Web, the PageRank of any given object is dynamic, echoing its evolving relationships with other objects in Google's index.

But PageRank is only one of some 200 or more factors (some of them decidedly opaque) used by Google in evaluating which results to return first for a search term: not least, the admission of editorial intervention in search results. For instance, content providers are punished with demotion of their search engine rankings for suspected disallowed strategies – such as purchasing multiple incoming hyperlinks to manipulate results for particular keywords – whereby search results are, in the opinion of Google, unfairly manipulated (Segal 2011). Likewise, famous Google bombs – such as 'miserable failure' returning pages for George W Bush and Michael Moore, or 'Jew' returning results for anti-Semitic hate sites – have fallen by the wayside as Google has seen fit to override these ostensibly 'democratic' interventions. User-experience researchers have demonstrated that most search users access information at the top of search rankings (rather than trawling through multiple pages of results) (e.g. Dupret and Piowowski 2008; Hochstetter and Koch 2009; Zhang *et al.* 2009) highlighting the power of code to shape regimes of visibility and invisibility. The ways in which geographic rankings influence urban spatial behaviour are less well known, but as Zook and Graham (2007) argue, it is likely that virtual visibility has material economic, social and political influences. Moreover, research on museum navigation with hand-held digital devices suggests that users become more dependent upon the representations of exhibits than the actual artwork (Ishikawa *et al.* 2009).

Thus, code power is exercised in a very centralised yet hidden manner. In augmented realities this entails the opaque and depoliticised process by which Google (via its Google Maps interface) blends PageRank with physical distance to produce a ranked search result for any particular location. Moreover, even as the

underlying algorithms are social products based on distributed and communication power, Google's engineers can intervene directly, with or without explanation, to modify search results or to change the rules of the game. It is therefore important, following Dodge to 'focus attention on describing *where* code is working in cities, account for *how* it works and offer explanations of *whom* it works for' (2010, 24).

Unfortunately, understanding the capacity of algorithms is challenging because of the fact that code power is derived not just from its performativity and technicity, but also its ephemerality (Chun 2008b). One of the starkest examples of the opacity and ephemerality of the blending of code and content are the ways that search engines organise and present information. Search results have long been temporally unfixed (the same search last month and today will yield different results), but this trend is accelerating as search engines strive to maintain real-time indices of the Web. Algorithms also vary substantially over space and identical searches from two different locations can yield substantially dissimilar results as search engines tweak results to better conform to their metrics of local contexts. This specificity extends to the individual with personalised search results through the stored records of clicked links as well as through the triangulation of results with other personal information and the preferences of other people in the searcher's social network (Miller 2011).

Pariser (2011) dubs these personalisations 'filter bubbles' in which searches only result in content supportive of one's preexisting views via active targeting of individuals and the coded power of algorithmically ranked maps. A range of efforts are underway to operationalise these filters, including Microsoft's recent patenting of a mobile mapping application (dubbed the 'avoid ghetto app') that allows pedestrians to actively avoid areas of high crime (Rogers 2012). Through the increasing employment of personalised and opaque code, geocoded content, and even our movements through material space, are ever more fragmented into individualised representations that ultimately enable the construction of self-reinforcing information cocoons. As such, code power makes a largely opaque contribution to the representation of places, resulting in augmented realities that are increasingly contingent on every person's individual positionalities in time, space and society.

#### *Timeless power*

The fourth and last dimension of power within augmented reality is the flattening of time. While this flattening is neither absolute (user-generated content can be time-stamped and Google Earth now provides a time series of imagery) nor completely novel (maps have long combined spatially proximate yet temporally

diverse events), the enactment of augmented reality represents a deepening of this effect. When one accesses a digital representation of a place, such as a set of Google Maps placemarks or Flickr photos, references to time largely disappear. Businesses that have been shuttered may be listed as open, photos of snow-covered landscapes remain in summer, and buildings that have been razed spring back to life. Simultaneously, however, augmented realities include real-time activities – a GPS track of a bus or live Twitter feeds – draped over an otherwise atemporal landscape.

Thus the production of augmented reality is an exercise of the power of what Castells refers to as ‘timeless time’ where time is dissolved ‘by disordering the sequence of events and making them simultaneous, thus installing society in an eternal ephemerality’ (1996, 467); ephemerality that are even more pronounced when combined with those discussed in the previous sections. This collapse of time is particularly remarkable given that much of this geospatial content has a time stamp associated with its creation: when the photo was taken, when it was uploaded to an online platform. However, these temporal data are routinely ignored in the enactment of augmented realities in the effort to construct seamless representations of place. Implicated within timeless power are the constraints imposed by code power, e.g. the software design that makes it extremely difficult to access time metadata within augmented reality interfaces.

#### *Distributed, communication, code and timeless power*

It is important to reiterate that the practices of power within augmented reality are often situated on the borders of these four contexts. Google’s PageRank, for example, takes the communication and distributed power that results from interlinkages, reposting and promotion, and filters it through the coded power of its search algorithm to derive a particular representation of a place via a ranked Google Maps search. Likewise the distributed power possessed by active Wikipedia editors is merged with timeless power when a geocoded Wikipedia entry is placed seamlessly on a real-time digital map.

Moreover, because the separation between powers is blurred, the way in which one can respond to the representations within augmented reality is similarly contingent. For example, Google’s coded power is opaque, but the company has a knowable presence. It can be criticised, lobbied, sometimes even debated with. In contrast, representations within Wikipedia, which in theory is far more open, possess a diversity and diffuseness allowing a very different sort of power to be enacted. It is hard to disagree with an amorphous cloud if the cloud simply discounts one’s argu-

ments or if the dispute is channelled into separate and non-interacting arenas of deliberation.

### **The uneven reach of content and code**

In short, the seeming innocence of augmented realities hides uneven constellations of power relations that help shape everyday practices and the cultural and political meanings of particular places. Our ability to point to the operation of these power-laden processes in empirical studies is limited because of the fact that many studies on location and mobile media have focused on urban locative media art or locative media gaming (Sutko and de Souza e Silva 2011). Far less research has studied augmented spatial representations as the products and producers of different configurations of power within places. The remainder of this paper takes up this task through a series of case studies ranging from the everyday to the extraordinary that illustrate how power-laden processes and relations behind digital code and content work in the construction of augmented realities.

Returning to the opening vignette in Dublin, we first review the significant social tasks in which augmented reality is regularly deployed, and highlight the often obscured power relations that influence these everyday contexts. We then move to two highly contested understandings of place to provide clearly defined examples of how the four-fold typology of power is enacted in the shaping and representations of place in augmented realities.

#### *Social and spatial sorting in everyday life*

Natasha’s everyday experience with spatial augmentation in Dublin highlights aspects of all four dimensions of power. Distributed power is evident through the ways that Natasha can harness user-generated content to both navigate through the city and ultimately engage in economic transactions. These distributed power relations that promote and demote some places over others all serve to influence Natasha’s movements through the streets of Dublin. Distributed power contributes to extreme variability in content density between and within material places (Graham and Zook 2011). Moreover these representations differ sharply when sets of programmers and switchers (Castells 2008) interpret and promote particular pieces of content, and thus particular versions of places/events. Importantly, all of these relationships are mostly invisible to Natasha as she seeks information via a mobile device to augment her sense of place.

Communication power is also important in the contexts of Natasha’s movements through the city. Her searches in English brought her to specific information (in Wikipedia) that necessarily fixed cer-



tain representations of the city. The very same actions in another language would have suggested entirely different paths. For example, a prominent French-language review for Yamamori Sushi exclaims 'La cuisine est correcte mais...' ('the food is ok, but...') in its title, and then proceeds to lambast the staff for being unresponsive: a review that contrasts sharply with the English-language descriptions seen by Natasha.

In an environment like Dublin in which there are dense clouds of augmented information layered over much of the city, code power also becomes crucially significant in filtering the visible from the invisible. Natasha's finding of Eamonn Doran's was influenced by the confluence of algorithms and content that allowed it to filter to a prominent position in search results. Her discovery of Yamamori Sushi, in contrast, was mostly influenced not by code making that establishment visible, but by the conscious decision by a manager of the restaurant to pay for increased online visibility.<sup>3</sup> The ranking of reviews of the restaurant, however, defaults to a code-defined notion of 'most helpful'.

In all of these observations one also sees the relations of timeless power. Some of the user-generated content seen by Natasha is time-stamped (restaurant reviews, texts), whereas other content has less obvious temporal origins. The net effect, however, is a flattening of the temporal dimension so that all relevant information is presented in the here and now. This temporal flattening also feeds into the algorithms that separate the visible and the invisible. The specific processes by which ranking algorithms operate and sort are opaque and not publically disclosed, but it is apparent that they weave historical informational cues into rankings for the present.

Natasha's stroll through Dublin is just one example of the hundreds of millions of enactments of augmented realities occurring around the globe on a daily basis. It was chosen specifically because behind its apparent banality are a host of power relations shaping how a specific place is brought into being in a specific time and for a specific person. The implications of this power becomes more pressing when considering examples of highly contested places or subjects such as the invisibility of abortion clinics in Apple's natural language interface to its iPhone (The Abortioneers Blog 2011) or the fundamentally different ways in which Tel Aviv is represented to/by Arabic and Hebrew speakers (Graham and Zook 2011). Therefore the last two case studies provide detailed analysis of such highly contested cases to illustrate how the power relations that enact augmented realities can produce decidedly different representations of the same place. These two cases were chosen based on their ability to highlight a range of power relations

in enacting augmented realities, their blending of both visual/map-based and non-map-based elements and the familiarity of the authors with these topics.

### *Programming and switching: the Bronze Soldier of Tallinn*

While the example of Natasha's walk through Dublin is significant for its countless replication across space and people, the second case study – The Bronze Soldier of Tallinn – is important because of the strongly conflicting understandings behind the multiplicity of augmentations in this place. In short, the contested and conflicting representations of the Bronze Soldier of Tallinn offer the opportunity to examine how urban political conflicts encompass both material and digital dimensions.

Erected by Soviet authorities in 1947 following the reoccupation of Estonia, the statue has been controversial for its entire existence because of the contested symbolic value ascribed to it by different segments of Estonian society. For most Estonian speakers it represents five decades of Soviet occupation and repression, while many non-Estonian speakers (about 25% of the population who are largely ethnic Russians) view the statue as a memorial to those who died during World War II and a source of pride and identity in a fast-changing society (Smith 2008). In short, the statue is a focus of the polarised understandings and representations that divide the population of contemporary Estonia (Ehala 2009).

This incipient conflict came to a head in April 2007 when the Estonian government began preparations to relocate the statue (and the graves of several Red Army soldiers) away from its location in central Tallinn to a military cemetery approximately 3 kilometres away. As the process began, a crowd of Russian-speaking protesters scuffled with police in an effort to reach the statue. This ultimately led to two nights of rioting including vandalism, property damage, hundreds of injuries and one death. Although the original relocation plan called for a longer time frame, in reaction to these events, the Bronze Soldier was quickly relocated and the memorial was reconstructed in the new location within 3 months (Ehala 2009). The relocation and riots also precipitated a multi-week cyber-attack on Estonian governmental and business websites organised via a series of Russian language websites located predominately outside the country (Lesk 2007). These events and the symbolism of the Bronze Soldier are reflected in the virtual landscapes of the city that are shaped by the four contexts of power manifested in augmented realities.

The code power of Google Maps is most readily apparent when 'Bronze Soldier' is used as a search term in English, Estonian (Pronkssõdur) or Russian (Бронзовый солдат). The algorithms that power Google Maps do not rank the present location of the

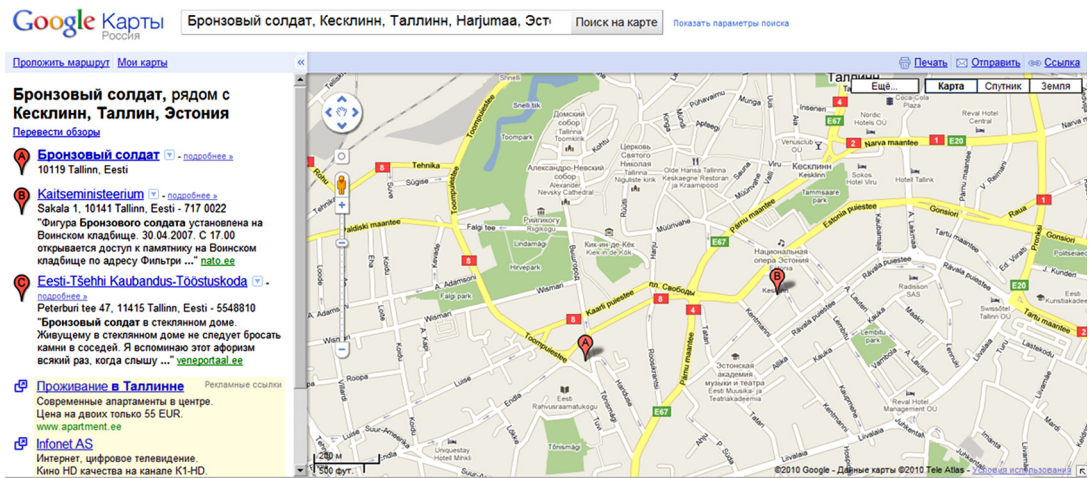


Plate 1 A search for the Bronze Soldier ('Бронзовый солдат') in the Russian version of Google Maps

Source: Collected by the authors via Google Maps on 12 February 2011 (© 2012 Google)

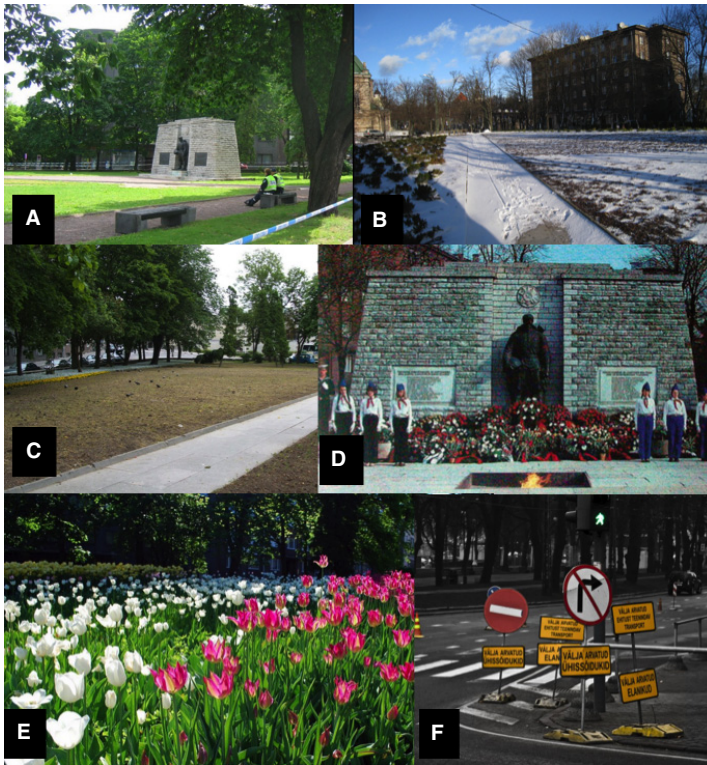
statue (where it has stood for more than 4 years) as the first result but continue to list its original location in downtown Tallinn (see Plate 1). This representation of place is not the result of any conscious decision or specific human effort within Google, but instead the outcome of the software code and underlying databases deployed to match search terms with the most 'suitable' location (see Zook and Graham 2007).

A series of user-generated and geo-tagged photographs provide an apt illustration of the timeless power of augmented reality via the visual and textual representations of this location. The photos (drawn from the Panoramio online photo-sharing service) are available via the Google Maps interface when the user toggles the 'show photos' option. Thus, the map becomes the interface to these images, allowing a user to switch between photos, e.g. zooming in for a close-up, seeing information about the author. While photos tagged in English are primarily focused on the events of April 2007, e.g. 'Tõnismägi under police protection June 27, 2006', photos tagged in Russian are heavily evocative of memory and Soviet times with phrases such as 'Здесь был' (It was here) or photographs from decades earlier (complete with young pioneers and the eternal flame) referencing 'Неизвестному солдату' (To the unknown soldier). In contrast, photos tagged in Estonian largely ignore any historical significance of the plaza and focus on an indeterminate time represented by surrounding buildings, flowers or mildly interesting collections of road signs (see Plate 2).

These differences in photographic representations are extended to the new location of the Bronze Soldier as well, where seven photos of the statue in its

new location are labelled in English, Russian and Belarusian. This stands in contrast to the sole photo labelled in Estonian at this location: an image depicting other grave markers and trees that simply makes reference to the location being a 'military cemetery'. Each language's annotation evokes a decidedly different representation of time ranging from the studied focus on events of 2007 within English, to the call to memory in Russian, to the disregard offered in Estonian. As in material landscapes, memories and forgettings are inscribed into the digital landscape by the efforts of a diverse range of actors; none of the user-generated photographs indexed in Google Maps are created by the same author. Instead each person seeks to convey their knowledge of a place by uploading their representation via geotagged comments, reviews, photographs and articles. While the examples thus far have focused on material available via Google, the contestation of representations of the Bronze Soldier extends well beyond it.<sup>4</sup>

Some of the most visible operation of distributed and communication power occurs within the 18 different representations of the Bronze Soldier found within the different language versions of Wikipedia. Although Wikipedia articles are freely accessed and editable via the open Web, the vast majority of people are likely only to ever access one because search engines (via default settings or user preferences) prioritise the primary language of the user, and preference by users for their native tongue or a *lingua franca*. A core Wikipedia principle is 'neutral point of view' and hence all articles within the online encyclopaedia are charged with being both balanced and written in an impartial tone.<sup>5</sup> Despite this charge, a



**Plate 2** Geotagged photographs from Google Maps at the original location of the Bronze Soldier.

**English labels:** (A): Under police protection June 27, 2006; (B) Tõnismägi park, the former place of the Bronze Soldier. Now a peaceful place, while [sic] the Bronze Soldier rests at the tranquil War Memorial burial grounds.

**Russian labels:** (C) 'Здесь был' (It was here); (D) Неизвестному солдату (To the unknown soldier).

**Estonian labels:** (E) Tõnismägi (Anthony's Hill); (F) Tõnismägi (Anthony's Hill)

*Source:* Collected by the authors via Google Maps on 12 February 2011 (© 2012 Google)

closer examination of the 18 articles on the Bronze Soldier offer fundamentally different readings of the historical and cultural geographies of this place and aptly demonstrate the diversity in attitudes held by the programmers and switchers of each Wikipedia version (Castells 2008).

The English language article, for instance, presents a detailed history and background of the statue. There is also a prominent section on the controversy surrounding the movement of the statue, but there are no photographs of the riots and the related death during this time. In contrast, the first two photographs in the Estonian version only show the statue in its new location (the English article uses before and after photographs). The Estonian version also gives prominence to the riots surrounding the relocation of the statue, including a photo of the riots, but makes no mention of any fatalities. Moreover, the history of the statue includes a reference to an attack on the statue by Estonian schoolgirls in the late 1940s and is contextualised with reference to the relocation of other statues within the former Soviet bloc. In

comparison with the English and Estonian versions, the Russian version offers a far more detailed history of the statue and the justifications behind erecting it. A large section on the riots is also presented featuring three photographs and it is the only article to mention the name of the Russian citizen killed, list allegations of grave desecration and enumerate heavy-handed actions of the Estonian security services. The Russian article also features an extremely lengthy section on reactions from around the world (most critical of the Estonian government) and a section on the negative economic consequences for Estonia.

The different narratives presented in the Estonian and Russian versions highlight the contingent nature of distributed power, especially regarding viewpoints that are heterodox to the community concerned. Although each language's entry had a sufficiently 'neutral point of view' to remain without significant edits during the year-long monitoring associated with this research, the contrasts in topics and tone reflect the power of Castells' programmers and switchers in

setting the agenda within their network. In contrast, the article in the Internet's *lingua franca*, English, is by far the most highly contested of the three. The entry itself only contains 1800 words, but the discussion pages about the article contain more than 70 000 words of argument – the textual equivalent of counter-mapping (Peluso 1995; Wood *et al.* 2010) – over the precise ways in which the Bronze Soldier and related events should be described (see Figure 1). The Estonian language article is roughly the same length as the English one, but the discussion page is one thirtieth the length with considerably less rancour in the exchanges. At 7500 words, the Russian language article is by far the largest but contains far less discussion than the English article. Clearly, the distributed power based on the make-up of participants varies according to who can or chooses to contribute. Approximately 70 per cent of the active contributors to the Russian and Estonian articles are from Russia and Estonia, while there is no dominant origin for the editors of the English article.

This case study demonstrates the highly uneven and subjective nature of virtual augmentations of place because of the workings of our four-fold typology of power. Despite clear policies that regulate neutral points of view, balance and impartiality (in the case of Wikipedia), representations of place are continually shaped by the distributed and communication power held by those who participate in their creation. Because of the existence of multiple networks and platforms in which place can be represented, augmented realities will necessarily always be characterised by multiple and contested representations.

### *Coding the transcendence of time at CentrePointe, Lexington, Kentucky, USA*

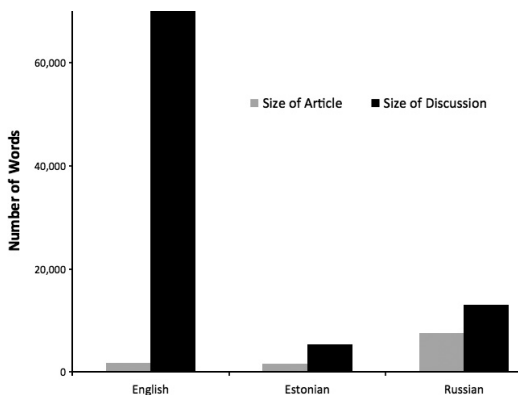
The timeless power of augmented reality represents an immense ability to structure representations of

place. For the virtual tourist in Lexington, Kentucky, Google's Street View affords a slightly unnerving experience where the old becomes new again, and the present not represented at all. Head west down Main Street into the heart of downtown and a 'sidewalk closed' sign hangs precariously from a jutting chain link fence circumscribing the perimeter of an entire rubble-strewn block. But approach the block from the opposite direction and something strange happens: the rubble disappears, the sun comes out, pedestrians walk the previously torn up sidewalk. The parking meters beside the jewellery store are occupied; business and life go on as normal. Two outdated sets of images comprising a professionally generated Street View representation of the block are software-stitched into a continuous panorama of a time that never was (see Plate 3).

The immediacy of the immersive and apparently dynamic experience of 'walking through' downtown Lexington's Street View provides an illustration of the timeless power of augmented reality to obfuscate the fact that the imagery behind it is both static and outdated. Older imagery blends seamlessly with newer imagery in creating an authoritative and coherent-looking whole in the present, betrayed programmatically only by a tiny caption within the Street View interface indicating 'image date'. Mediated by Street View, downtown Lexington is disorienting, offering an almost voyeuristic window onto the past lives of the flattened Victorian facades and the shoppers whose blurry figures and digitally blanked faces are afforded a degree of permanence (cf. Kingsbury and Jones 2009).

This temporal levelling of timeless power is even more poignant with the knowledge that the 'Centre-Pointe' block in downtown Lexington is a contested landscape complete with user-generated commentary and memories. Located prominently on the south side of Lexington's Main Street, the block was acquired by developers as the site for CentrePointe, a 'landmark' 35-storey mixed use residential/retail and hotel development (Fortune 2008a). Objections to the proposed development were (and remain) legion (Fortune 2008b; *Lexington Herald Leader* 2011). Although the historical preservation argument was dealt a major blow as the wrecking ball swung through the last of the block's historical architecture, the memories of the block persist. Numerous temporal layerings of user-generated content showcase the enactment of distributed power in the creation of a collective imagination that both relies on and exceeds the materiality of the place itself (Edensor 2005).

Within its augmented realities, this downtown block is littered with user-contributed photographs depicting its pre-demolition heyday. Images entitled 'Lexington skyline' and 'Joe Rosenburg diamond broker' (in reference to one of the relocated businesses



**Figure 1** Size of Wikipedia article and discussion by language



**Plate 3** Downtown Lexington viewed through Street View. Note the absence of buildings (top) and their presence (bottom). Although ostensibly ‘current’ within Google Street View, the (at least) two sets of imagery depict the block in 2009 and 2007 respectively

Source: Collected by the authors via Google Maps on 14 March 2011 (© 2012 Google)

from the site that Google’s algorithms still locates here), memorialise, perhaps indefinitely, the former streetscape. These images may be long ago forgotten by their creators, stored online only for convenience, lost among a sea of new and different material, only to be washed up years later by an unknown searcher. They present snapshots of a time, or of multiple times, when this place was significant to someone, when *something happened* that piqued a photographer’s imagination. Separated from the moments of their creation, from their origin stories, from the motives and imaginations of their photographers, these snapshots in time now stand as annotations of place. They are echoes of the pasts of which they are products, but they are also affective, ‘available as a resource to be taken up and through which present actions can occur’ (Crag and Travlou 2001, 173) as they contribute to the enacting of augmented reality.

The timeliness and accuracy of these representations are dependent upon the vagaries of user-generated content. The Google Maps interface is no exception since user-editing of information and reporting of inaccuracies is not only possible but necessary for the maintenance of the company’s vast international databases of georeferenced information. As such, this peer review offers an avenue for the enactment of distributed power. This is both a major

democratic strength, and a potential threat, to the accuracy (Goodchild 2007) of constructed augmented realities as users manipulate information towards particular ends. Until 2011, the Dame music hall, formerly located on the demolished CentrePointe block, remained one of the top results for a search on the keyword ‘Centrepointe’ in Google Maps. Although the venue had been designated as ‘permanently closed’ by 2009, the user-contribution functionality of Google Maps provided the public sufficient distributed power to readily change that ‘fact’ (see Plate 4).

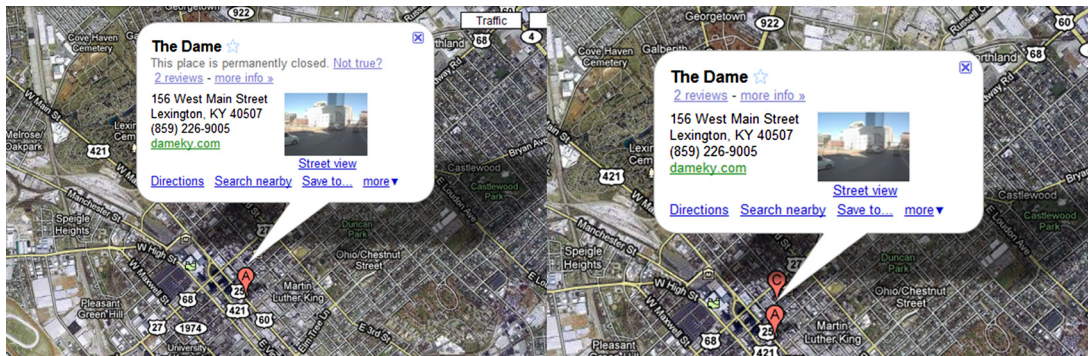
Rarely are the contradictions of augmented realities’ ambivalent temporalities as stark as in the CentrePointe case, and one might contend that such inconsistencies are inevitable and of little consequence. But we argue that it is the temporal ambivalence of these representations as a particular set of claims to locations that makes it imbricated so fully in the palimpsests of place (Graham 2010). Subjective experiences of place-as-augmented reality therefore involve not the layering of an imperfect or inaccurate ‘virtual’ (qua digital) reality over an ‘actual’ (material) reality, but rather the re-combination of multiple discourses and multiple temporalities into indeterminate and multiple presents (Crag and Travlou 2001).

### Critical geographies of augmented realities

With the increasing prevalence of both spatialised information and the technologies needed to access such information, geographic content, and the code through which it is regulated, plays an ever more central role in augmenting and mediating realities. Through a series of explorations of digital augmentations of places, we provide a broad overview of not only the ways in which augmented realities matter, but also the complex and duplicitous manner by which the power relations that construct code and content congeal our experiences of them.

Because the re-makings of our spatial experiences and interactions are increasingly influenced through ordering, stabilisation and contestation of code and content, we focus on how power, as mediated through technological artefacts, code and content, helps to produce place. Specifically, we identified four key moments for examining the ways in which power works through augmented realities: two manifested largely by social actors, distributed power and communication power; and two enacted primarily via software, code power and timeless power.

Communication power is exerted through the creation, interpretation, recirculation, repackaging and even contestations of content. Distributed power refers to the decentred practices of content creation



**Plate 4** User-generated information closes (left) then opens (right) the Dame

Source: Collected by the authors via Google Maps on 21 and 22 April 2010 (© 2012 Google)

and shaping in augmented realities. This creation and re-creation of spatial representation occurs not by a fixed entity or discrete actor, but by a much more amorphous group lacking knowable (and challengeable) contours.

Code power is derived from the performativity, technicality and ephemerality of software as a mediator of content. Within augmentations, code can function as a set of laws to govern or influence how space is brought into being (Kitchin 2008; Kitchin *et al.* 2009). Code's often duplicitous, ephemeral and highly personalised nature can make it difficult to map, measure and challenge. Finally, timeless power refers to the dissolving of temporal meaning within augmentations. The 'here and now' of traditional material experience is continuously augmented by the 'here' but not by the 'now'.

The lines of separation between these contexts of power are undoubtedly blurred, but by constructing this typology and exploring how power can be exercised through a series of examples, our goal is to provide a useful beginning for developing further understandings of the generative social process through which augmentations of reality shape how place is brought into being. In developing this framework we illustrated the utility of addressing questions of augmented realities within a broader critical geographic engagement with key questions of representation, power and place. As Thrift notes, 'space is clearly the stuff of power. But, equally clearly, it is the stuff of creativity and imagination' (2000, 274). Further explorations are undoubtedly needed into a range of questions in this area. What tools, methods and theories should be employed to make sense of the highly distributed ways in which content and code are shaped and reshaped, enacted and re-enacted? As technologies are increasingly used to automate the production of space, how should inequalities in information about place best be addressed from theoretical and practical standpoints? What are the dangers of being excluded from digital representations, and what are the emanci-

patory possibilities and potentials that can be realised through practices of augmenting place?

This paper has begun the task of looking 'behind the screens' of digital representations of place within an explicitly geographic framework. Given the important role that digital discourses (in the form of geographically referenced content) play in co-constituting place, we call for redoubled attention to both the layerings of content and the duplicity and ephemerality of code in shaping the uneven and power-laden practices of representation and experience of augmented urban places.

## Acknowledgements

Thanks to Anna Secor, Muki Haklay and three anonymous viewers for their constructive comments on earlier drafts of this paper. All three authors contributed equally to this article.

## Notes

- 1 It should be noted that all of these terms are inherently problematic and can fail to capture the broad range of practices associated with the broadening of participation in online content creation. Content is not necessarily volunteered by willing agents, nor is it necessarily produced by users. However, for the purposes of consistency in the remainder of this paper, we use the term 'user-generated content' to refer to content produced and gathered in a relatively decentralised manner.
- 2 See, for example, Google's Realtime search function, which incorporates up-to-the-second micro-blog feeds, news stories and other content into the results for any search term.
- 3 The positioning of sponsored advertisements is still influenced by opaque algorithms, but it remains that having a sponsored advertisement provides a higher degree of visibility.
- 4 The ordering of geographic data (or the augmenting of realities) by Google is focused on because of the impact and reach of Google's representations (it serves a third

of all searches in Russia and over one half of all searches in the UK, US and Estonia) (<http://marketshare.hit-slink.com>; Accessed 28 June 2012).

- 5 See [http://meta.wikimedia.org/wiki/Foundation\\_issues](http://meta.wikimedia.org/wiki/Foundation_issues) (Accessed 28 June 2012).

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