



# TelSoc

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### Public Wi-Fi

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#### Abstract

Public Wi-Fi services are rolling out across Australia, with city councils and telcos building large-scale networks in urban areas. Questions as to the value of public Wi-Fi have never been more significant in the Australian context. In this article we explore how free Wi-Fi services offered by cultural institutions and municipalities influence public spaces, and ask how such services can engender practices which promote the social good.

Drawing on ethnographic research into six Wi-Fi equipped spaces in Victoria, we find a variety of issues which influence whether a service will be popular and hence have a significant influence on public space. Services which are popular enable a range of uses, and this can add to the appeal and atmosphere of a space. However, Wi-Fi has yet to truly facilitate the kind of social interactions and rich civic placemaking we associate with the social good.

## Introduction

Free public Wi-Fi services supplied by cultural institutions, municipalities and telcos are rolling out across Australia (Lambert et al. 2013<sup>[7]</sup>). Wi-Fi is taking its place alongside other concepts such as the 'smart city' and the 'Internet of Things' as a much hyped media future. However, despite this enthusiasm, relatively little is known about what effects free public Wi-Fi will actually have in the Australian context. In this article we consider public Wi-Fi as it relates to issues of public space and the social good. How do these services influence social life in public spaces, and is this influence cognate with a civic, inclusive, cosmopolitan and creative conception of the social good?

Between late 2012 and early 2013 we surveyed a number of free public Wi-Fi projects provided by municipalities and cultural institutions. We studied public policy and planning documents and interviewed representatives of the different institutions. We also conducted ethnographic research at six Wi-Fi equipped sites in Victoria to understand how and why people use free Wi-Fi. A variety of factors influence whether a Wi-Fi service will attract regular users and significantly influence a public space. There is also a variety of ways in which people use free Wi-Fi. In what follows we will explore these ethnographic findings within the context of current significant transformations in Australia's Wi-Fi landscape.

### Wi-Fi narratives and debates

'Wi-Fi' is the popular name for the IEEE 801.11 technology standards which enable wireless networking between devices across the class-licensed 2.4 GHz spectrum band. The last 15 years have seen the rapid distribution and commodification of Wi-Fi technology in Internet routers and computers. Wi-Fi hotspots have appeared in homes, workplaces, and public spaces of consumption such as cafes, hotels and airports (Economist 2004<sup>[8]</sup>).

Since its popularisation, Wi-Fi has been embroiled in quasi-utopian narratives of the digital city. For example, the P2P foundation imagines a 'wireless commons' which closes the digital divide, enlivens the city and fosters innovation and creativity ([p2pfoundation.net/wireless???commons](http://p2pfoundation.net/wireless???commons)<sup>[9]</sup>). Early supporters of this doctrine had a grassroots and often illegal character. Some took to mapping Wi-Fi by driving around looking for unsecured networks, a process known as 'wardriving', and posting these maps on the Web (Sandvig 2004<sup>[10]</sup>). Yet these networks became increasingly unreliable as network owners became more savvy with password protections. Community Wi-Fi networks also emerged in which members meshed together hotspots they owned and managed in their homes. Yet licensing laws often prevent these networks from providing Internet to the public (Sandvig 2004<sup>[10]</sup>). Some community networks have attempted to collaborate with governments to provide free public Wi-Fi. Yet these projects often fail due to a mismatch between the technologies, practices and ideals of community Wi-Fi members and government policy makers (Heer et al. 2010<sup>[11]</sup>).

Overall, the early enthusiasm around free Wi-Fi can be critiqued for not appreciating the legal, institutional and technological problems which determine the outcomes of Wi-Fi networks in specific cultural and economic contexts (Goggin 2007<sup>[12]</sup>). Municipal Wi-Fi initiatives, which took off in the United States around 2004, have also had to grapple with these issues: specifically, the contradictions that exist between the allure of free Wi-Fi and the often costly realities of implementing it. The US broadband landscape is dominated by a few incumbent providers whose monopolistic market effects are often blamed for broad swaths of the population lacking sufficient broadband (Crawford 2013<sup>[13]</sup>). Municipal Wi-Fi services were justified as a response to this digital divide, and this began a significant economic and regulatory debate on the role of government in providing free Internet (Gibbons & Ruth 2006<sup>[14]</sup>; Shaffer 2007<sup>[15]</sup>). Within this context numerous studies focus on describing the value of different public/private partnerships in relation to network ownership, architecture and management (Bar & Park 2005<sup>[16]</sup>; Evenepoel et al. 2012<sup>[17]</sup>). Other studies decry municipal Wi-Fi outright, arguing such services are discriminatory and crowd out competitive ISPs (McClure et al. 2005<sup>[18]</sup>).

Australia's economic and cultural environment has significant differences. Broadband penetration is higher, and the Australian mobile internet service sector is quite competitive. Australians have embraced wireless services. According to the Australian Bureau of Statistics (2013<sup>[19]</sup>), as of December 2013 there were 20.3 million mobile Internet subscriptions. As Potts (2014<sup>[20]</sup>) has argued in this journal, Australian cities cannot point to significant market failure as a justification for free public Wi-Fi. Potts goes on to detail how the provision of free public Wi-Fi could lead to negative outcomes. Like any attractive 'free' resource, public Wi-Fi has to be paid for by someone. Potts argues that the provision of free public Wi-Fi could increase local rents, which in turn could cause an increase in local prices. Costs will be passed on to visitors, and those with less disposable income might be excluded from free Wi-Fi equipped places. This conventional market-led argument seems limited on at least two counts. First, it is yet to be tested empirically as to whether the introduction of Wi-Fi in already populous and competitive areas will have a significant effect on rents and prices, or whether (as we predict) Wi-Fi will come to be seen as an integral part of public infrastructure alongside services such as electricity and telephony. Second, it treats the potential benefits of public Wi-Fi as accruing entirely to individuals, and ignores any collective benefit that might arise from the contribution that Wi-Fi makes to public space as a site of social interaction.

Overall much of the literature on municipal Wi-Fi lacks a grounded analysis of the social and cultural practices which free Wi-Fi engenders, and whether these practices contribute to the social good. We understand the relationship between the social good and public space through a range of processes and principles. Public spaces are important sites for fostering communities in contemporary society. They are sites for community members to socialise in serendipitous and unplanned ways, and can help to provide a sense of belonging and inclusiveness. Public spaces host creative cultural expression and are a vital site for different groups to express their diverse cultural identities and collectively negotiate differences (Carr et al. 1992<sup>[21]</sup>). In this sense public spaces are important for fostering cosmopolitanism and cultural citizenship in an increasingly heterogeneous, globalised world (Binnie et al. 2006<sup>[22]</sup>). Public spaces also host forms of public activism and protests, and hence are critical sites for informal democratic participation (Mitchell 2003<sup>[23]</sup>). Nevertheless, there is a sociological concern that public space is in 'crisis', and that various structural forces are causing more social atomisation and cultural homogenisation (Mitchell 2003<sup>[23]</sup>; Tonkiss 2005<sup>[24]</sup>). A key question is how networked public spaces, including those with free public Wi-Fi, can avoid this state of affairs and engender the positive attributes mentioned above.

### **The drivers of free public Wi-Fi in Australia**

The factors which drive the implementation of a free public Wi-Fi service are important in determining the eventual characteristics of that service and, consequently, the influence it will have on public culture and public space. A number of Australian public institutions have established free Wi-Fi services for a variety of reasons. City councils are primarily concerned with how Wi-Fi will stimulate local economies, though it is also hoped that Wi-Fi will augment other city services. Sometimes more community-minded outcomes are also foregrounded in policy documents and press releases.

Most councils are primarily interested in using free Wi-Fi services to attract more visitors, such as tourists and students, and hence increase local business revenue. Hotspots are often rolled out in commercial precincts and near sporting venues. Cities such as Brisbane, Geelong, Adelaide and Canberra expect Wi-Fi will also lead to innovations in creative and technology industries, spurring on, in the words of ACT minister Katy Gallagher (2014<sup>[25]</sup>), the 'tech savvy population' and 'small, innovative entrepreneurs'. Indeed, there is a common and frequently stated belief in Wi-Fi's potential as a powerful economic stimulus.

Councils are also using Wi-Fi to brand themselves as 'smart cities' in a global reputation economy which centres around the alluring aesthetics of digital urbanism. See, for example, Canberra's *Digital Action Plan* (2014<sup>[26]</sup>). This form of branding is expected to assist in attracting business investment and knowledge tourism in the form of students and certain types of mobile professional.

Councils also hope Wi-Fi will augment the value of other city services. For example, many councils provide splash screens with community announcements, safety warnings, event promotions and free marketing for local businesses. Press coverage of the Victorian Government's Wi-Fi project reports that Wi-Fi will serve as a wireless backbone for health, education and transport services (Cowan 2014<sup>[27]</sup>). We talked to Luu Nguyen, ICT Manager for the City of Adelaide, who told us the city intends to use its Wi-Fi service to support coordination between 'smart' city assets such as sprinklers, lights and parking spaces. Adelaide also intends to use wireless CCTV cameras which afford rapid deployment of surveillance infrastructure to trouble spots. The deployment of the Internet of Things throughout cities will undoubtedly have significant effects on public spaces.

Councils also value the potential for Wi-Fi to enhance communities, creating 'a more social environment' by allowing people to connect more in physical and digital spaces (Wollongong City Council 2012<sup>[28]</sup>). Similarly, the *Canberra Digital Action Plan* states, '[Free Wi-Fi] can transform community centres and spaces into digital spaces where residents and visitors can check email, access government services, update social media and find directions' (Canberra Digital Action Plan 2014<sup>[28]</sup>: 10). However, little is known about how these activities coalesce in such a way as to make communities more social and inclusive. As will be discussed later, it was the City of Moreland's intention to foster a safe and social youth community in Harmony Park, yet free Wi-Fi did little to help this cause.

Unsurprisingly, cultural institutions are more directly concerned with how Wi-Fi can enhance public space in partnership with forms of curation. Various art galleries and museums now use Wi-Fi in conjunction with mobile phone apps and RFID tagged exhibitions to support the delivery of exhibition content. Institutions which govern open public spaces, such as Fed Square P/L, which oversees Melbourne's Federation Square, also provide free Wi-Fi in partnership with interactive digital media events.

Overall, these various drivers for implementing Wi-Fi, if reflected in actual project design, could influence public spaces in a variety of different ways. For example, free Wi-Fi may help draw people to a location, but Wi-Fi supported surveillance may deter certain people and hence produce social exclusion. We discuss some early ethnographic findings about what makes a potentially popular Wi-Fi service later in this article.

## Recent evolution of Wi-Fi in Australia

The primary period of research for this study was between December 2012 and March 2013, and preliminary findings were published in a White Paper for the Institute for a Broadband Enabled Society (Lambert et al. 2013<sup>[7]</sup>). We found that free Wi-Fi projects, especially those offered by municipalities, were evolving in diverse and uneven ways across the nation. Most cities offered free Wi-Fi in municipal libraries, but at this stage only a handful offered Wi-Fi in other public spaces. Extant or planned services differed in a variety of ways. There were many small projects covering specific buildings, parks, squares and commercial streets, and a few emerging large-scale projects such as Brisbane City Council's (2012<sup>[29]</sup>) implementation of Wi-Fi in 22 parks and the City of Perth's (2012<sup>[30]</sup>) CBD project. Different locations tended to reflect council priorities, with commercial locations being favoured by small councils seeking to enhance local business districts. Councils varied in the business models they employed, resulting in different allocations of public and private ownership and control over the service. They also varied in the kinds of access limitations they placed on usage time, download volume, and controversial content such as pornography, file sharing and online gambling. It was difficult to ascertain the success of many of these projects. Usage statistics were hard to obtain and many councils were reticent in divulging actual capital and operating costs.

A year and half later, and the public Wi-Fi environment in Australia is going through a significant transition buoyed by a renewed interest from major telcos. State and city governments have partnered with telcos to provide large-scale free Wi-Fi services in Melbourne, Canberra, Perth and Adelaide. The Victorian Government has sought expressions of interest for a city-wide five-year free Wi-Fi trial (Cowan 2014<sup>[27]</sup>). The ACT Government has partnered with iiNet to provide 700 hotspots across 12 business districts by June 2015 (Coyne 2014<sup>[31]</sup>). Perth is extending its trial services in Murray Street, Forrest Place and Grand Lane to blanket the whole CBD (Robertson 2013<sup>[32]</sup>). Adelaide is currently operating the most generous and advanced free Wi-Fi service, 'AdelaideFree', with 300 hotspots covering high traffic areas in the CBD, parts of residential North Adelaide, and some surrounding parklands. Representatives estimate approximately 30,000 daily users (Francis 2014<sup>[33]</sup>). The service is run by Internode, an iiNet subsidiary.

While Perth's service is owned and operated by its city council, Adelaide and Canberra have opted to provide a one-time fixed portion of the costs while letting iiNet and its subsidiary Internode supply the remaining funds as well as own and operate the networks in both cities. How iiNet intends to sustain these large 'free to use' services is an interesting question. It may seek revenues from advertising, 'freemium' subscriptions, or through merely increasing the visibility of its brand. It is possible that iiNet will make cost savings if it chooses to offload its mobile broadband traffic onto the Wi-Fi network. More will be said on this below.

Alongside these large-scale municipal developments, telcos have also introduced plans for widespread commercial Wi-Fi projects. Since the announcement of the NBN, the second tier Telco industry has undergone expansive consolidation, with M2, TPG and iiNet emerging as challengers to Telstra and Optus across a range of services. In this context, mobile Internet solutions have become a significant area of competition and innovation. iiNet has introduced plans to install 30,000 Wi-Fi hotspots in Australian capital cities (Bingemann 2014a<sup>[34]</sup>). This commercial Wi-Fi network will extend existing customer broadband subscriptions and likely provide premium subscriptions to new customers, thus competing with more expensive 3G/4G services. The existing hotspots iiNet has developed for Canberra and Adelaide's free Wi-Fi services will also likely be incorporated into this broader network.

Telstra has also announced an innovative Wi-Fi network combining residential and business customer hotspots with 8000 Telstra hotspots in high traffic areas (Bingemann 2014b<sup>[35]</sup>). Telstra's fixed-line broadband customers will be given the opportunity to purchase a special modem which will allocate a portion of the customer's bandwidth to the general Wi-Fi network. All participating customers will be able to access the network, with non-participants able to establish access for a 'small fee'. Telstra is attempting a kind of Wi-Fi crowdsourcing, and predicts 2 million hotspots within five years, the world's largest Wi-Fi network.

It could be that ever increasing demand for mobile broadband is a chief reason for telcos re-emphasising Wi-Fi. As demand increases beyond the capacity of spectrum allocated to 3G/4G traffic, carriers elsewhere in the world are seeking to offload data to Wi-Fi networks in high traffic locations. A report by Juniper Research (2013<sup>[36]</sup>) estimates that 50 percent of 3G/4G data was offloaded to Wi-Fi networks last year. Telstra has denied building its Wi-Fi super network to alleviate 4G congestion (Colley 2014<sup>[37]</sup>); however global trends suggest that mobile offloading will likely drive Wi-Fi infrastructure in Australia. Within the context of all these changes, questions of why, where, how and who regarding the use of free Wi-Fi, as well as what outcomes this has for public space, become increasingly significant.

## Factors which make a free Wi-Fi service popular

The Wi-Fi discourse in Australia has recently become one of scale: blanketing entire cities, cornering markets and handling massive volumes of data. The danger here is that more nuanced factors which influence how and why people use Wi-Fi are diminished or covered over by the big picture. In this section we approach this problem by exploring the factors that make a particular Wi-Fi service 'work' in a particular public space. We begin by describing Victorian free Wi-Fi services we visited in the course of our research that could be said to have 'failed' in their attempts to enhance public spaces, largely because they garnered hardly any users. We are not criticising these attempts as they are in fact elucidating experiments in a relatively uncharted territory. These include projects in Darebin's Edwardes and Broadway Streets, the State Museum of Victoria, Moreland's Harmony Park and Geelong's Johnstone Park. Following this we describe services in Federation Square and the State Library of Victoria which attracted numerous users and hence had a notable influence on public space.

Edwardes and Broadway Streets are in the heart of Reservoir (a suburb of Melbourne) and contain various retail and lifestyle stores, restaurants, cafes, supermarkets, and health and fitness services. Darebin City Council (2012<sup>[38]</sup>) commissioned this Wi-Fi service based on a 2006 census which indicated a lack of domestic Internet connection in parts of Reservoir. The service was thus originally intended to provide Internet to surrounding residences. However, by the time it was implemented in 2010 many of the surrounding houses had obtained private Internet subscriptions, reflecting the national intensification of broadband penetration in this period. The service was scaled back to the commercial streets and the justification of its existence became less civic and more commercial. Participant businesses can give customers vouchers with passcodes to access the service, and these businesses can in turn utilise the network. However, when visiting the area we found no-one using the service. In fact, the Darebin service logged 413 non-business users over 10 months, approximately 1.3 sessions a day if averaged over that period (Darebin City Council 2012<sup>[38]</sup>). We suggest that spatial characteristics played a key roll in this outcome. Both streets are mostly pavement and lack open, comfortable places to sit down and use the Internet. They are utilitarian places for shopping and strolling, not for socialising or undertaking activities such as surfing the net. As will become apparent, Wi-Fi services come to life when augmenting recreationally designed social spaces.

The Museum of Victoria's service has a similar problem. The Museum occupies a large portion of the Carlton Gardens on the northern cusp of Melbourne's CBD. Surrounding the museum is a large, open concrete area with few places to sit in the shade. Beyond that, many visitors relax in the grassy gardens, though the museum's Wi-Fi service does not extend that far. The administration portioned off bandwidth from the internal staff network for public use to add value to the site, expecting the public network would eventually be integrated with exhibitions. However, when visiting the site we found no-one using the service in the public space outside of the museum building. Again we believe the spatial layout of this area is a primary cause of this outcome. The museum is surrounded by a stark, open, unshaded concrete exterior as shown in Figure 1, which provides few places to sit, socialise and browse the Web.

[39]

**Figure 1: Exterior of the Museum of Victoria**

Harmony Park in Coburg contains ovals, a playground, a skate bowl, and both shaded and unshaded picnic areas. A primary school and a kindergarten occupy the same block. The park is built around family and child-centred recreational activities, and this reflects the surrounding parts of Coburg and Coburg North, which consist mostly of family housing. Moreland Council funds an initiative called the OxyGen Project, which provides facilities and organises activities for the local youth community. Local youth requested free Wi-Fi in a 2010 council survey and so a hotspot was installed in Harmony Park. When we visited the park after school and on weekends we found families having picnics and youths skating. However, no-one was using the Wi-Fi service. There is no real need for Wi-Fi in Harmony Park, as the kinds of young people and families who come to the park are not there to surf the Internet but to skate and socialise. These other amenities construct the park as a particular kind of space in which Wi-Fi plays an insignificant role. Nearly every visitor spoken to admitted to being unaware of the existence of a free Wi-Fi service in the park. Compared to successful sites such as the State Library and Federation Square, the park does not attract a large amount of unique visitors, being in a comparatively quieter suburban neighbourhood. Harmony Park reveals how geographic and cultural location significantly influences the 'success' of a service.

Johnstone Park is in the centre of Geelong, close to a large commuter train station, Deakin University and a busy commercial district. Various municipal buildings containing a courthouse, a performing arts centre and the city library face onto the park. The library also has a Wi-Fi service, but this can only be accessed by guests inside the library building. Interestingly, despite the comfortable space and well-positioned location, we did not observe any users when visiting the site. The service is set up primarily as an information and marketing portal for tourists. Users can surf the council portal without any time or data restrictions; however, other forms of Internet use are severely restricted. The participating ISP offers a meagre 10 Mbit download limit with the hope it will attract visitors to a premium service. This case illustrates the distinction between an institution-centric service, which primarily provides council services and information, and a user-centric service which affords more unrestricted and data-hungry Internet practices. This service is unsuccessful, we argue, because it lacks a user-centric orientation.

Both Federation Square and the State Library are in the heart of the Melbourne CBD, opposite two of the city's largest train stations, and near heavy flows of students, workers, shoppers and travellers. Federation Square is marketed as a prime tourist location and cultural institution. It contains various bars and cafes, the Ian Potter Gallery, a National Gallery of Victoria studio, and the Australian Centre for the Moving Image. Outside, a large public screen faces an expansive stone piazza. Similarly, the City of Perth's Northbridge Piazza combines a large public screen and Wi-Fi service, and there are plans for similar spaces in Greater Dandenong (Barber 2014<sup>[40]</sup>) and Canberra's Garema Place (Digital Canberra Action Plan 2014<sup>[26]</sup>). The Federation Square service is robust and covers a large area, so people can be found using Wi-Fi all over the piazza, sitting on grass, concrete edges and steps, on fold-out chairs, and crowding on the steps in the eastern crook of the square where the signal is strongest. An example is shown in Figure 2.

[41]

**Figure 2: Tablet user sitting in the complimentary beach chairs at Federation Square**

The State Library of Victoria is opposite RMIT and the Melbourne Central Mall. Its free Wi-Fi service covers the interior of the library as well as a small foyer and a rectangular outside area with grass, benches, concrete platforms and stairs. (See Figure 3.) As with Federation Square, we found people using the service all over the outside space, though most users crowded on the stairs near the library entrance where the signal is strongest. We conducted our research in February 2013 when it was very hot, and we found many users escaping into the comfortable and air conditioned library foyer to use the free Internet.

[42]

### **Figure 3: Lunchtime out the front of the State Library, Swanson Street.**

Both Federation Square and the State Library attract a lot of users, with representatives estimating user levels averaging in the hundreds daily. Based on the short interviews we conducted with visitors in both spaces, we find most users to be either travellers, students or out-of-office professionals. Students and professionals come to use the Wi-Fi as a means of escaping the distractions and confines of home or the office. Some students come to the lawns outside the State Library because they intend to eventually go inside to use other library resources for study. Travellers come to both spaces because they are close to their accommodation. Hostels often charge to use Wi-Fi or have unreliable connections, making free services more attractive to travellers with tight budgets. The travellers we spoke to had also visited cafés to use free Wi-Fi, but many preferred the State Library and Federation Square as there was no obligation to buy anything.

Visitors also come to the State Library and Federation Square because of the other attractions these spaces and surrounding businesses offer. These other use values work with Wi-Fi rather than against it. For example, using the library complements the needs of students and out-of-office professionals to study and work. The media assets, such as the large public screen at Federation Square, work with the desire to use the Internet for entertainment and sociality. For example, we visited Federation Square when the Super Bowl was playing on the public screen, and many people were checking sport statistics on their devices while also communicating with family members in America.

Most participants reported coming because they liked the ‘look and feel’ of these places. They were described as ‘comfortable’, ‘nice’, and ‘easy on the eye’. People reported enjoying the ‘atmosphere’, which one participant described as ‘lots of people relaxing, looking happy’. Unlike the negative cases discussed above, both Federation Square and the State Library are busy spaces with numerous attractions and hence are capable of pulling in new visitors who seek this kind of atmosphere.

To summarise, both the State Library and Federation Square ‘work’ as free Wi-Fi spaces because they are located in busy areas, near people who have a demand for network services, are attractive spaces which have a social atmosphere, and have a confluence of other use values which work with Wi-Fi rather than against it.

## **How people use free Wi-Fi**

Visitors to Federation Square and the State Library used laptops, tablets and smartphones and engaged in different forms of use which we conceptualise as ‘supportive’, ‘productive’, ‘entertaining’ and ‘social’.

Travellers primarily engaged in ‘supportive’ forms of use. Many travellers had just arrived in Melbourne, were young, on a tight budget and had yet to find more permanent places to live and work. They valued free Wi-Fi to help support themselves in various ways, such as sending out job resumes and responding to online accommodation advertisements. Travellers also used free Wi-Fi for interpersonal support, emails and social media such as Facebook to communicate with friends and family.

Students and out-of-office workers come to use free Wi-Fi to complete study and work tasks. **Melissa Greg (2011)** <sup>[43]</sup> has explored the way in which mobile media accommodates an expansion of professional work beyond the office and the ‘9 to 5’ time slot. Laptops, smartphones and tablets are the tools of entrepreneurs, freelancers and home workers who often do not have a specific work space and hence rely on Wi-Fi equipped spaces such as cafes, co-working hubs and places like Federation Square and the State Library. Free Wi-Fi is a key form of infrastructure which, in enabling ‘productive use’, transforms public spaces into ‘productive spaces’.

Visitors also come to these places to ‘chill out’, ‘relax’, and use the free Wi-Fi to ‘kill time’ surfing the net. This is a form of digital leisure which can be conceptualised as ‘entertaining use’. Because it involves data-hungry activities such as watching YouTube videos it requires user-centric services with low restrictions on download volume.

Finally, visitors come to use free Wi-Fi to socialise with friends over the Internet via email, Skype, and social media. Most people were using some form of social media, with Facebook being the most common. Visitors upload photos, make or respond to updates, and scan News Feeds. Visitors also use free Wi-Fi in pairs and groups. Those engaged in supportive, entertaining and social forms of use were more likely to be with at least one friend compared to those who said they were studying or working. It was much rarer for people to have engaged in a social interaction with a stranger while using Wi-Fi. In cases when this did happen, it was usually to respond to a request for directions or a question as to how to log onto the service.

## Discussion

This research has described a range of factors which influence whether a Wi-Fi service will be popular, as well as how and why people use a popular service. Not every space is appropriate for free Wi-Fi, as the design of a space, its material attributes and location, the existence of other amenities and attractions, and a proximate demand for free Wi-Fi all come into play in determining the 'success' of a service. CBD projects will likely be more successful than suburban ones by virtue of their greater population flows and densities. However, it is likely that there are many places within a CBD which are not appropriate for Wi-Fi because they lack the attributes discussed above. CBD-wide 'blanket' services such as those being constructed by Perth, Adelaide, and Melbourne may be providing Wi-Fi in places it will be rarely used, a potential waste of resources better spent elsewhere.

Looking at how people utilise free Wi-Fi in popular sites helps understand whether its introduction will enhance public space in line with a conception of the social good. Federation Square and the State Library of Victoria are successful in attracting people to a particular place and enhancing the perceived 'atmosphere' of space, which goes toward a kind of cultural place making. They are also successful in providing Internet to people in need, namely travellers, youth and out of office workers, and thus address issues to do with digital equity. They are user-centric services which enable a range of uses, discussed above, which are undertaken alone and in both physical and virtual social contexts. However, our initial observations found that users tend to be 'cocooned' within existing social relationships, which means they may be less open to chance public encounters and experiences, confirming previous theory and research (Habuchi 2005<sup>[44]</sup>; Hampton et al. 2010<sup>[45]</sup>; Humphreys 2007<sup>[46]</sup>; Ling 2008<sup>[47]</sup>). This kind of cocooning is potentially harmful to the cosmopolitan principles stated above. Public institutions that genuinely want to construct good public places supporting rich social interactions between diverse groups should be mindful of this, and should consider strategies for encouraging cross-group mingling. Federation Square often has events and, as the Super Bowl example reveals, these can work with Wi-Fi use. Public institutions have an explicit incentive to engage in this kind of cultural curation, stemming from their responsibility to the social good. Yet achieving these outcomes may require further advocacy and education in local government about the relationship between public space, network technology and mobile media.

It is also worthwhile contrasting this public and civic orientation with how commercial entrants into the Wi-Fi space have considered public space and, indeed, the public. Commercial providers tend to categorise space primarily in terms of demand for different services and the opportunities for market gain when considering competition, population and mobility statistics, usage volumes and access to broadband infrastructure. In this context 'the public' is defined as a collection of businesses and individual mobile consumers who are monetised through subscription plans and forms of surveillance which yield valuable data on patterns of use and consumption. While this orientation is understandable, it means that the question of the collective, public or civic benefit that might arise from networked public space are often ignored. An alternative provided by a cultural institution or municipality is in the position to treat the 'public' and public space differently and create places where users have collective experiences with less intensive forms of personal data surveillance.

## Conclusion and questions for further research



Australia is transitioning from a diverse but unevenly developed public Wi-Fi landscape into a far more institutionalised and expansively capitalised one in which public and private players are cooperating and competing on large-scale urban projects. It may still be too early to say how these new Wi-Fi services will affect public spaces, cultures and the social good. Further research should focus on some of the key open-ended questions touched on in this article. Will Wi-Fi services significantly affect rents and prices in already populous and competitive urban areas, and will this have a negative, exclusionary effect on public space? How will the emerging large-scale, citywide free Wi-Fi projects influence the many different public places they cover in different ways? How will co-located free and commercial Wi-Fi services influence each other? What will users prefer, and how will the adoption of one over the other influence public spaces? Finally, how can local governments curate networked public spaces to foster more virtuous public experiences?

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