Enhancing the Experience of Public Transport Users with Urban Screens and Mobile Applications

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ABSTRACT
Public transportation is an environment with great potential for applying location-based services through mobile devices. This paper provides the underpinning rationale for research that will be looking at how the real-time passenger information system deployed by the Translink Transit Authority across all of South East Queensland in Australia can provide a core platform to improve commuters’ user experiences. This system relies on mobile computing and GPS technology to provide accurate information on transport vehicle locations. The proposal builds on this platform to inform the design and development of innovative social media, mobile computing and geospatial information applications. The core aim is to digitally augment the public transport environment to enhance the user experience of commuters for a more enjoyable journey.

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

General Terms
Management, Design, Experimentation, Human Factors.

Keywords
Urban Informatics, public transport, social media, passenger movements, interaction design, mobile technologies, ubiquitous computing

1. INTRODUCTION
Public transport infrastructure represents a unique urban space in the sense that citizens with diverse socio-economic backgrounds come together for extended periods of time at regular frequencies, with usually little environmental stimulation. A passenger sitting on a vehicle is an ideal candidate to be entertained or informed about not only the next stop and the facilities available nearby such as commercial organisations or public service facilities, but also about the people sitting next to them. In addition, daily commuters are a congregation of local experts. How can this crowd be sourced in this situation of their daily commute and in meaningful and mutually beneficial ways?

Public transport is thus an environment which has great potential for the application of location-based services through the use of mobile devices. This paper is looking at how the new real-time passenger information system being deployed by the TransLink Transit Authority across all of South East Queensland in Australia can provide a core platform to improve commuter’s experiences. This system relies on mobile computing and GPS technology to provide accurate information on the location of transport vehicles, and it is this platform which our study intends to build upon.

Previous research in ways to enhance the user experience in urban environments has led to applications such as CityWare [16], which utilises Bluetooth nodes at public locations and a link from a user’s Bluetooth device to their Facebook profile to present information about the people an individual encounters most frequently. However, this system does not fully exploit the environment of public transport where familiar strangers [20] are together for extended periods of time at regular frequencies, with little environmental stimulation. These characteristics of the space offer opportunities to trial digital augmentation scenarios that foster social connections between individuals, or use ambient visualisations of historic presence data that do not require commuters to directly interact with each other.

There are new opportunities afforded by the provisioning of real-time scheduling information to users through innovative design solutions on web systems, mobile applications and urban information displays. We will look at ways to utilise multi-platform interfaces to engage commuters. Initial applications are looking at either embedding portals to social networking sites, or creating novel social networking applications. Both approaches will exploit the real-time location information to add new value to social networking. In the former case, by enhancing existing social networking sites with real-time location information, a collective presence can be created online. For example, all passengers on a particular bus can join a collaborative group to chat, share podcasts [1], signal intended destinations, or ask for advice on tourist attractions. In the later case, new applications can be created which utilise the real-time location information to not only display accurate scheduling information, but assist in capacity management and on-demand public transport by allowing people to signal their intended trips in advance. Further benefits of this kind of application would be to inform individuals of friends who may be on closely-aligned trips, and to suggest impromptu gatherings on public transport by minor modifications of trip timing, for example by running to catch an earlier train, or waiting an extra half hour at work to miss peak hour and chat with an old friend.

The specific aims of our study are to:

1. Identify new opportunities that arise from connecting data made available by real-time passenger information systems with social media applications.
2. Inform the design and development of multi-platform prototypes that are deployed across urban screens, web applications, and mobile devices.

3. Evaluate these prototypes in the field according to criteria of usability, usefulness and experience.

4. Understand the balance between the opportunities of these interactive services and locative media on the one hand and issues of identity, trust and privacy on the other.

5. Explore and assess the implications of deploying these technologies for the development of an integrated public transport infrastructure that meets the demands of a growing population in South East Queensland.

The quality and excellence of a telematic system contributes significantly to the user experience of public transport. However, the accessibility of real-time information of bus, train and ferry locations is only a necessary first step which other ideas can build on and add further value. We will conduct applied research and development of human-computer interaction and user experience design in urban environments. It focuses on web systems, locative media, mobile applications and urban screens as communication devices to support the exchange of real-time information. At the moment, commuting is a socially isolating experience. However, it bears great potential as a platform for fostering social connections because of the confined space that people travel in. The primary goal of this research is to explore innovative design solutions that take advantage of the telematics infrastructure currently being tested and deployed by our partner TransLink in order to provide value-added services and enhance the experience of public transport users.

2. TRENDS IN PUBLIC TRANSPORT

South East Queensland (SEQ) is Australia’s fastest growing metropolitan region. From 2006 to 2031, its population is expected to grow from 2.8 million to 4.4 million people [28]. The region covers 22,890 square kilometers, stretching 240 kilometers from Noosa in the north to the Queensland-New South Wales border in the south, and 160 kilometers west to Toowoomba.

The SEQ region includes land covered by 11 city and regional local governments. SEQ’s population is heavily urbanised and is generally concentrated in Brisbane and Toowoomba and at the Gold and Sunshine Coasts. By 2031, an additional 754,000 dwellings will be required, as well as supporting infrastructure and services. This will impose significant social, economic and environmental pressures on the region.

Car use in SEQ is growing. Private cars will continue to be used into the future for the majority of trips in SEQ. However, with oil supply vulnerability, dependency on cars will cause financial stress to urban-fringe communities and vulnerable groups.

• Public transport is the more sustainable transport mode and must be made more viable and attractive. In recognition of this need, our partner TransLink and the state government have improved and will further improve the public transport infrastructure and services.

• A strong busway network has been started in the Brisbane area and planned investments for more busways, new train lines and light rail systems are underway.

• The public transport fleet is being updated with visually stimulating vehicles that make people want to look inside and be part of the experience. However, even though newer buses provide more aesthetic appeal, better impressions of space, light, style, quality and comfort, it does take a long time for a current fleet to be updated.

• Ticket sales management has been improved through the introduction of the GoCard, providing reduced cash leakage, greater accountability, faster passenger loading, more convenience for passengers, easier sales process for drivers, detailed revenue and passenger load reports.

• A real-time passenger information system will be deployed by TransLink, which will enable more accurate journey planning based on where the buses are at the time of planning.

Despite these improvements in reliability and efficiency, the act of traveling on public transport usually remains a rather dull experience, which most commuters would not associate with fun. One exception are travels on Brisbane’s popular CityCat, a catamaran which provides travels on the Brisbane River so enjoyable that residents might even consider a trip purely for the enjoyment and not just to get from origin A to destination B. The ultimate aim of this study is to provide similar associations of public transport for enjoyment on TransLink’s buses and trains.

Long distance travel providers such as the aviation industry and train providers, have recognised the importance of enhancing the travel experience by installing in-flight entertainment systems. However, these solutions are not directly transferable to local public transport because vehicles travel shorter distance, more frequently, with more passenger changes and turnaround. Within local public transport, the most innovative solutions so far have been installing passive TV screens, which show content such as news, weather, sports, general entertainment and a What’s On guide. However, it is usually largely left to the commuter to entertain themselves, e.g., by reading a book, newspaper or magazine, playing games on portable consoles, listening to music – mostly isolating activities, and more recently by using their powerful and smart mobile phones which allow users to do all of the above and much more, specifically social networking applications such as Facebook and micro-blogging such as twitter.

While infrastructure and service improvements are largely well understood and well supported financially, the following question is far less well understood: How can introductions such as the GoCard (history data) and real-time passenger information systems in combination with the affordances of social data, ubiquitous mobile phones and public screens, innovatively enhance the experience of daily commuters?

3. FUNOLOGY & EXPERIENCE DESIGN

This paper will be investigating opportunities to enhance the experience of commuters in all aspects of their journey, starting with the planning, the waiting at the platform or bus stop and the payment before the journey, being on the vehicle during the journey, and the time after the journey. Instead of focusing on efficiency and speed of each of these steps, we will focus on making the experience more enjoyable and meaningful, in particular through the innovative combination and interaction of technologies such as mobile devices and urban screens, real-time data and sensor networks, as well as social media and Web 2.0. In addition, the planning, duration and post trip experiences will be contextualized as a cyclical process where the information from a previous trip can help inform decisions for the next trip. Data about sustainability such as energy saved by not driving is one
example. By taking this approach, the project aims to think outside the square to create a user experience that stretches the way we think about what it means to be a public transport user.

3.1 Before the Journey
The TransLink website currently ranks number one among all Queensland Government websites, which is evidence that commuters are increasingly searching for public transport options as an alternative to using their cars. One million visitors look up the site each month, mainly for planning their journey. The Google Transit Partner Program invites public transport agencies from all over the world to participate by making their stops, routes, trips, schedules, fares, available in a standardised manner so users can use Google Maps to search for nearby bus stops or to get directions from A to B using public transport as the desired transport option.

Real-time passenger information systems such as the one deployed by our partner TransLink will allow future journey planners to calculate the fastest and most efficient trips. This can be done based on the current location of the TransLink’s fleet at the time of the request, as well as based on where the fleet is predicted to be at the time of travel. The latter takes into consideration real-time information of traffic congestions or other obstacles which might impact travel times. Furthermore, systems like these allow the real-time information to be accessed through various platforms so commuters can access it where and when it is needed, such as before going to the bus stop. Real-time passenger information systems are well understood and engineered, however, they are currently exclusively targeted at reducing waiting and travel times. What is far less understood is how different journey options can be planned, assessed, and distinguished on the premise whether they are going to be more fun rather than faster.

There are several innovative scenarios to be explored in which a more enjoyable journey could be preferred, for example, when travelling with a lot of luggage or a baby and a pram. Under these circumstances a passenger may opt for a journey that provides the most space. Furthermore, systems built on top of social networking sites may aim at enhancing the chances that a friend (or a friend of a friend) or a work colleague happens to be on the same bus (or is being avoided). In this way, real social interactions or casual business meetings could take place (or are purposefully avoided) while commuting. Using location data to maintain social networks is similar to the growing number of commercially available social mobile applications, including Google Buzz and Latitude, Foursquare, Brightkite, Plazes, Fire Eagle, Zkout, Rummble, etc. Systems that provide such functionality, require the close interaction between the real-time passenger information systems, real-time sensing and social networking sites that need to be further explored, especially with regards to identity, trust and privacy. We hope to better understand how these elements and aspects can interact with each other.

With regards to the waiting time at bus stops and train terminals, currently, the situation in most public transport networks shows an emphasis on trying to reduce waiting times. The introduction of real-time passenger information systems and associated information channels will reduce waiting times even further. However, some waits will always be unavoidable, and we consider the environments of bus stops, train stations and ferry terminal as opportunity spaces for the introduction of novel interaction technology. The installation of public urban screens at these locations will be particularly relevant for the provision of real-time passenger information, but – in addition – for the provision of social, civic, or entertaining applications and content as well.

While personal mobile devices have been the predominant platform for interaction away from the desktop in recent years, ambient and situated displays play an increasingly crucial role in ubiquitous computing. Advances in interaction technology, such as the availability of large-scale multi-touch wall displays, have led to an increased deployment of interactive displays in urban environments. CityWall is a large multi-touch interactive display installed in Helsinki, which displays information about events happening in the city. Peltonen et al. [26] studied how large interactive displays get shared between multiple people and addressed issues such as crowding, teamwork and conflict management, as well as the questions of how content from personal mobile devices get shared on public displays [27]. In addition, there is an increasing amount of research into non-standard urban interfaces such as, e.g., urban pixels [31] or façade interaction [5].

While each of the services and technologies discussed here represent interesting approaches to interacting with information away from the desktop they focus on isolated modes of interaction. The EyeStop concept goes further in that it combines different display technologies (e.g. E-ink and LED displays) with different modes of interaction (web-browsing, timetables, ambient display, etc.) (senseable.mit.edu/eyestop). Our approach differs from the above in that our study follows a holistic approach using the concept of communicative ecology [12] that considers the interplay between technical, social and discursive (content) components in the urban environment in order to inform the development of new design interventions.

The payment process: Ticket sales management has been improved through the introduction of the TransLink GoCard system, providing reduced cash leakage, greater accountability, faster passenger loading, more convenience for passengers, easier sales process for drivers, detailed revenue and passenger load reports. Further research and development into the usage of this system by TransLink is looking at the benefits of the embedded RFID tags inside the GoCards, or using mobile phone as an e-ticket after selecting a route order, as well as mobile ticketing options, that allow commuters to pay for, obtain and validate tickets from any location and at any time using mobile devices. Mobile tickets reduce the production and distribution costs connected with traditional paper-based ticketing channels and increase customer convenience by providing new and simple ways to purchase tickets.

In addition to these research trajectories conducted by our partner, we will look at how the payment process itself can be made more fun and enjoyable. Examples to be explored include personalised tickets, ticket readers that play short, personalised confirmation melodies or fun sounds (nano-audio), and linkages with social networking applications.

3.2 During the Journey
On our daily public transport routes, we often come across the “familiar stranger” [20], an individual we recognise from regular activities, but choose not to interact with. Springboard (cristinamatei.com/springboard.html) is a design idea for a mobile social networking application that features GPS tracking of
passengers, a list of passengers on the same bus including their short profiles and a means to text them. The goal here is to eventually spawn real life interactions between passengers. However, some passengers feel quite comfortable being left alone enjoying their daily bus commute as personal idle time that allows them to think, reflect, meditate and relax. We are interested in achieving a better, more diversified understanding of the different objectives and requirements of public transport users in order to allow public transport to become more personable and customisable.

Systems such as Cityware [16] aim to connect familiar strangers with each other by deploying nodes, e.g., at bus stops, that detect people’s Bluetooth devices. The time-stamped data is stored, analysed and made available through a Facebook application, where users connect their device’s Bluetooth ID with their profile and are presented with the Facebook profiles of the people they come across most often. Other Bluetooth based mobile applications include Bluedar [7] and the Lovegery [14], which aim at matchmaking familiar strangers in public places based on their profile information. All of the above have privacy concerns. Jabberwocky [25] on the other hand only enhances the visibility of familiar strangers but respects the boundaries. We have been working on visualising this data anonymously on a public screen near bus stops. The visualisation shows a virtual aquarium where passers-by whose bluetooth devices are detected are anonymously represented as Virtual Fish [37], and their “familiarity” is illustrated through the formation of schools of fish (Fig. 1). Further work in this area has the potential to explore affective designs that may visualise an indication of the emotional “state” of a bus represented by the occupants’ emotional state.

Figure 1: Virtual Fish display

Entertainment and Web 2.0: Commuters are largely left to entertain themselves, e.g., by reading a book, newspaper or magazine, playing games on portable consoles or listening to music, all of which are mostly isolating activities. More recently, by using powerful and smart mobile phones, commuters can do all of the above and much more, all on the one device. Particularly popular in this context amongst young commuters is social networking. The innovation of this approach lies in its emphasis on the collective for these activities and investigating the impact it might have on commuters and the perception of their temporarily confined space during their travel. In this context, games, for example, provide a great potential as they are usually played for enjoyment and can be played by multiple players. In today’s aviation industry we can witness in-flight entertainment options including networked games, which can be played between two or more passengers. Games focusing on the individual could be played between two or multiple seats either synchronously or even asynchronously, while collective games could see two buses competing against each other in a playful way. Furthermore, popular multi-player location-based games played out on city streets and built up urban environments such as Foursquare.com and Gowalla.com allow players to unlock badges, find items, rank up, and interact with other locals as they do their normal everyday activities around town. A new area of investigation is to look at how multi-player gaming concepts could be applied to public transport, which does not have a fixed longitude and latitude. Could this distinction have a positive effect on the social connections between passengers? How could they be designed to engage with commuters in a playful and useful, collective way? Chatroulette.com pairs two random strangers from around the world for a webcam based conversation. Similarly, two random commuters could be paired for a themed text based chat over their mobile. Games can also be used to obtain information from players unobtrusively, which in turn could generate ideas and feedback.

Besides gaming, we also want to explore ways of bringing Web 2.0 technologies into the public transport environment. In particular the generation and sharing of content and information. Undersound [11], for example, is a concept that provides a means of (anonymous) interaction between frequent travellers by enabling peer-to-peer music sharing over Bluetooth in the London Underground. We will examine the means by which commuters can leave digital traces which are linked to the bus. Buses could be equipped with digital guest books for passengers to leave their “mark”, similar to what we can observe by the occasional graffiti on the back seats, but without damaging TransLink’s property. These could also be used to rate a bus or bus driver. Wiffiti.com, a social bulletin board on large flat urban screens where city dwellers can post text messages using their mobile phones, installed on a bus could enhance a sense of community of passengers. A more enhanced version called “Discussions in Space” has been developed by us [30]. Such a system could link people waiting at a bus stop with other commuters “on the move” and on the bus. In addition to or as an alternative to advertisement, it could also provide a link between content generation processes by passengers inside the bus and how this content is conveyed on dynamic displays on the exterior surface of the bus to communicate with the outside. However, the effects of such tools in this environment have remained largely unexplored yet.

Furthermore, the Australian mobile penetration rate is predicted to reach 122% by 2012 (itwire.com/content/view/18424/1231). This now near-pervasive availability of mobile devices has opened the door to new types of interactions and services. The notion of location-based services lies at the very heart of ubiquitous computing research. Researchers in this field have explored services ranging from electronic city guides, e.g. [3, 21], education, e.g. [32], location-based games, e.g. ciphercities.com, to location-based notification systems for police officers [33]. There are a growing number of commercially available social mobile applications, which use location data to maintain social networks (e.g. Google Buzz and Latitude, Brightkite, Plazes, Fire Eagle, Zkout, Rummble) and predict social trends (e.g. CitySense.com). An innovative development in this context is the use of augmented reality in combination with mobile devices in order to overlay the city with an additional interactive information layer. For instance, iCam [23], a location and orientation aware device has been used to demonstrate the annotation of real-world objects and requirements of public transport users in order to achieving a better, more diversified understanding of the different objectives and requirements of public transport users in order to allow public transport to become more personable and customisable.

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objects (without the necessity of static labels). Metro Paris Subway is an iPhone application that overlays real-world environments with additional information enabling service discovery and way showing (metroparisiphone.com).

3.3 After the Journey
Since the introduction of the new GoCard system for ticketing in South-East Queensland, it is possible to log each commuter’s travel history. This information is made available online to customers who registered their GoCard. However, currently it is only being used to tediously verify past trips, and no tools are provided to make this powerful resource more engaging or to share an anonymous version of it with the public so it could be analysed and visualised in either entertaining or meaningful ways. For example, the analysis of historic personal transport data could also be displayed on the basis of a commuter’s carbon footprint reduction compared to traveling by car. It could also indicate the level of expertise a person has on using public transport or the person’s level of knowledge about the city. Cabspotting.org for example traces San Francisco’s taxi cabs as they travel throughout the Bay Area. The patterns traced by each cab create a living and always-changing map of city life. This map hints at economic, social, and cultural trends that are otherwise invisible. These and related opportunities for post-journey data analysis and comparison as well as associated issues of identity, trust and privacy provide novel areas of investigation.

4. APPROACH
The authors and their colleagues have developed, applied and tested a suite of action research methods for developing new media applications [12]. This approach considers study participants as co-investigators and agents of social change [9]. Qualitative research [24] and user-centred design [2] will operationalise this process and assist in the delivery and assessment of our Research Aims #1 to #5. The research methodology comprises an initial immersive phase utilising ethnography and cultural probes (I); two action research cycles which involve design studios utilising use scenarios and human-centred design methods (II) as well as rapid prototyping and testing (III); and a final evaluation (IV). Stages I, II and III operationalise Research Aims #1 to #4 and Stage IV operationalises Research Aim #5.

Research Sites: QUT provides three dedicated shuttle buses to assist students and staff travelling between the Gardens Point and Kelvin Grove campuses for the purpose of attending lectures or attending to University business. The 391 service operated for QUT by TransLink is the study’s primary research site. QUT staff and students are able to travel free on route 391 but will need to show the driver their QUT identity card. Services operate all year round, excluding weekends, public holidays and the days between Christmas Day and New Years Day when the University is closed. The 391 timetable varies in frequency during the year. A 10 minute service is provided during semester 1 and 2, and a 15 minute service at other times. The 391 bus stops will be the points of installation for the deployment of three public screens. The first installation location at the corner of Musk Ave and Carraway St at the Kelvin Grove Urban Village has just been completed following approval and support from QUT Facilities Management, Brisbane City Council, and the Principal Body Corporate of the Kelvin Grove Urban Village (Fig. 3).
In effect, the study is thus able to draw on the communicative ecology at the bus stops as well as inside the buses. Further, in addition to the 391 bus service, the study will collaborate with our partner TransLink for access to other services on the TransLink network in order to test the study’s design prototypes in different environments and transport modes such as trains or ferries.

4.1 Stage I: Immersion
Ethnography lends itself effectively to the immersive phases of the project where the goal is to establish an awareness for and knowledge of the existing communicative ecology of residents by identifying stakeholders and leaders, mapping and establishing relationships, contextualising information needs and building trust with participants [15]. Howard [13] argues that “qualitative methods tend to be best for generating theory and quantitative methods tend to be best for testing theory” (p. 569). In this sense, the qualitative nature of ethnography has proven to be appropriate for generating a rich understanding of the characteristics of the local research site during the initial project start-up phase, which is necessary to prepare for and inform the forthcoming systems design phase.

To gather baseline data at the beginning of the study, both statistical usage data provided by QUT Facilities Management and TransLink as well as qualitative data gathered from participant observations and on site (or on-board) ad hoc interviews will be collected and analysed with a view to address Research Aim #1: Identify new opportunities that arise from connecting data made available by real-time passenger information systems with social

4.2 Stage II: Design Prototyping

The aspiration of the design process is to engage commuters of public transport for a fun and enjoyable experience. All systems designed for use in social environments incorporate assumptions about how they will be used. Increasingly attention is being focused on how activities are represented in the practice of technology design. This attention stems from the recognition that the quality of thinking about any problem depends, in large measure, on the adequacy of the representational artefacts, such as use scenarios and cultural probes, that are available to us to think with [34]. We will employ Cultural Probes [10, 19] as a method to elicit research data relevant for design in environments that are usually challenging to observe without that the researcher’s interference potentially influences the participant’s course of action. Probes are functional products with open-ended functionality that support user-led innovation and capture examples of social interactions. They offer an authentic insight into the user environment. Inspired by the IDEO Method Cards iPhone app, our study participants recruited from Stage I will be given access to a custom-made mobile device application that will act as a software-based virtual cultural probe. It combines the functionality and purpose of a variety of conventional objects such as disposable cameras, notebooks, audio recorders, maps, photo albums, and postcards to record aspects of their public transport experience. This approach will make the translation process from emerging themes to user needs and finally, design implications, relatively seamless. However, it is not enough for the findings to be understood by the researcher conducting the user study, the design implications must be communicated to systems engineers working at TransLink. In order to achieve this, techniques from scenario-based design will be drawn on. The results of the cultural probes exercise will inform the development and ongoing refinement of a portfolio of use scenarios specifically designed to capture important aspects of the use of context in public transport over time.

Use scenarios are concrete descriptions of activities that users do as part of their life that can be used to drive the ongoing design and evaluation of social media and ubiquitous computing systems. They are valuable research and design tools because, as narratives, they can move from general work process to detailed and specific interaction in a coherent and systematic way [18]. Empirically informed use scenarios, such as those developed here, can function as vehicles for supporting the creative meeting between users and designers; they can indicate the usefulness of a system relative to the background of the public transport environment and they can be used to generate new metaphors and concepts that can drive the development of new kinds of social and mobile applications. While seemingly simple tools, empirically informed use scenarios and cultural probes are not trivial to produce, requiring a deep understanding of the environment they are representing. Producing scenarios to drive the design process is an iterative process. The scenarios will be developed from Stage I research and will then be continually evaluated against related social contexts and developing technology and refined throughout the project.

4.3 Stage III: Usability Testing

The scenarios will form the basis of the usability testing by describing how the user archetypes or personas engage with technology to achieve their social and cultural goals more effectively than current technologies allow. In this way the scenarios are ‘Scenario-Prototypes’ because they are design
solution specific [29]. This sets them apart from the scenarios outlined by Cooper [4], because the basis for design is incorporated within the scenario itself. The benefit of this method is that the prototyping and usability testing occurs as an extension of the analysis of user needs. This not only aids the development of the physical design by providing a template that we will use in his development work, it ensures that the final design stays true to the original user needs. A number of individual interviews as well as four focus groups will be conducted to refine the personas and use scenarios. As per the timeline above, stages II and III will be repeated and refined starting in Year 2.

4.4 Stage IV: Impact Evaluation

The last stage of the research aspect of the project calls for a final holistic evaluation particularly in relation to Research Aim #5. Participatory evaluation methodologies have long been effectively used in a diversity of fields, including education, social services and health [22, 8]. The current study will use a variant developed specifically for ICT projects [12]. The final evaluation phase will be a continuation of the action research cycles already established but supplemented with social media data and respondent interviews. The method will incorporate a critical reflection workshop [12], and will involve participants from TransLink, respondent populations as well as other transport stakeholders in the TransLink network (e.g. ferry operators, bus drivers). As per [12], the workshop will include an overall analytical framework for assembling and interrogating the above evidence base in terms of claims about the implications of deploying new technologies for the development of an integrated public transport infrastructure that meets the demands of a growing population in South East Queensland. Stage IV will thus provide a summative response to Research Aim #5.

5. CONCLUSIONS

One of the most profound changes to our world in recent times is the urbanisation of our species. As of mid-2007, the majority of humankind lives in urban centres [35]. But this is only the beginning: a 2008 report by McKinsey & Co. predicts that China alone will build 20,000 to 50,000 skyscrapers over the next twenty years; this is equivalent to ten current-day New York cities. Australia is at the forefront of this global megatrend: it is forecast that by 2015, nearly 90% of Australia’s population will dwell in urban areas [36]. These changes bring with them many challenges. Existing urban problems, including traffic congestion, pollution, stress on civic services, incidence of crime, etc. will intensify correspondingly. Yet the increasing population in cities affords numerous opportunities for research in the social sciences, architecture, urban planning and, of course, ICT.

The advent of the so-called ‘Web 2.0,’ in conjunction with advances in personal mobile devices has triggered the proliferation of user-generated content, whereby the primary units of exchange are textual conversations, photos, video, and audio. Yet, we are only in the nascent stages of a user-generated world [17]. Our study promises to inform the research, design and development of far wider, and more meaningful engagement of citizens by providing them with a means to uncover non-obvious aspects of the world around them, share this information with others (including government agencies) and make decisions based upon their data compositions. This technology will significantly impact the way in which people navigate and negotiate transport options available to them. This opens the door to a myriad of commercial opportunities, literally constrained only by what can be sensed, and one’s imagination.

The Queensland Government has a $124 billion infrastructure plan to manage South East Queensland’s rapid growth and to protect the lifestyle of its residents. They are planning and investing in major bus and rail infrastructure to meet the growing transport demands of this region. Our partner TransLink reports that in 2009, more than 180 million passenger trips were taken on their bus, rail and ferry network, resulting in an average of 7.4% patronage growth across all services. TransLink now has more than 24 kilometres of dedicated busways – including the Eastern Busway and Northern Busway, which opened in 2009. TransLink has rolled out more than 680 extra buses in the past four years including the first SuperBus capable of carrying 112 passengers. TransLink now has a smart card ticketing system with the GoCard being used to take more than 400,000 trips a week. The focus of the proposed study on enhancing the experience of public transport users with urban screens and mobile applications will strengthen and enhance the huge investment made by TransLink, its partners, and the Queensland State Government.

This paper was written in the hope that sharing the underlying thinking and assumptions as well as hopes and aspirations of this research project in this public forum will enable a level of constructive scrutiny that contributes to pushing the agenda forward.

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7. REFERENCES


