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Time to spread out the peak!

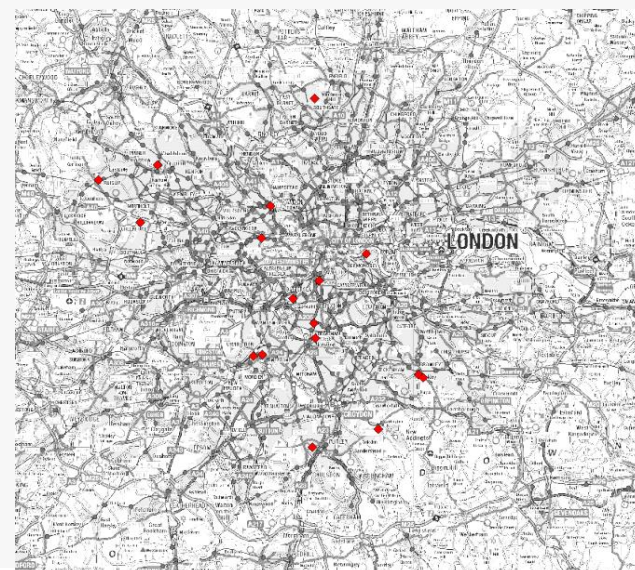
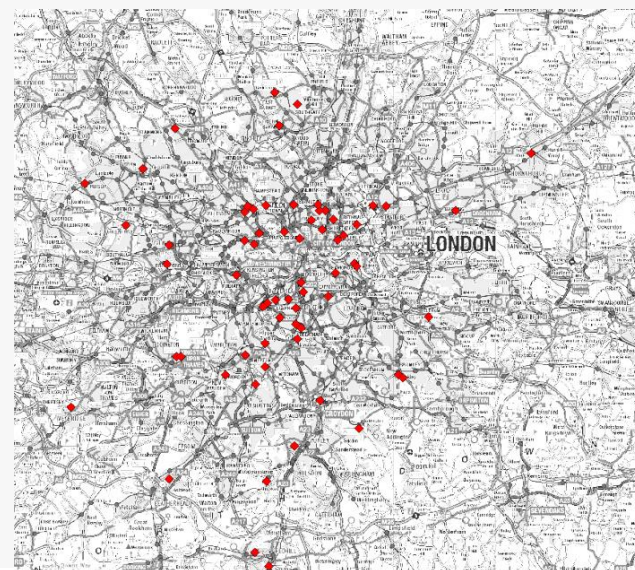
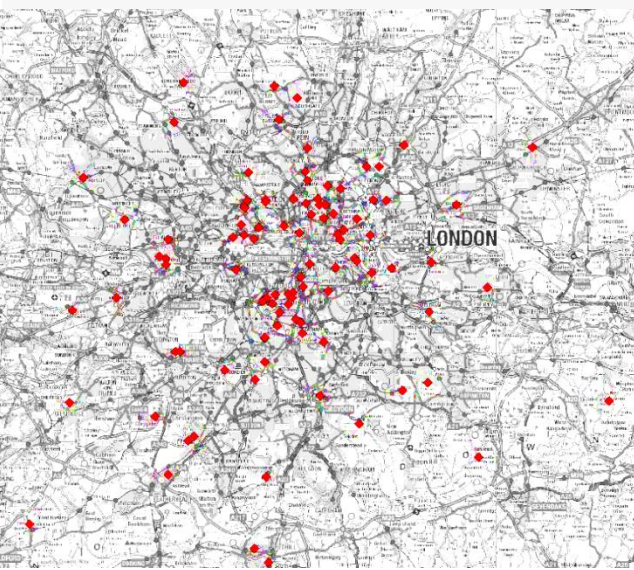
Melina Christina TPS Bursary 2015

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Introduction

In some parts of London, crowding in public transport has become a significant issue leading to journey time unreliability and discomfort, where dissatisfied passengers can't board the first tube carriage or bus but still pay the same price for their journey. A common solution to peak time congestion during commuting periods has been the increase in supply, i.e. public transport capacity, but given the tighter budgets now available, this has become more difficult and sometimes unachievable. London's population is predicted to grow from 8.4m to 10m by 2030 (TfL, 2015) so innovation is needed to face this challenge on a short, medium, and long term.

Taking the London Underground (LU) network as an example, there is a possibility to spread out the peak of passengers which is characterised by big spikes of demand concentrated in rather short time periods, leaving the transport network under-utilised before and after such spikes (Capra, Smith, Ceapa, 2012). When looking at TfL data for November 2014, **the number of passengers entering the LU network from 08:00 to 08:45 would decrease by 16% if passengers were to arrive evenly between 07:30am and 09:30am.** This shows a real opportunity to decrease overcrowding, improve public transport quality, and attract reluctant car drivers to public transport.

However, to what extent are commuters flexible on their departure time? And if they are flexible, how can they be nudged to change their habits and shift their departure time? After investigating passenger flexibility, this paper discusses the potential

effectiveness of two incentives to spread out the peak of passengers:

- Passengers being financially rewarded for commuting off-peak. This is at odds with conventional travel demand management which tends to penalise for “bad behaviour” (or negative externalities) instead of rewarding for “good behaviour” (or positive externalities).
- Passenger information about crowding levels via a mobile phone application, possibly integrated with a journey planner. If passengers were made aware of crowding levels and patterns, they would adapt their behaviour consequently. The smartphone seems to be a viable channel to convey this information as 72% of passengers have one and 54% consider it as essential to their travel experience (Transport Systems Catapult, 2015).

“The daily commute is hell on earth and I would do anything to never have to do it again!”

“I will stop living in London soon. The main reason is being treated like cattle when commuting.”

Consultancy Survey, October 2015

Methodology Overview

To investigate the potential to spread out the peak of passengers, this research was based on:

- A literature review including research and academic papers and reports published by network operators and governments.
- A survey carried out in October 2015 of approx. 300 respondents in two consultancy companies (survey further quoted as the “consultancy survey” for simplicity). This sample population – working in the consultancy industry – was particularly targeted identified as flexible on their departure time (which was later confirmed with the survey). Focusing on this flexible population would give a better understanding by reducing the number of respondents stating the two incentives are poorly effective because they are not flexible on their departure time, and not because of intrinsic characteristics of the incentives. The socio-economic statistics for the sample were the following: 67% male, 33% female; 48% below 35 years old and 52% above 35 years old; 41% with a salary of less than 40k pa, 46% with more than 40k pa, and 13% refusing to answer.
- An interview with a representative of Transport for London to discuss current and future initiatives of TfL to spread out the peak of passengers.



Are Passengers flexible on their departure time?

Employees' angle

In July 2014, Transport for London conducted a survey¹ of over 2,031 tube users living and working in London and SE England in order to understand travel attitudes towards changing habits. One result was that 70% of tube passengers were flexible on one aspect of their commute (time/route/mode) with 25% of tube passengers who have already changed one aspect. **Looking at time flexibility only, 30% of tube passengers stated they were flexible and 11% had already changed their departure time** and similar results were obtained for the route aspect. However, 32% of tube users were flexible on the mode of transport but only 4% changed.

Only tube users were surveyed and flexibility might slightly differ with the transport mode. However, in the consultancy survey, no significant variation in departure time flexibility with the transport mode was observed and this can be explained by the relative high frequency of all public transport modes in London. **Time flexibility in the consultancy survey was much higher with 80% and 74% of respondents commuting during the peak and off peak respectively that could travel up to 30mins earlier/later.** This shows that departure time flexibility varies greatly with the type of workplace.

¹ "Travel behaviour segmentation", Transport for London (September 2014).

Employers' angle

Flexitime is the possibility to choose when to start and end work (within agreed limits) but whilst working certain 'core hours', e.g. 10am to 4pm every day. Flexitime availability was investigated in the Fourth Work-Life Balance Employer Survey² (WLB4, 2013) which achieved a total of 2,011 interviews³, each interview being conducted with the senior contact at each establishment with responsibility for human resource and personnel issues or for general management issues. The table below shows the main results for London (320 employers surveyed):

London Statistics	Proportion of employers
Flexitime available at the establishment	66%
Flexitime is currently being used, or has been used in the past 12 months	28%
Is the site covered by a written policy which provides for flexitime?	Yes 50%; No 38%; 12% I don't know
Whether all employees, or only some, are eligible to work flexitime	66% all eligible; 34% Some employees not eligible

Source: Work-Life Balance Employer Survey (IFF Research, 2015)

² The survey was carried out by IFF Research working with the Institute of Employment Studies (IES) on behalf of the Department for Business, Innovation and Skills (BIS).

³ Establishments were randomly selected from the Inter-Departmental Business Register (IDBR). Data were then weighted at the analysis stage to ensure the survey findings were representative of all workplaces with five or more employees in Great Britain, and of all employees in these establishments.

Even if flexitime seems to be largely available (66% of establishments), the low proportion of workplaces where flexitime is effectively used (28%) seems to indicate a gap between what is officially stated and what is happening in practice. This might be due to personal constraints of employees (such as family, transport availability etc.) or to the flexitime policy which is not socially accepted in practice or not sufficiently stated by the company in order to have the employees fully aware of it. Supporting these two latest explanations, the WLB survey has shown that the perceived availability of flexitime from the employer and employee perspective differed, with 64% of the workforce covered by flexitime according to the employers against 48% of the workforce according to the employees (all UK respondents).

Still based on the WLB survey, the availability of flexitime has shown to increase with the size of the establishment, the presence of a union presence (52%, compared with 35% without), and be more common in the public and third sectors (59% and 60% respectively) than the private sector (35%). The availability also varies with the organisation sector, as illustrated in Appendix 1, and has increased from 2003 to 2007 (from 38% of establishments to 55%) but stabilised since then (54% in 2013).

To conclude, there is room for time flexibility and it can be noted that this is supported by technology (e.g. accessing working emails outside work or working remotely) which would keep improving. **However, this available flexibility does not lead necessarily to a change in departure time in practice** and potential explanations include a lack of support from the working organisations despite policies put in place or a lack of strong incentives.

What effective incentives to shift departure time?

Current difference in fares between peak and off peak does not seem to be an efficient incentive for passengers to change departure time. Based on Transport for London's survey⁴ undertaken in July 2014, only 3% of tube users changed their departure time because of fare. Similarly, only 5% of respondents in the consultancy survey have changed their departure time permanently or often because of fare (against 17% who have changed because of overcrowding). Moreover, it did not apply in 20% of cases (because of season tickets for instance) and approx. 60% of respondents said they have never changed their departure time because of fare. **Therefore, the current travel demand management based on price strategy seems to have a negligible impact on spreading out the peak of passengers.**

Two other types of incentives were therefore investigated: passengers being financially rewarded for commuting off peak (including free transport tickets which are considered here as a reward rather than a difference in fare) and passenger information about crowding levels via a mobile phone application.

What is the potential effectiveness of reward systems?

As part of the literature review, only implemented schemes were considered and results from modelling studies or stated preference surveys were ignored. Moreover, only reward systems targeting public transport users for commuting off peak were included and

not those rewarding car users, even if they are much more common and have been implemented in several cities such as Rotterdam where car users have been paid to travel off peak ("Wild! Van de spits" scheme). Two reward schemes are detailed below.

Early Bird programme, Melbourne	
Spatial scale of the scheme	Entire Melbourne metropolitan rail network but with tickets sold at approximately 30% of stations at first.
Time scale of the research findings	Research outputs six months after the beginning of the programme (Currie, 2008).
Details and impact on departure time shift	
Since March 2008, passengers have benefited of free journeys if exiting the arrival station before 7:00am on weekdays. Among the 901 early bird ticket holders surveyed before 07:00am by Currie, 23% of them had shifted their departure time, 67% had travelled as before, and 10% were new passengers. The shift was estimated to have reduced demand in the peak by between 1.2% and 1.5% from previous levels, with average time shift of 42mins. However, due to the significant passenger growth during that period, the early bird tickets had only reduced the "scale" of increased overcrowding, rather than generated a net reduction.	

⁴ "Travel behaviour segmentation", Transport for London (September 2014).

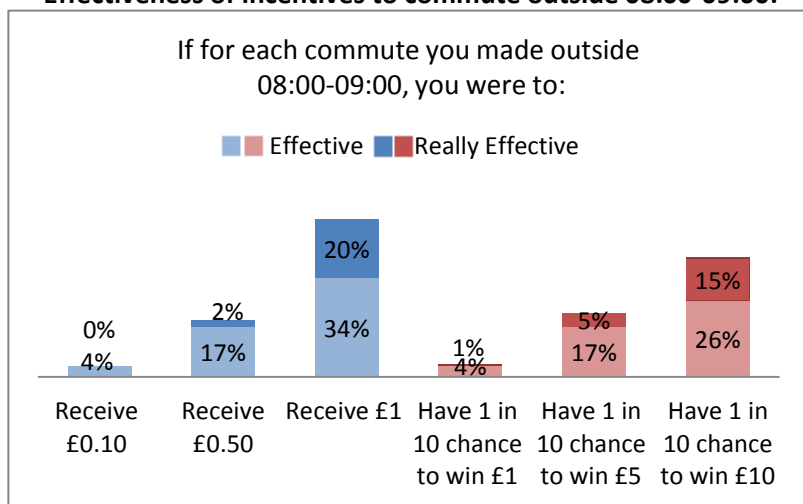
Travel Smart Rewards Singapore	
Spatial scale of the scheme	18 designated MRT stations (16% of the rail network).
Time scale of the research findings	Research outputs after the six month trial for INSINC (PLUNTKE, PRABHAKAR, 2013) and figures published in 2015 for the Pre-peak Free Travel (LTA, 2015).
Details and impact on departure time shift	
<p>This programme includes two schemes:</p> <p>INSINC (Incentives for Singapore Commuters), since January 2012. INSINC is a system of credits earned by the commuters based on the number of kms done on weekdays, with the number of credits multiplied by 3 if it occurs outside the 07:30-08:30 period. The credits are redeemable either at a fixed exchange rate (1000 credits = SG\$1), or for prizes ranging from \$1 to \$100 in an online game similar to a “self-administered raffle”.</p> <p>There is also a strong social element in INSINC with passengers earning bonus credits when friends they invited sign up. Friends are also displayed in a “ranking list” style: off- peak commuting friends on top, followed by others.</p> <p>The overall shift in the percentage of peak trips (07:30-08:30) was estimated to be 7.49%.</p> <p>Pre-peak Free Travel, since June 2013. Passengers benefit of free journey if exiting the station before 7:45am on weekdays and 50% discount if exiting the station between 07:45 and 08:00 on weekdays.</p> <p>Since the introduction of Free Pre-Peak Travel, LTA has estimated a 7 to 8% reduction in the number of commuters during the morning peak period (08:00-09:00). The ratio of morning peak (08:00-09:00) to pre-peak (07:00-08:00) travel has fallen from 2.7 and stabilised at 2.1, based on commuters exiting from the designated stations.</p>	

Reward Systems have generally proven being efficient during trials, at least at reducing the growth rate of peak passengers instead of causing net reduction, and therefore have been extended such as in Singapore and Melbourne. However, one secondary effect to take into account is the generation of new trips, due to latent demand. It has to be also economically and commercially viable. This type of scheme is unlikely to be considered by Transport for London which has to be subsidy-free by 2030. TfL will have to fund its services through commercial investment, cuts and/or potentially higher fares to cover an operational budget of almost £700m a year (Guardian, 2015).

Rewarding passengers seems to be particularly efficient when combined with a clear support from the employer, as demonstrated in Singapore which also launched in July 2014 the Travel Smart Network to encourage companies to create supportive environments for their employees. It now includes more than 50 organisations, employing more than 120,000 employees. This has followed a successful 9 month pilot trial, managed by AECOM, which included training and guidelines for managers of employees who wished to take up flexible working arrangement (FWA), the extension of FWA policies to allow earlier/later staggered working hours or more than one telecommuting days, and the promotion of incentives which encouraged FWA such as free breakfasts. An overall 9-12% reduction in peak hour trips was recorded among the 12 participating organisations, regrouping approx. 23,000 employees (Morailon, Brick, 2014). This shows that the role of the company is key to ensure a clear support so that the consultancy survey investigated reward systems implemented by the company itself.

Respondents in the consultancy survey were asked to imagine that their company implemented a scheme to encourage them to commute outside the 08:00-09:00 period. They had to assess the effectiveness of six schemes whose results are shown below, for respondents commuting during the peak and for whom it is applicable (195 answers, 67% of total respondents). Only schemes related to receiving money were investigated and not schemes related to receiving vouchers because the effectiveness of the voucher depends on the field (culture or food&beverage etc.) and this would have been too complex to investigate. However, one respondent raised the point in the comment section, indicating that vouchers could be potentially effective.

Effectiveness of incentives to commute outside 08:00-09:00:



* Excluding N/A which was 13%

The results were slightly higher when considering passengers who stated they were flexible up to 30mins.

The schemes seemed to be poorly effective in general, except the ones “Receive £1” or “Have 1 in 10 chance to win £10”. However, the other schemes, especially “Receive £0.5” or “Have 1 in 10 chance to win £5” could be effective on passengers with revenue of less than 40k as the table below shows:

Proportion of respondents stating the scheme was effective and really effective
(all modes, peak and off peak passengers, excluding N/A answers)

	Receive			1 in 10 chance to win		
	£0.10	£0.50	£1	£1	£5	£10
All Incomes*	4%	18%	43%	4%	17%	33%
<40k pa **	9%	38%	73%	8%	32%	56%
>40k pa ***	3%	10%	40%	2%	13%	28%

*236 respondents

**102 respondents

***103 respondents

What is the potential effectiveness of passenger information about crowding levels?

Passenger information about crowding levels is an efficient incentive if crowding is a trigger to shift departure time. There is also the need to understand which type of information is of interest and current relevant mobile phone applications are discussed.

1- Is crowding a trigger to shift departure time?

	Crowding is an issue but does it make people change their departure time?
TfL survey, July 2014 ⁵	66% of tube users experienced crowding and 57% of them would have changed their journey to avoid crowding. However, only 6% have changed their departure time due to overcrowding.
Consultancy survey, October 2015	<p>Across all modes, 13% of passengers commuting during the peak said their journey was <i>really</i> uncomfortable, and 57% said it was <i>slightly</i> or <i>moderately</i> uncomfortable.</p> <p>Approximately 17% of respondents said they changed <i>permanently</i> their departure time because of overcrowding and 13% said they changed <i>often</i> their departure time because of overcrowding.</p>

	How does this compare with other aspects of travel (route/mode)
TfL survey, July 2014	Crowding was not factor for those who changed route which was mostly explained by cost. However, crowding was the primary factor to change time (20% to avoid crowds and 23% to get a seat, against 26% due to cost) and crowding was a factor as much as cost for people who changed mode.
Consultancy survey, October 2015	The consultancy survey led to the same results about crowding having a bigger impact on the departure time than the route or mode choice: 30% of respondents said they changed permanently or often their departure time because of overcrowding against 17% who changed route permanently or often and 17% who changed transport mode permanently or often.

As a conclusion to the consultancy and TfL surveys, crowding appears as an issue for passengers but does not necessarily make them change their departure time. However, it has shown to have a big impact on flexible passengers – up to 30% of respondents have changed often or permanently their departure time due to crowding in the consultancy survey. Crowding seems to have a negligible impact on route choice so that the plan of TfL to include the ‘least crowded route’ as an option in their Journey Planner in March 2016 is likely to be used by occasional passengers or those with special needs and not by regular commuters.

⁵ Travel behaviour segmentation”, Transport for London (September 2014).

2- Which type of information?

Available channels providing information about crowding are limited, especially in real-time. The information provided by existing channels is usually about delays or cancellations (e.g. on National Rail or Virgin Trains apps) which lead to overcrowding, but not about crowding itself, and is usually operator specific for rail. Therefore, it is not used on a daily basis by passengers as a mean to adapt travel behaviour.

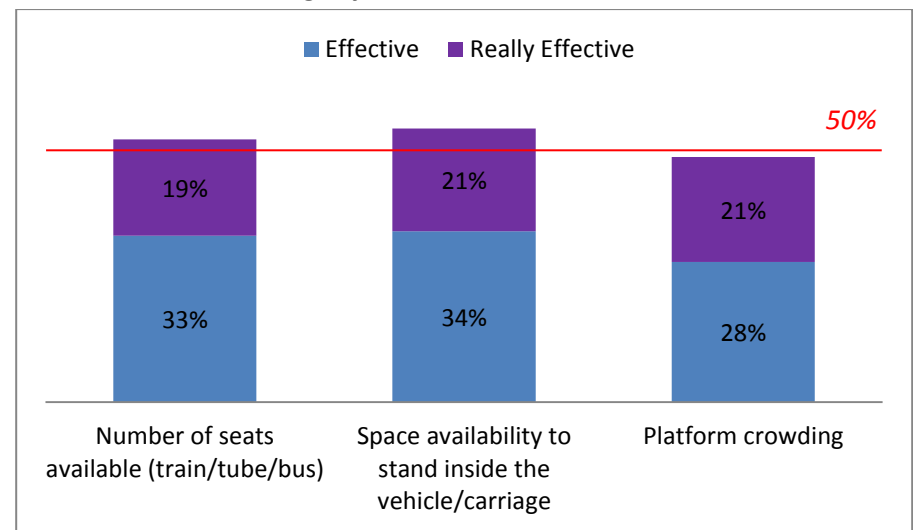
However, according to TfL, customer feedback have identified that passengers would particularly welcome real-time information about crowding and available capacity and could use this information to consider their journey options. In September 2015, they published passenger information for 4 stations⁶ as a first phase (see Appendix 2), including a chart of the number of passengers from 07:00 to 10:00 highlighting the busiest 30 minutes at the stations, and variation of journey times to key destinations to show the benefits of shifting departure time. Following the trial, a shift in demand of 5-6% from the busiest period was observed at Bethnal Green and Highbury & Islington stations. This initiative was further extended in November 2015 to 4 other stations. The programme is also testing innovative approaches, such as prototyping real-time crowding information on trains as part of a wider programme of greater personalisation of travel information.

In the consultancy survey, respondents were to imagine a transport application providing real time and forecast information about crowdedness on the rail, tube and bus networks. They had to assess

⁶ Balham, Bethnal Green, Highbury and Islington, and Mile End stations.

the effectiveness of three types of information at making them commute slightly earlier or later⁷. The results are shown below for respondents commuting during the peak by public transport (207 answers, 72% of respondents). Passenger information was generally perceived as effective, which was confirmed by respondents' comments.

Effectiveness of passenger information at encouraging slightly earlier or later commute



*Excluding N/A which was 10%

To conclude, crowding information depending on departure time would be potentially truly effective by making passengers aware of spare capacity near their usual departure time. This would be

⁷ This question is not directly comparable with the question on the reward schemes which specified « travelling outside 08:00-09:00 » and not «travelling slightly earlier or later».

especially effective when combined with information on the benefits of shifting travel time (not only reduced crowding but also shorter journey times) such as undertaken by TfL in four busy stations.

Information about crowding is not well conveyed in London but there seems to be a real interest from passengers. TfL is only starting taking actions on that, with the plan to invest in information to help customers avoid congestion, focusing on short and medium term actions and using various channels (Travel Demand Programme (October 2015)).

3- Case studies and lessons learned

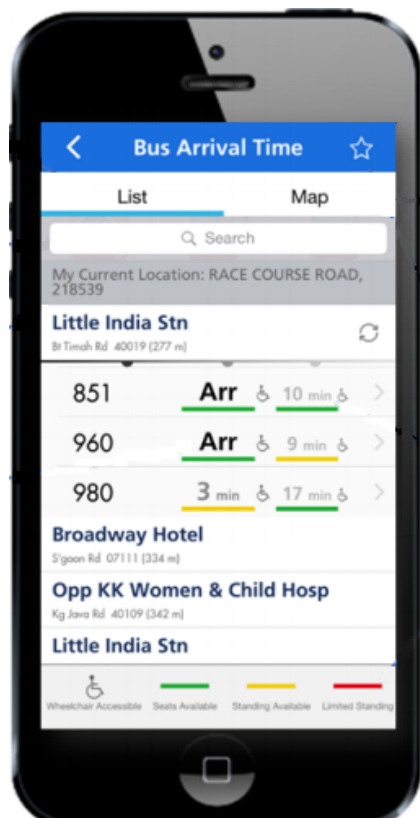
Only applications, or apps, providing information about crowding in public transport were investigated and not those providing information about congestion for car users. Only a few were developed and none have proved being enough robust to have an impact on departure time or this phenomenon was not investigated.

One challenge faced by developers is the number of users when the app – said crowd-sourced – relies partially on this as a source of information. Such challenge is currently faced by the UncrowdTPG app, started in July 2014, which provides crowding level estimates in Geneva region thanks to historical data and real time information provided by passengers⁸ both on route and at public transport stops. The app has approx. 150 users with the application installed

⁸ Passengers can indicate if a vehicle is “not crowded”, “slightly crowded” or “overcrowded”.

but active users per day are down to 5-10 (Matthia, 2015). This low number of active users does not ensure enough information and good reliability and quality. Another example of apps facing this barrier was Tube Star, an application developed for the London Underground as part of a research project, merging the official status updates provided by the transport operator with tweet-like reports and 1-5* ratings from passengers. Between June 28th 2012 and March 4th 2013, the app received 215 (rating-only and rating with text) reports by 44 users only (Capra, Lathia, 2014)

In London, Moovit integrates real-time GPS data from TfL with crowd-sourcing data from actual users. The user can report the level of crowding in vehicle or at stops, choosing between 4 options: empty, half full, full, and packed. The user can also send ‘free text’ report and this information is then available to other users. However, the information is not presented in a way that it allows comparing different journeys in term of crowding easily.

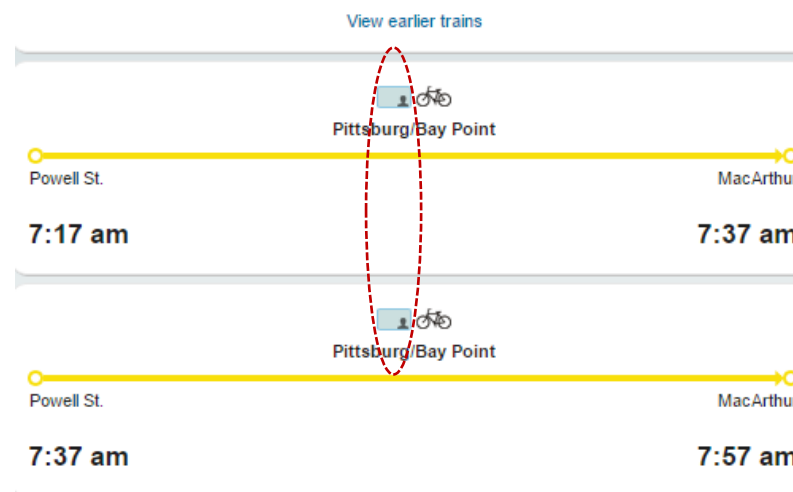


Source: MyTransport.SG, Singapore

In Singapore, information about bus spare capacity is provided on the journey planner MyTransport.SG since April 2015 for 4,700 public buses over 360 routes. This journey planner which has received several awards is really popular (1 million downloads) as it also provides information on taxi stands, real-time parking lots availability for popular locations, cycling route and facilities, and the users can also receive notification on expressways traffic news during peak hours and train service delay information.

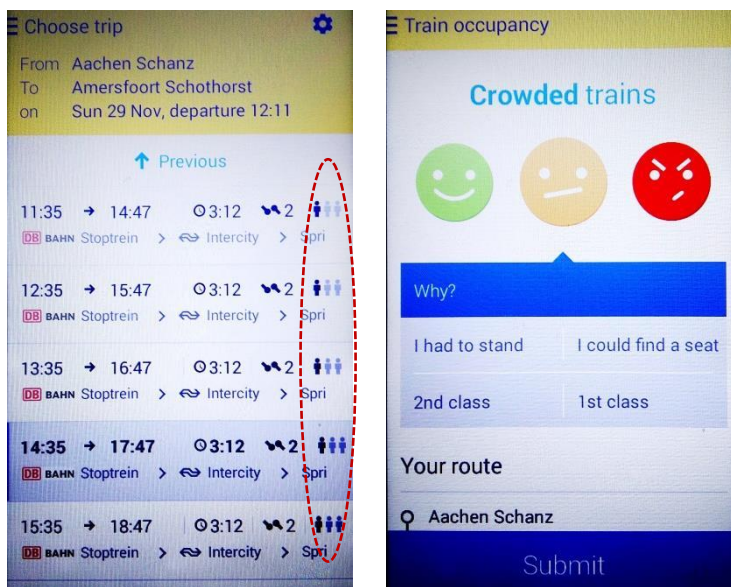
Spare availability on bus is illustrated by a colour code system, green colour indicating “seats available”, yellow “standing available” and red “limited standing”. This display allows a quick comparison of crowding levels depending on departure time but only within a window of up to three minutes for bus arrival estimations.

In San Francisco, the BART (Bay Area Rapid Transit) website and mobile site have a “crowd level” indicator that shows how crowded the train might be for the next five departures based on historic data. The indicator has three levels for light, moderate, and heavy crowds and allows comparing easily different journeys in term of crowding depending on departure time.



Source: BART (Bay Area Rapid Transit) website, San Francisco

The Netherlands Railways (NS) has developed the journey planner NS Reisplanner Xtra which gives information about crowding in the train based on historical data and in the form of three figures (one for quiet, two for average, and three for crowded). A feedback button allowing passengers to report on the accuracy of the information should contribute to its improvement over time.



Source: the journey planner NS Reisplanner Xtra, Netherlands

To conclude, to allow passengers to compare different journeys in term of crowding depending on departure time, historical data must be used to calculate prediction (with a 30min window at least) and few apps have been developed so far. However, designing such an app is feasible and has already been done in London thanks to Oyster card data. Crowding levels at stations are highly regular and

can thus be accurately predicted using simple predictors based on historic data averages (Capra, Smith, Ceapa, 2012). Historical data should be ideally combined with real-time information, potentially provided by the passengers themselves (crowd-sourced apps) to improve quality. However, key challenges for crowd-sourced apps include generating interest to ensure sufficient information. This can be solved by adding crowding information as an 'add-on' to an existing popular app such as city mapper which added "Tube Exit", indicating which tube carriage Londoners should get to ensure the quickest route to exit or transfer.

Conclusion

Only the morning commute was considered in this study as the peaks of passengers are usually higher in the morning than in the evening. However, the evening commute should not be ignored especially that employees might be more flexible during this time period. The availability and use of working from home was also not studied but the associated effectiveness at reducing the peak is worth investigated.

The paper has shown that the two incentives, rewarding passengers for travelling off peak and passenger information about crowding levels, could be effective at spreading out the peak of passengers, especially the latter. However, the methodology based on a questionnaire raises some limitations (e.g. bias and sample size) which should be kept in mind. Moreover, the two incentives do not propose any solution to tackle the source of inflexibility such as the impossibility to leave work earlier even when coming in earlier or the complexity of trip chains which constraints behaviour. Regarding the objective to attract car users to public transport, there is a need to understand better if improving public transport quality by reducing the peak could really attract them to public transport. Moreover, **it would be worth investigating the potential effectiveness of the two incentives depending on passengers' lifestyle rather than demographics as the former gives better insight into the level of flexibility.** For instance, somebody going to the gym near his workplace after work could be easily convinced to go before work if he was benefiting of free journeys for his morning commute.

Regarding the passenger information about crowding levels, very few “crowding apps” have been developed and this can be explained by a lack of strong business case, or evidence of passengers' interest, beyond technical issues such as data availability and process. This could potentially change with the work which starts being done by TfL. It would also solve the problem that crowdedness is not a topic well conveyed by the transport authority, especially in real time. **If passengers were able to share information about crowding levels (crowd-sourced data), there would be the potential to generate additional crowding indicators ready to be shared with passengers. These indicators based on perception would give the opportunity to adopt a customer-centric approach.**

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Appendix

Appendix 1: Work Life Balance Survey, 2013 (Base: 2,011 respondents)

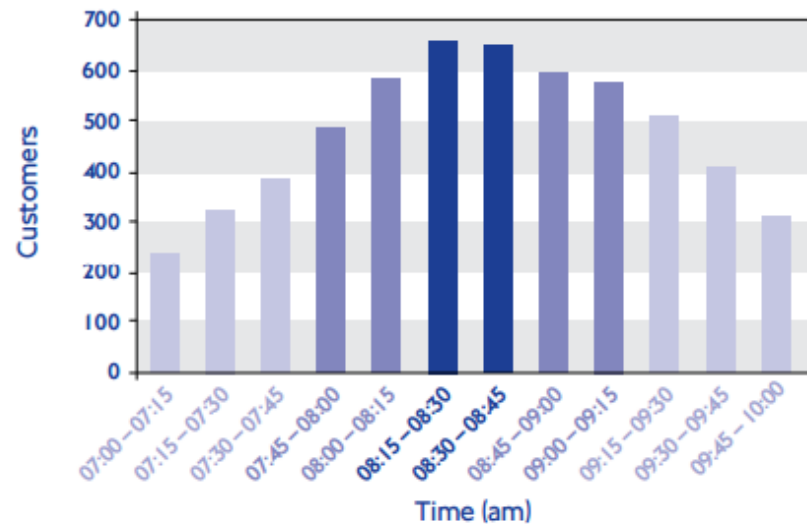
	Flexitime available at the establishment	Flexible is being used currently, or has been used in the past 12 months
Public Admin and Defence	83%	45%
Manufacturing	67%	26%
Other community	67%	26%
Utilities	67%	21%
Real Estate and Business	63%	29%
Health and Social Work	62%	35%
Finance	58%	24%
Hotels and Restaurants	58%	42%
Education	56%	50%
Transport and Communication	54%	35%
Trade	38%	18%
Agriculture, Fishery and Mining	36%	30%
Construction	33%	13%

Travel options from Bethnal Green station

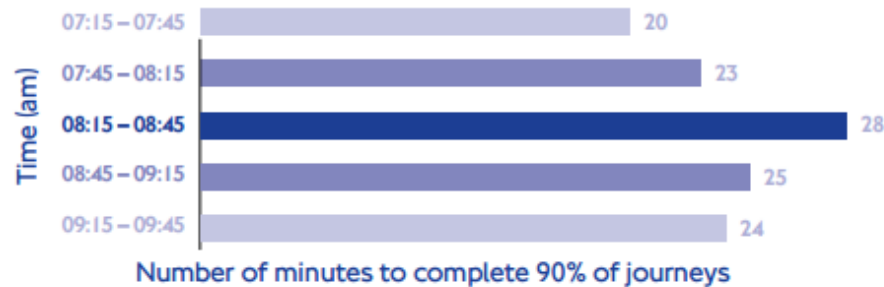
New or occasional customer at this station?

The busiest time here is 08:15 - 08:45 on weekdays

If you are able to travel outside of this time, your journey could be quicker and more comfortable.



Journey time to Oxford Circus



Appendix 3: Consultancy survey (October 2015)

1. Journey from home to work

Please fill in this questionnaire only if you work in Greater London

This questionnaire aims at investigating your attitude towards crowding and potential incentives to encourage you to commute slightly earlier or later than your usual departure time. Please note that all questions refer to your commute which is the journey from home to work (workplace being the university if you are a student).

Thank you for participating!

6. Excluding exceptional events such as strike, train cancellation or football match, has overcrowding already made you change your:

	Never	Rarely	Sometimes	Often	Always	N/A (e.g my commute is not overcrowded)
departure time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
route	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
transport mode	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Incentives to commute earlier and later

7. Fare

Still considering your journey from home to work, has the difference in fare between off peak and peak already made you change your:

	Never	Rarely	Sometimes	Often	Always	N/A (e.g. I cycle, walk or have a season ticket)
departure time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
route	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
transport mode	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Rewards

Imagine that your company (or university) implements a scheme to encourage its employees (or students) to travel outside the 8:00-9:00 period for their morning commute.

How effective would the following schemes be at making you commute outside this time period if for each trip you make outside 8:00-9:00 you were to:

	Not effective	Poorly effective	Effective	Really effective	N/A (e.g I already commute outside 8:00-9:00)
Receive £0.10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Receive £0.50	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Receive £1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have 1 in 10 chance to win £1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have 1 in 10 chance to win £5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have 1 in 10 chance to win £10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Information

Do you use any website or mobile phone application providing information about crowding levels, such as number of seats available, space availability to stand inside the vehicle, or Santander bikes availability?

Yes

No

Please specify

10. Imagine a transportation application providing real time and forecast information about crowdedness on the rail, tube and bus networks.

How effective would the following information be at making you travel slightly earlier or later?

	Not effective	Poorly effective	Effective	Really effective	N/A
Number of seats available (train/tube/bus)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Space availability to stand inside the vehicle/carriage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Platform crowding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Socio-economic data

Finally, please tell us a little about yourself:

11. What is your gender?

F

M

12. How old are you?

Under 18 18-25 26-34 35-54 55-64 65 or over

13. Please specify your postcode

14. Please specify your salary range per annum

- <20k
- 20-30k
- 30-40k
- >40k
- Do not want to reply

15. Do you have any comments?