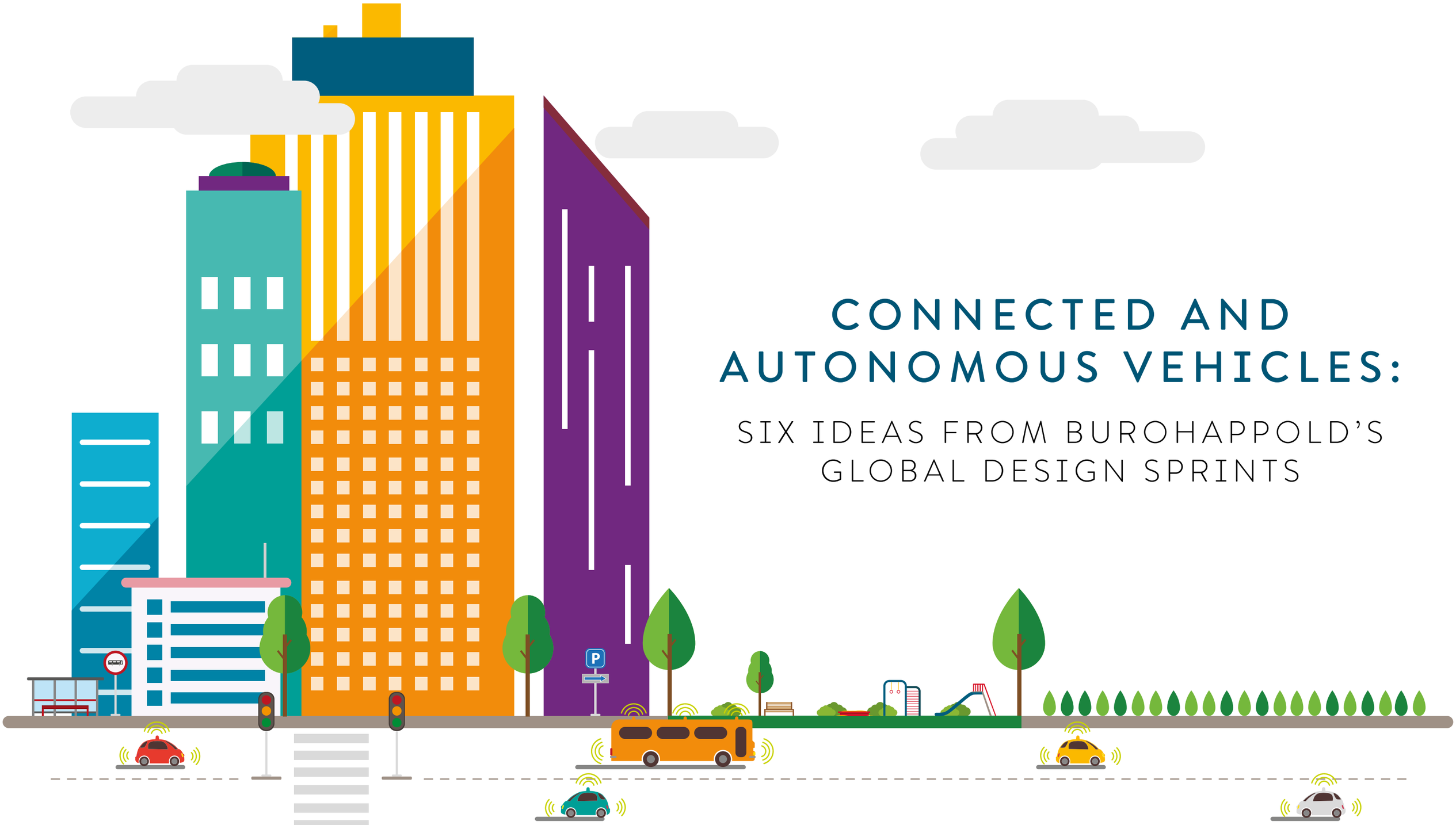
BUROHAPPOLD ENGINEERING



CONNECTED AND AUTONOMOUS VEHICLES:

SIX IDEAS FROM BUROHAPPOLD'S GLOBAL DESIGN SPRINTS

CONTENTS

SIX IDEAS FROM BUROHAPPOLD'S GLOBAL DESIGN SPRINTS

INTRODUCTION

Connected and autonomous vehicles (CAVs) are en vogue. Car manufacturers and technology companies are competing to be the first on the scene of fully autonomous driving. Real estate developers are wondering how it will affect their portfolio. And cities are beginning to recognise that they need to be prepared for the disrupting influence this technology will have on not just the way we move around but on city-life itself. Over the past year, BuroHappold has undertaken research, supported by a series of workshops that we have termed Global Design Sprints. The aim of these sessions has been to gather experts from government, planning, and the automobile and technology industries to debate and address the challenges and opportunities presented and to answer questions such as how urban streets can be reimagined in an age of connected and autonomous vehicles. The full report of the outcomes from the Design Sprints in nine cities across the world is available here.

This following report is a summary of the outcomes from the work to date and highlights six key issues that have emerged from the Design Sprints. We are grateful for the contributions to the debate from our many participants who were willing to share their expertise in design, policy-making, and technology development (see Appendix) and their own thoughts on the future of mobility.

The current discussions around CAVs tend to focus on the vehicles and what they will mean for future mobility. But it is clear from our research that **cities and developers need to articulate their vision and promote their views on maximising the benefits for urban environments whilst the technology is still formative** and options still exist. Within this short report, we hope to make a valuable contribution to the question of how cities and developers can realize the opportunities that CAVs bring, including increased mobility by solving the first- and last-mile problem, and alleviate their potential risks such as increased congestion.

OPPORTUNITY FOR IMPROVING URBAN ENVIRONMENTS

The emergence of CAVs alongside, and eventually in place of, conventional vehicles create a series of efficiency gains that allow us to rethink the way our cities function and how we can make better use of streets and public spaces. The physical environment can benefit greatly:

- CAVs respond to their environment using a number of high-accuracy sensors to analyse their surroundings, making them more consistently responsive, and therefore safer, than human drivers. These sensors are further enhanced by CAVs' ability to connect with all other vehicles (referred to as "V2V"), creating a system that can fully optimise itself to move quickly and safely in a city. As CAVs will be "aware" of all other vehicles, they will move more fluidly. This will reduce the required distance between vehicles and therefore increase current road capacity. In addition, road signs could eventually become obsolete with the introduction of dynamic traffic management systems that recognise local rules and regulations.
- Private cars today require multiple parking spaces distributed near the destinations of their users, be at work, home, the supermarket, event venues, or other recreational facilities. CAVs can change this space requirement for parking by dropping off users at their destination and then continuing their journey, picking up new passengers or commuting to a centralised parking lot. Off-street parking will also benefit from the more precise navigability of connected and automated vehicles. As CAVs will be able to enter and exit parking garages without their users, they will be able to park closer together, maximising space usage. This will enable car park operators to re-plan their assets and optimise parking availability, perhaps by implementing robotic parking systems that remove the requirement for ramps within multi-level car parks.

These opportunities are even greater if CAVs are not individually-owned, but part of a shared fleet where each vehicle is used up to 70% of its time, and not the 5% an average individually-owned car is used today. Thus, the promised efficiency of CAVs will allow alterations to existing streets to provide more space for people instead of vehicles. We wanted to challenge the Design Sprint participants with the task of thinking about the opportunities and challenges that CAVs create for an urban environment. This included a broad spectrum of issues, from the physical implications for urban streets and plazas, to the social questions around accessibility, to the political and financial challenges there might be to continue improving cities for people and not for cars. The six ideas presented in this report speak to this wide range of implications that our Design Sprint participants discussed.

URBAN CONTEXT MATTERS!

Early on in this series of Design Sprints, it became clear that the different contexts of the cities matter. This report highlights the differences between cities and makes the point that there is no single solution for all cities. **The existing transport system, the political context, the local environment and cultural aspects are all factors that will influence the way connected and autonomous vehicles will impact and be impacted by any city** (see following pages).

Each of our 'Sprint cities' has its own set of challenges. One of the impacts of technology is that the cost of driving is likely to decrease and could make it a lot more convenient to simply sit in a car rather than navigate a public transit system with the consequence of greater congestion. Cities such as Bath and Pittsburgh are much smaller and less dense than the other cities of our Design Sprint series. They also have a somewhat limited public transport system (within both cities, buses are the primary public transport mode), which is reflected in the relatively high usage (around 50%) of cars in the modal split. Design Sprint participants in these cities, recognising the potential for increased congestion, focused on how to improve the public transport system through either replacing buses with autonomous on-demand shuttles or a fleet of CAVs that would provide residents with increased mobility without the need to individually own a car.

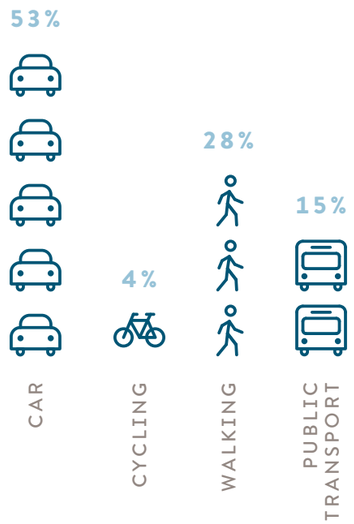
The 'Sprint cities' in the Middle East and Asia (Riyadh, Dubai and Kuala Lumpur) are rapidly growing cities in emerging economies. Car usage is extremely high, at 80% or above, and still seen as an important status symbol for the wealthy middle and upper classes. Active transportation such as walking or cycling is very limited, mainly due to the climate – but also due to the lack of infrastructure. Both Dubai and Riyadh have been investing heavily in new metro systems to improve access to public transit and general mobility in increasingly congested conditions, and Kuala Lumpur has already a developed an urban rail network, featuring a monorail and a metro system. These cities thus need to find ways to make the committed investment in the public transit infrastructure relevant and, at the same time, increase active travel for those who are already used to sitting in a car.

By contrast, Berlin, London, New York, and Hong Kong are cities with well-developed but, in some cases (especially New York), an ageing subway system. The modal splits in these cities are dominated by public transport and active travel, pushing car usage down to around 30% (and in the case of Hong Kong down to 18%). One of the key questions these cities need to address is how to leverage the opportunities of CAVs by integrating them with the existing public transport systems to continue the reduction of car usage.

In the context of the challenges the different cities face, we identified six key ideas from the Design Sprints. The following sections of the report discuss these from technical, economic, social, environmental, and political perspectives.

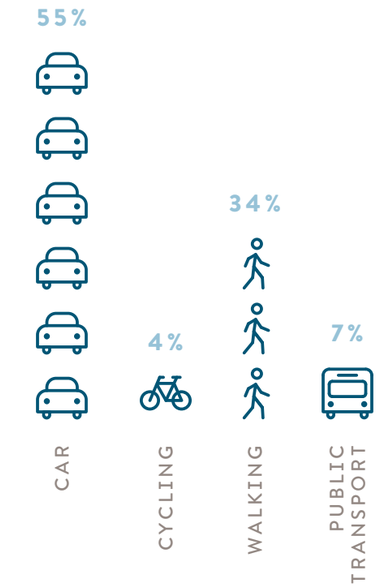
SIZE AND MODAL SPLIT OF 'SPRINT CITIES': **SMALL- TO MID-SIZE CITIES WITH RELATIVELY HIGH CAR USAGE**

BATH
POPULATION: 88,000
AREA: 29 SQKM



Source: Nomis, 2011

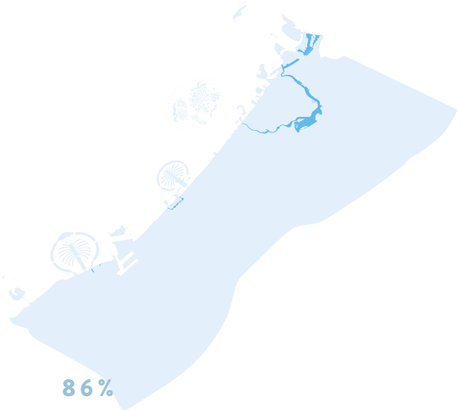
PITTSBURGH
POPULATION: 304,000
AREA: 143 SQKM

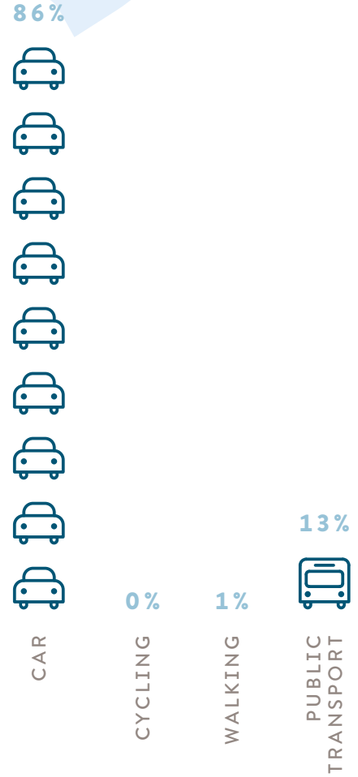


Source: Make my Trip Count (Pittsburgh Commuter Survey), 2015

SIZE AND MODAL SPLIT OF 'SPRINT CITIES': **EMERGING CITIES WITH VERY HIGH CAR USAGE**

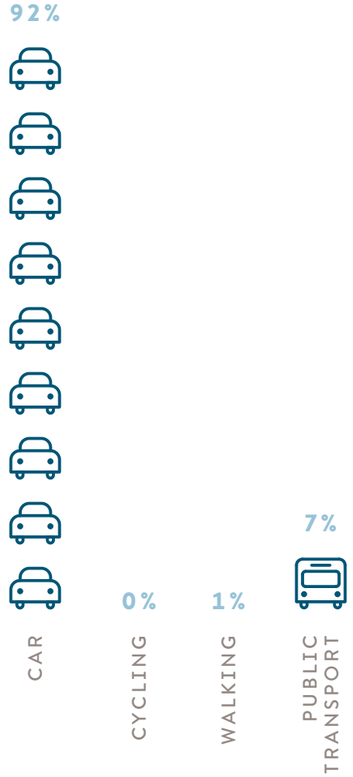
DUBAI
POPULATION: 2,800,000
AREA: 1,388 SQKM





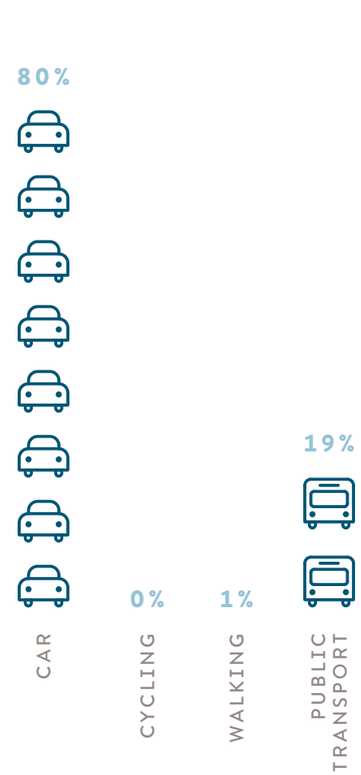
Source: Government of Dubai

RIYADH
POPULATION: 8,000,000
AREA: 1,797 SQKM



Source: Alqhatani, M.S. (2014). Sustainable Transport and Urban Form: Modelling the Shift from Monocentric Private Transport-oriented City to a Polycentric Public Transport-oriented City.

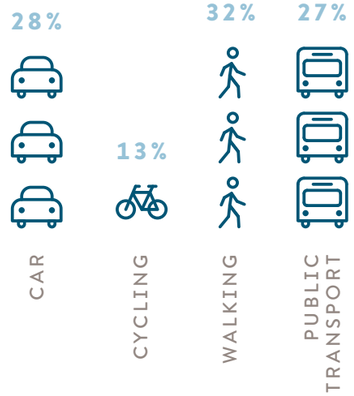
KUALA LUMPUR
POPULATION: 1,800,000
AREA: 243 SQKM



Source: BuroHappold

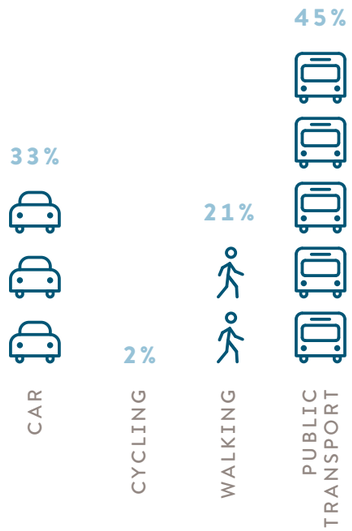
SIZE AND MODAL SPLIT OF 'SPRINT CITIES': **LARGE CITIES WITH LOW(ER) CAR USAGE**

BERLIN
POPULATION: 3,700,000
AREA: 891 SQKM



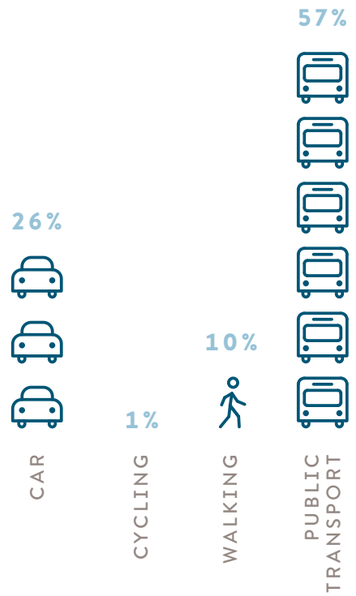
Source: Senatsverwaltung für Stadtentwicklung, 2013

LONDON
POPULATION: 8,200,000
AREA: 1,572 SQKM



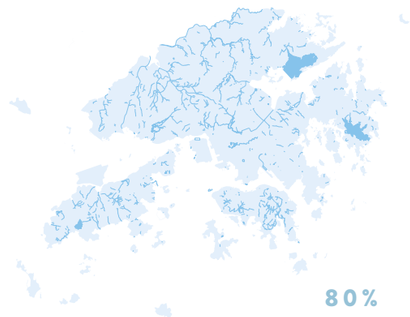
Source: Transport for London, 2015

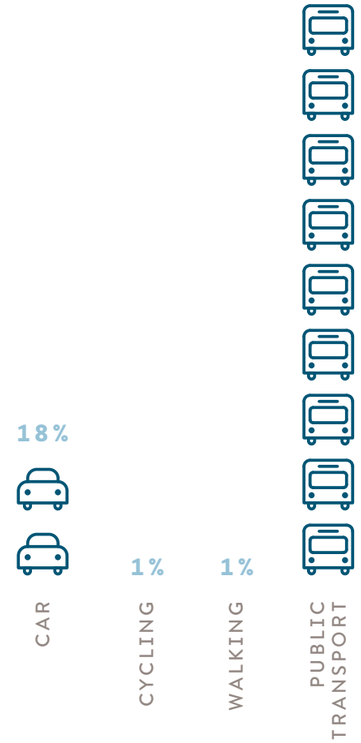
NEW YORK
POPULATION: 8,200,000
AREA: 784 SQKM



Source: U.S. Census Bureau, 2015

HONG KONG
POPULATION: 7,400,000
AREA: 1,104 SQKM





Source: Hong Kong in figures, 2011

#1 INTEGRATING WITH EXISTING TRANSIT

The integration of CAVs with existing transport systems was an issue contemplated and discussed across most of the Sprints. In particular, the Berlin and Hong Kong Design Sprint participants felt strongly about protecting their well-developed and efficient public transport network. Participants regarded CAVs as a mean to complement and enhance existing transit infrastructure by solving first- and last-mile issues. They acknowledged the higher capacity that buses and, even more so, trains have for moving people in dense urban environments. Participants however also saw the risk of CAVs to render public transit obsolete if they become a more convenient and affordable alternative to public transit. A challenge for cities and transport agencies is thus to invest in transit infrastructure and create integrated systems that allow for multi-modal trips – as well as to consider the need for fiscal and regulatory interventions (see idea #3).

INCREASING MOBILITY BY SOLVING FIRST AND LAST MILE ISSUES

CAVs can enhance a public transit system by providing first- and last-mile solutions through, for example, automated mini-buses or autonomous vehicle fleets. People who currently live too far away from a transit station could use an on-demand service from and to their nearest station to reach their destination in the central business district (or elsewhere) in the urban core. To solve successfully the first- and last-mile issue and incentivize people to transfer from the convenience of sitting in a private space to standing in a commuter train, cities will need to invest in fully integrated systems that allow users to conveniently transfer across all modes. This could be via a single payment system (e.g., travel cards or phone app) that is accepted by an autonomous shuttle bus and a shared bike system. It might also be a new rate system, such as fixed subscriptions to the modes that residents want to use.

CREATING CONVENIENCE THROUGH MULTI-FUNCTIONAL TRANSIT HUBS

Public transit must also provide convenience and comfort to be able to compete with a door-to-door ride in a CAV. This includes frequent and on-time service, modern infrastructure, and enhanced convenience. A metro station that also integrates retail activities, whether a supermarket or Amazon lockers, could be a great asset and attractor as it will allow transit riders to combine a journey home from work with collection of packages and groceries before jumping into an autonomous vehicle, cycling, or walking for the last mile. Several Sprint teams explored ideas around mobility hubs that would not only combine different travel modes but also serve as logistic centers.

REPLACING CONVENTIONAL BUS SERVICES WITH ON-DEMAND SHUTTLES

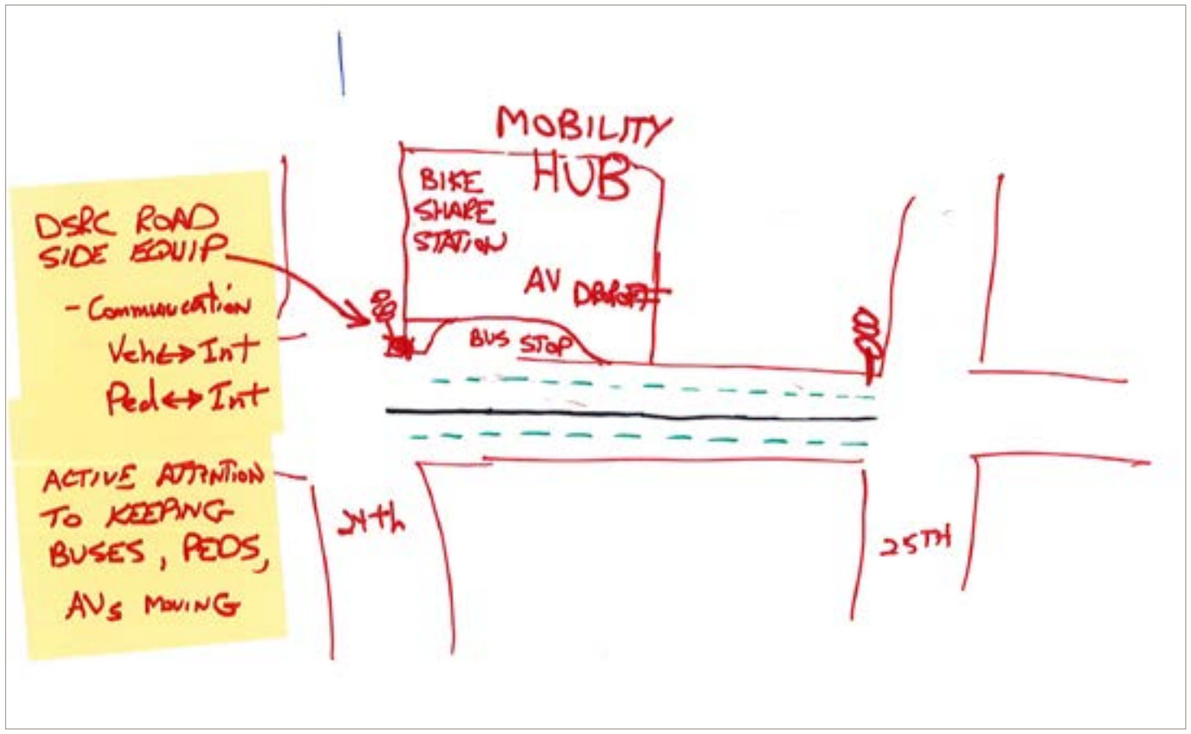
The introduction of CAVs has the potential to make conventional bus systems obsolete. The traditional bus system is based on a fixed schedule and route and provides riders with access along key corridors. At the same time, a single (non-articulated) 12m long bus can accommodate up to 50 people. With current levels of car occupancy and vehicle sizes, this is equivalent to over 30 cars required to convey the same number of people (and occupying a road length of approximately 180m, 15 times that of the bus). The idea of on-demand bus services thus provides many of the benefits of existing bus systems with some of the convenience of the individual car trip. Start-up companies like Via are developing a dynamic-routing system that adjusts to new trip requests in real-time, balancing space in the vehicle with origins and destinations of new passengers, to manage overall journey times. Autonomous on-demand shuttles have the potential to decrease costs of such on-demand services.

USING CAVS WHEN PUBLIC TRANSIT IS NOT EFFICIENT

In some cases, public transport is inefficient and expensive to operate. For example, in low-density areas where there is not enough demand for frequent bus or metro services or at night times when travel demand is low. In these circumstances, use of CAVs modelled around conventional mini-vans or taxi-vehicles could offer a more sustainable and convenient mode of transport in comparison to a private car. Partnerships between transit agencies and private mobility providers such as Lyft, Uber, or the above-mentioned Via, could be considered – although challenges around issues such as data sharing between private corporations and public agencies will need resolution. It was felt strongly that public authorities and public transit agencies need to ensure that they gain access to the data being collected by CAVs to inform decision-making.

Not all cities have a well-developed transit system and the specific challenges and opportunities will differ for each city. However, if your city is heavily investing in new transit infrastructure or your city struggles with finding the funding and political support for investing in mobility, CAV technology is an opportunity to rethink the mobility vision, and some of the above-discussed ideas from our Design Sprints might help doing that.

Multi-functional mobility hub, Pittsburgh



Source: Pittsburgh Design Sprint, Carson Street Team 2

#2 EMBRACING DYNAMIC ROAD USAGE

One of the exciting opportunities that CAVs offer is the potential for real-time traffic management systems. There are already examples of dynamic traffic management systems such as switching lane directions depending on peak demand. However, the benefit of having vehicles that are connected to each other and the road infrastructure is that traffic flows and use of road space can be adjusted to optimise efficiency of movement. This means vehicles can respond to fluctuations in traffic conditions in case of an accident or could be redirected on to less congested streets. Participants in Pittsburgh, New York, London, and Berlin were especially keen to promote technology use in this sense and saw the potential to reverse the current hierarchy of movement in cities, which tends to promote cars at the expense of the pedestrian.

REDUCING THE NUMBER OF LANES BY USING OTHER LANES MORE DYNAMICALLY

Today, most streets are used inefficiently in areas where there is heavy 'tidal flow'. For instance, during the morning commuter period, the majority of people might be moving in one direction with hardly anyone travelling in the other. And during the evening rush hour, the situation can be completely reversed. Each direction has to be designed to accommodate the peak flow, even if that means lanes may be only partially used for much of the day. If the direction of some lanes can be changed dynamically throughout the day to reflect real-time demand, road space can be used much more efficiently and free up space for widening sidewalks or bike lanes. In addition, such a system could contribute significantly to safety (as it could be used to control speed limits) and road accidents could be monitored in real-time, enabling emergency services to be dispatched immediately and traffic to be re-routed. However, for this to be viable, significant infrastructure investment will be needed; a central traffic management system/platform that links CAVs to all possible transport-related infrastructure would be a requirement for this type of responsive traffic management system. And this begs the questions of who pays and how is investment recovered.

DYNAMICALLY ALLOCATING SPACE TO DIFFERENT USERS

In some cases, Sprint participants went even further than the ideas above and suggested that space could be allocated to different users based on demand and in a dynamic context. This could, for instance, allow children to play in streets during the afternoon and vehicles to use the same routes at peak commuting times. The challenge however is that such a use of space would not only require vehicles to be connected to a traffic management system/platform, but also all other users whether cyclists, pedestrians, or the children practicing their soccer skills.

Dynamic road usage on Waterloo Bridge, London

Source: London Design Sprint, Waterloo Bridge Team 2

#3 INTRODUCING DYNAMIC PRICING STRATEGIES

The use of any vehicle imposes a range of external costs including congestion, road and parking infrastructure, and various environmental and social costs. While some of these costs are at least partially covered by road and fuel taxes, many are not. Some cities have already started to introduce pricing strategies, such as congestion charges for vehicles driving in the urban core or higher fuel taxes. The introduction of CAVs could make appropriate pricing strategies even more relevant. The convenience of CAVs is likely to incentivize users to increase their vehicle miles travelled, which in turn has the impacts of greater congestion, increased pressure on road infrastructure, and the potential for generating other external costs. At the same time, the technology embedded in these vehicles and the necessary urban street infrastructure will make it possible to deploy far more sophisticated and targeted pricing schemes. These could extend to taking account of routes travelled, time of day, distances covered, vehicle weight, number of passengers, and, perhaps even, the income of the driver and passengers.

In the Design Sprints in London, Pittsburgh, Berlin, and New York, the introduction of dynamic road pricing schemes was heavily debated, undoubtedly because of the political implications. Interestingly, London's Design Sprint participants saw integrated dynamic pricing as part of the solution, as they strongly believed that the existing congestion charge regime delivers an improved quality of life for London, as well as revenue for the government to invest in transit. Different approaches for pricing were discussed, some of which might be politically more acceptable than others.

PRICING AS A MEANS TO MANAGE TRAFFIC FLOW AND PROMOTE ALTERNATIVE FORMS OF TRANSPORT

Peak time congestion is a common issue in urban centres and one of the main reasons why cities like Stockholm, Bergen, and London introduced congestion charges. The technology of CAVs will allow pricing to become much more dynamic based on various defined criteria. In the same way as price surging on an Uber or Lyft ride or on some US express lanes (e.g., I-95) works, CAVs could be charged based on demand for driving a certain route at specific times. Tolls and parking rates could be adjusted the same way. This would be a powerful tool for transport planners to use to help manage traffic flows and dis-incentivize car usage based on time and location. It would also allow cities to create new revenue streams to improve infrastructure for public transit and active modes of transportation – as well as establishing the necessary technology infrastructure to support CAVs. It will also help individuals think through their priorities when planning a trip. In some circumstances, people might need to be somewhere quickly and on time and are hence prepared to pay more.

CHARGING THOSE WHO CAUSE MOST OF THE EXTERNAL COSTS

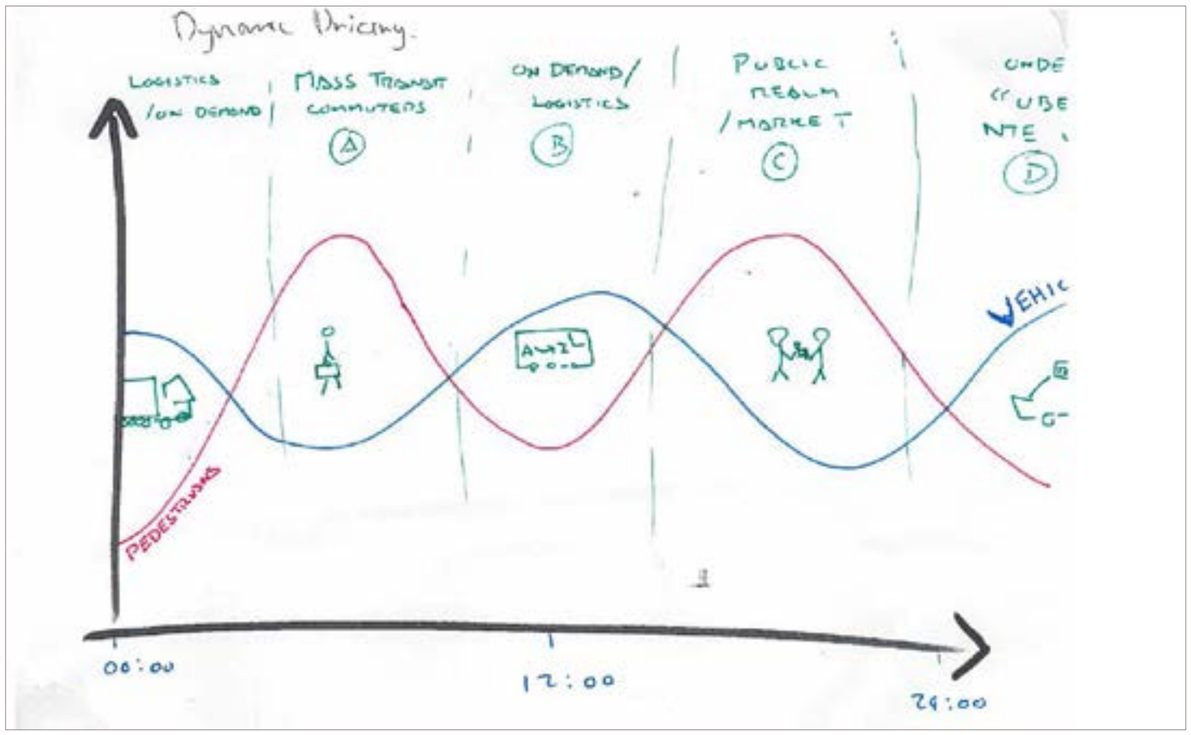
CAV technology allows regulators and policy makers to go further and price, for example, miles travelled for each vehicle. This would allow for a more accurate pricing of the cost of driving a car. Surcharges could be placed on those vehicles that are used less efficiently (e.g., cause more greenhouse gas emissions, have fewer passengers on board) or subsidies could be offered for those vehicles that are more efficient and/or sustainable (e.g., electric vehicles, shared fleets). These costs could be easily transferred to the user. Again, ride-hailing companies like Uber and Lyft already provide different pricing mechanisms; if a customer shares the Uber or Lyft ride with others, he or she pays significantly less for the ride. If these charges form part of the cost of the ride, they might even be politically less contentious than today's congestion charge approach. However, it is an area that regulators and policy-makers need to give consideration to in the near future or risk the problem of current low prices for car hailing being seen as the norm.

PROVIDING SUPPORT FOR THOSE LEAST ABLE TO USE ALTERNATIVE TRANSPORT

Design Sprint participants also raised questions about the affordability of transport for those who might not have an alternative to a car or car service such as, for example, disabled or elderly people who live in a transit-poor areas. Similarly, there are questions of inclusion for those without access to smartphones. Cities might want to think about ways to alleviate this inequality and help those groups play more active, economic roles. Vouchers or credits for those already on tax credits is one idea, although challenges could arise around issues of privacy as income data might be shared with mobility service providers.

While for most cities, road pricing is still a taboo, the loss in revenue from parking fees and fines might force governments to find other income streams. Urban streets on average make up around 25% of a city's land use, making it one of the most valuable assets that the public owns. Recognizing the fact that streets are a public utility that is designed, maintained, and managed as such and that the public owns the streets right-of-way is a first step. If a city adopts suitable dynamic pricing strategies, it is likely that over time there will be a reduced presence of vehicle traffic within the urban core, a reduction in private car ownership, an increase in active travel, and new revenue to invest in transport systems and infrastructure.

Dynamic pricing scheme to promote different uses at various times, London



Source: London Design Sprint, Old Street Team 1

#4 CREATING NEW PUBLIC SPACES

Most of today's developed and developing cities have been planned around the car. Even though there are, in many parts of urban environments, more pedestrians on streets, cars have been allocated a majority of the space. Many cities have started to adjust this hierarchy with the creation of wider sidewalks, bike lanes and shared spaces. However, we are still some way from placing pedestrians and cyclists as a priority in the planning of routes through our cities. The introduction of CAVs provides an opportunity to change radically the way we think of and plan the urban environment. It will however need governments that are prepared to regulate the deployment of CAVs in an efficient and sustainable way. Design Sprint participants were hopeful that policymakers will recognise this moment in time and make the right choices to introduce some of the ideas previously discussed (e.g., road pricing, dynamic traffic management) to reallocate road and parking space for other uses. From this position, they then explored the potential of a range of ideas, from providing more space for active transport such as cycling and walking, to creating new public spaces, to greening parts of the road for improving storm water management. Through these types of interventions it should be possible not only to increase the safety of cyclists and pedestrians, but also to improve the health and well-being of urban residents.

CREATING GREENER STREETS

Space that is potentially freed-up, through the increased efficiency in use of road space and the reduced demand in curbside parking, could be used to make our cities greener. This would not only make for more pleasant environments, but also help to improve air quality, reduce the urban heat island effect, and strengthen stormwater management systems, making our cities more resilient. Numerous studies have shown that greener urban environments improve physical and mental health.[1] Moreover, greener spaces also increase land values, as several studies looking at the correlation of trees on a street and property values have shown.[2]

RECLAIMING SPACE FOR COMMUNITY ACTIVITIES

Other ideas that Design Sprint participants across the globe developed for reallocated space included making better provisions for active travel modes such as cycling and walking or various ways of programming space for activities such as farmers' market, pop-up cafés and retail, or event stages. These types of use could potentially help revitalize streets and neighborhoods that are currently underutilized.

REMOVING CURBS AND OTHER INFRASTRUCTURE

Several teams also proposed the removal of curbs that generally mark the border of pedestrian and vehicle areas on the basis that CAVs will be able to adapt their speed and movement more precisely and accurately than a human driver for any specific context. Thus, in a residential neighbourhood where many children might enjoy playing in the street, CAVs could move through more slowly, eliminating the need to delimitate space for pedestrians and vehicles. Eventually, when the entire vehicle system and urban infrastructure becomes inter-connected, there will be opportunities to remove street paraphernalia that we currently take as given, such as road signals and traffic signs, reducing clutter and freeing-up additional space.

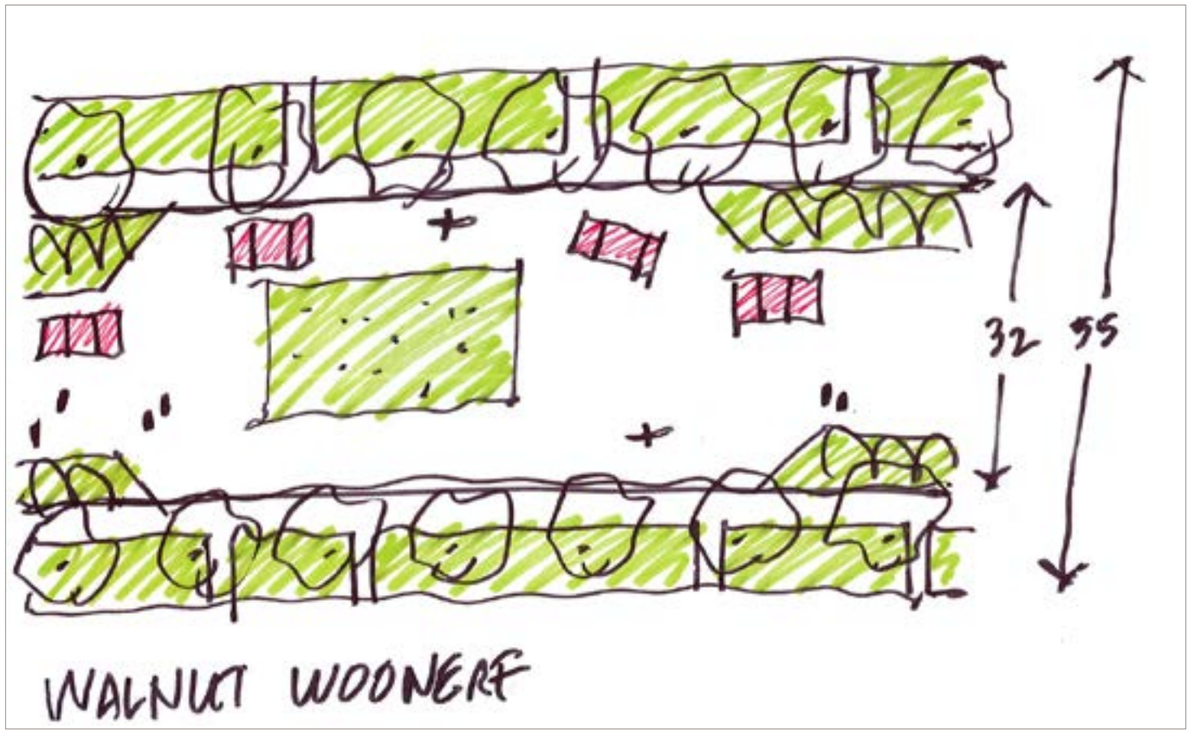
CREATING A STREET NETWORK HIERARCHY

The growing dominance of CAVs should allow city authorities to think in more depth about street hierarchy and the opportunity to prioritize vehicles on some streets and, say, pedestrians and cyclists on others, with residential neighbourhoods becoming much less trafficked. But again, this will only be implementable if some of the previous ideas such as promoting transit and shared vehicles, and/or introducing road pricing are realized. Only then will the density of vehicles on our roads decrease and the opportunities of the CAV technology be able to support these types of ideas.

[1] See, for example, *Urban green spaces and health.* Copenhagen: WHO Regional Office for Europe, 2016.

[2] Conway, D. Li, C.Q. et al. (2010). A Spatial Autocorrelation Approach for Examining the Effects of Urban Greenspace on Residential Property Values. *The Journal of Real Estate Finance and Economics*, 41(2): 150-169.

Reclaiming space for greening the public realm



Source: Pittsburgh Design Sprint, Walnut Street Team 1

#5 DESIGNING EFFICIENT PICK-UP/DROP-OFF AREAS

Ride-hailing apps such as Uber and Lyft have already led to an increase in drop-offs and pick-ups at airports, train stations, hotels, shopping malls, and event venues. The introduction of CAVs will increase the popularity of these types of services and place even more pressure on the spaces adjacent to large commercial and public buildings as well as other popular destinations. Developers of shopping malls, event venues, hotels and operators of transport hubs like airports and train stations need to give serious thought to the changing pattern of future arrivals and departures and particularly the need for high capacity drop-off and pick-up zones. Almost all Design Sprints grappled with the question of how to best plan for this. Ideas ranged from creating specific zones to better spatial layouts. In the same way, the potential increase in delivery vans (as customers take advantage of improved and automated delivery) poses a challenge not only for commercial real estate but also for residential neighbourhoods. This challenge provoked some of the Design Sprint participants to promote the replacement of curbside parking with the creation of 'drop-off' lanes.

DROP-OFF ZONES AT AIRPORTS/ VENUES/SHOPPING MALLS

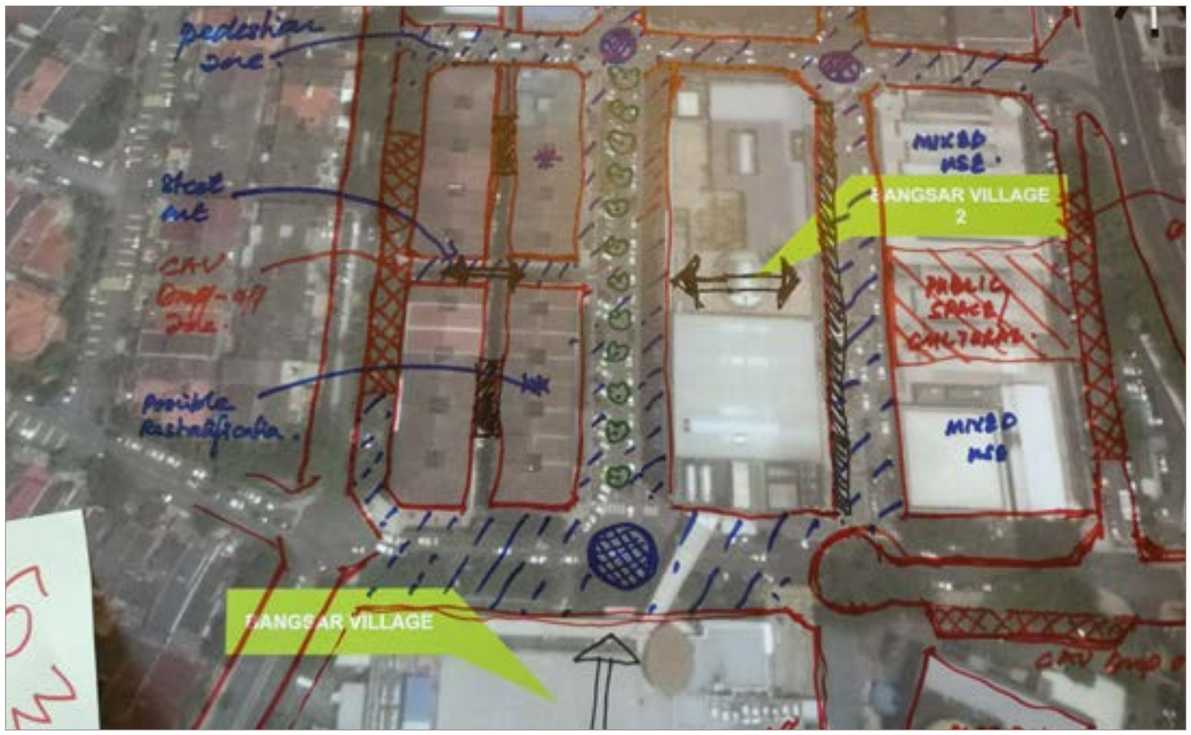
Some airports, venues, and shopping malls have already entered into partnerships with ride-hailing companies like Uber and Lyft. In many airports, there are different levels for flight arrivals and departures and there is a logic to the separation of drop-off and pick-up zones to match these arrangements. When someone arrives at San Diego International Airport and wishes to use the Lyft app, he or she is guided to the pick-up zone for ride-hailing companies. Whilst the spatial question is not fully solved (as it is still a single lane into which cars have to manoeuvre), customers at least know where they have to wait for their vehicles. One Design Sprint idea for this situation was to stack cars in multiple lines. Depending on the volume of passengers, even this scheme could run into capacity issues, however. Similar approaches could be considered for event venues and shopping malls.

DELIVERY AND DROP-OFF ZONES IN RESIDENTIAL AREAS

Deliveries and drop-off/pick-ups in residential areas could prove to be even trickier than for commercial buildings. With the growing service economy, where everything from fresh food to laundered clothes, are directly delivered to home, the delivery vehicles can become a nuisance on urban streets. For large commercial businesses, many cities are promoting managed delivery programs forcing carriers to deliver their goods during less busy hours to the commuter peaks. For residential areas, this approach will be more difficult. A recurring idea during the Design Sprints was the replacement of curbside parking spaces with 'drop-off' lanes for deliveries. Another idea that was discussed was the combination of multi-functional transit hubs that also double-up as logistic centers and collect not only passengers from nearby transit services, but also mail and deliveries.

Designing efficient pick-up and drop-off zones is likely to require a mix of policy and design solutions as well as a degree of experimentation. The increasing popularity of ride-hailing companies and the growth of delivery vehicles is already focusing minds around potential solutions. As CAVs become commonplace, it will become increasingly important to find good physical design solutions and policy proposals.

Designated drop-off zone for a neighbourhood



Source: Kuala Lumpur Design Sprint, Jalan Telwai 3 Bangsar Team

#6 RETHINKING PARKING

With the potential for CAVs to park more efficiently than conventional vehicles and (at least in a shared ownership model) the reduction in vehicles requiring to park (at least in urban areas), the current levels of car parking provision in our city centres are unlikely to be required. This not only provides opportunities for rethinking curbside parking, but also forces the current and future owners of parking facilities to rethink above ground and underground garages. Whilst demand for future scenarios is still unclear, many real estate developers are already contemplating the future of their parking facilities – but it also requires municipal governments to rethink regulations that set minimum parking requirements, which, even in today's environment, can promote over-provision.

BUILDING ADAPTABLE PARKING STRUCTURES

With land prices and construction costs in urban areas escalating, real estate investors and developers are generally careful to ensure that their projects are able to respond to changes in future scenarios and the type and quantity of parking provision is simply another consideration. Whilst parking demand requirements to provide for today's use is reasonably predictable, future demand is likely to be reduced by the advent of CAVs, and thus planning and designing new parking facilities in an adaptable way has to be a route to pursue. Some developers are already taking into account the likelihood of this change. There are, for example, companies that design and build flexible parking spaces, based on temporary foundations (if ground conditions permit) and with fully demountable and re-purposing structural elements. Other developers are building parking structures that are designed to be adapted at a later stage. Often this involves structural space with flat floors, comfortable floor-to-ceiling heights, and sufficient loading capacity/strength to support other service uses. Whist provision of this level of adaptability may increase initial capital costs, the intent is to improve asset value in the long term.

DEVELOPING IDEAS FOR THE RE-USE OF EXISTING CAR PARKS

Whilst development of adaptable parking structures will create resilience for the future and the arrival of CAVs, there are numerous existing parking facilities which are likely to become under-utilized. Car parks that are no longer required could potentially be used for facilities to support CAVs, including charging stations, servicing areas (cleaning and maintenance), or simply as lay-over space. If the structure allows, they could also be adapted for other uses such as art spaces, restaurants, or even commercial and residential units. Ultimately, a garage that has no viable purpose could be demolished and replaced with a more valuable asset.

CREATING SMART PARKING GARAGES

For the foreseeable future, parking garages will not disappear, but they are likely to become highly connected spaces, fitted with new levels of technology, from electric charging stations to hardware that alerts vehicles to free space, and from on-demand parking apps to embedded data analytics. These parking spaces may also no longer be in the city centre, where land value is high, but perhaps pushed towards the urban edges (since CAVs will be able to navigate their way to any lay-over/servicing area if not immediately required for a new passenger).

For these changes in parking provision to happen, municipal governments also need to be responsive and adapt their parking policies to ensure that regulations are positive and supportive. Concurrently, financial institutions, funds and insurers need to recognise and respond to the changing needs of urban development.

Redeveloped garage as a logistics, staging and distribution hub with workforce development opportunities

Source: New York Design Sprint, Greenpoint Team 1

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