Inter-modal transport data-sharing programme

"Transforming Mobility in Hong Kong"

11 July 2019

Agenda

1. Introductions
2. Interviewees
3. Report on Findings
4. Passenger-centric stories ('Use Cases')
5. Long-term vision

Interviewees

We have conducted over 45 stakeholder interviews, including:

- Hong Kong Government B/Ds
- Transport operators
- Transport consultants
- Payment service providers
- Universities
- Research institutes
- NGOs
- Data analytics application developers
- Vehicle telematics technology developers

The need for cooperation and integration

In a rating of global cities, Hong Kong was the "*study winner: 58.2 points, 1 out of 84 worldwide, 1 out of 28 in Asia Pacific [...] further improvement of the mobility system will require more cooperation with other stakeholders in the ecosystem and the introduction of innovative mobility services*".

[But] what is holding back change?

[In Hong Kong] "*... the next step must be to fully integrate the travel value chain to foster seamless, multimodal mobility while ensuring "one face to the customer" and to increase the overall attractiveness of public transport by service extension*".

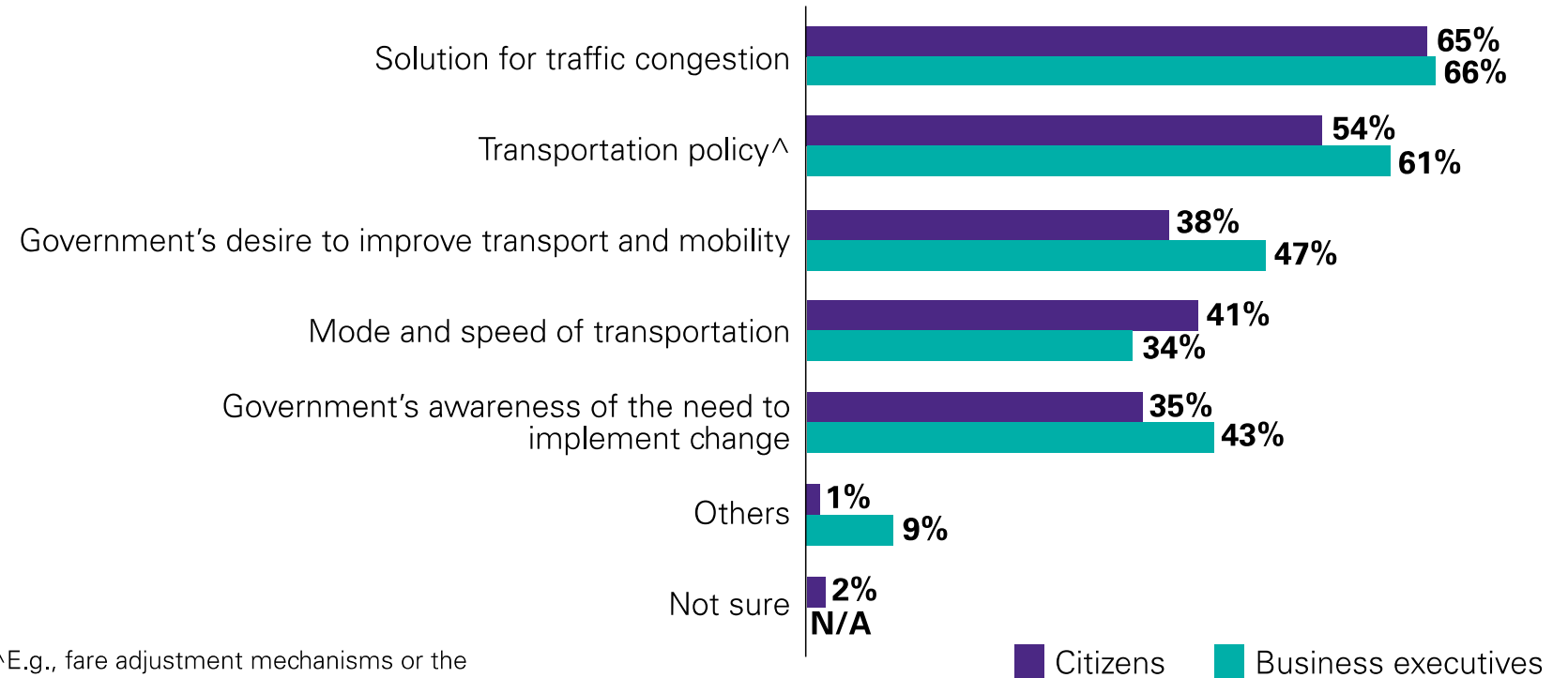Source: Arthur D. Little, 'The Future of Urban Mobility 2.0', **Jan** 2014

Pain points

Congestion and Air pollution

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Figure 3.2: What needs to be changed to better develop transportation and mobility in Hong Kong in the next 10 years?*

Category	Citizens	Business executives
Solution for traffic congestion	65%	66%
Transportation policy^	54%	61%
Government's desire to improve transport and mobility	38%	47%
Mode and speed of transportation	41%	34%
Government's awareness of the need to implement change	35%	43%
Others	1%	9%
Not sure	2%	N/A

■ Citizens   ■ Business executives

^E.g., fare adjustment mechanisms or the construction of new railways and/or highways

*Respondents were asked to select all that apply

Source: KPMG Survey analysis

Source: KPMG/YouGov Survey 2018 Connected City

TRP Technology Research Project

What needs to be changed?

1. Solution for traffic congestion
2. Transportation policy
3. Government's desire to change transport mobility

Source: YouGov KPMG survey on Smart City Development (Section Transport and Mobility)

Policy strategies to respond to Climate Emergency

Sweden to ban sales of fossil-fuel powered cars by 2030

2030 | CLIMATE TARGETS | COMBUSTION ENGINES | ICE BAN | STEFAN LÖFVEN | SWEDEN

Sweden is saying goodbye to cars with internal combustion engines. Prime Minister Stefan Löfven has now declared that no new cars with diesel or petrol engines will be sold after 2030.

Clearly, Scandinavia is stepping up when it comes to transport transition off fossil fuels. Norway, which is so far the only country ever to have an EV-registration quota of around 50 per cent, has aimed even higher, with no new cars with combustion engines to be on the market in 2025. Denmark has drawn up corresponding plans for the year 2030, as Sweden has now done.

But it is not just Scandinavia that is managing the change. Greenpeace transport expert Marion Tiemann pointed out that Sweden is now the tenth country to have set such a concrete phase-out date, and that larger nations such as Great Britain and France are also among them. The latter however angle toward ICE bans no sooner than by 2040 – for the time being.

Tiemann pointed out that Germany, home to a large portion of the world's automakers, was lagging behind since German Federal Transport Minister Andreas Scheuer (CSU), has yet to present concrete transition goals. "It is clear that without a phase-out date for diesel and gasoline engines he will not be able to meet climate targets," Tiemann believes.

Her thoughts were echoed by the expert body NPM just a few days ago. The 'National Platform for Future of Mobility' urged the German government to introduce mandatory sales quotas for electric cars and plug-in hybrids of 25 per cent in 2025 and 50% in 2030. The experts also called for a general speed limit of 130 kph on motorways and increased taxation of petrol and diesel, which in turn could finance subsidies of 8,000 euros for the purchasers of electric cars. Already the proposed speed limit on motorways has been met with opposition. The federal transport ministry itself could be heard on Twitter considering the cap "neither socially nor economically responsible" – an astonishing reaction to something that other countries regard as effective climate protection. So, an ICE ban seems a long way away in "Autoland".

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Policy strategies to respond to Climate Emergency

Norway to 'completely ban petrol powered cars by 2025'

'What an amazingly awesome country', Elon Musk tweeted in response to the plan

Jess Staufenberg | Saturday 4 June 2016 18:15 | 231 comments

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Hong Kong

A range of measures and policy statements, including:

"The Government's long-term policy is to have zero emission buses running across the Territory." Source: https://www.legco.gov.hk/yr18-19/english/panels/ea/papers/ea20190325cb1-723-3-e.pdf

"The [Transportation] Sub-group acknowledged that the implementation of both fiscal and non-fiscal measures to control private car growth needs the consensus and support of the community and Legislative Council as legislative amendments are required." Source: https://www.legco.gov.hk/yr18-19/english/panels/ea/papers/ea20190325cb1-723-3-e.pdf

…. and also …

"Our 2020 [carbon intensity] target will reduce Hong Kong's per capita contribution to less than 4.5 tonnes; and our 2030 target could reduce it further to about 3.3-3.8 tonnes. There would still be a way to go for Hong Kong to reach 2 tonnes per capita further into the future."
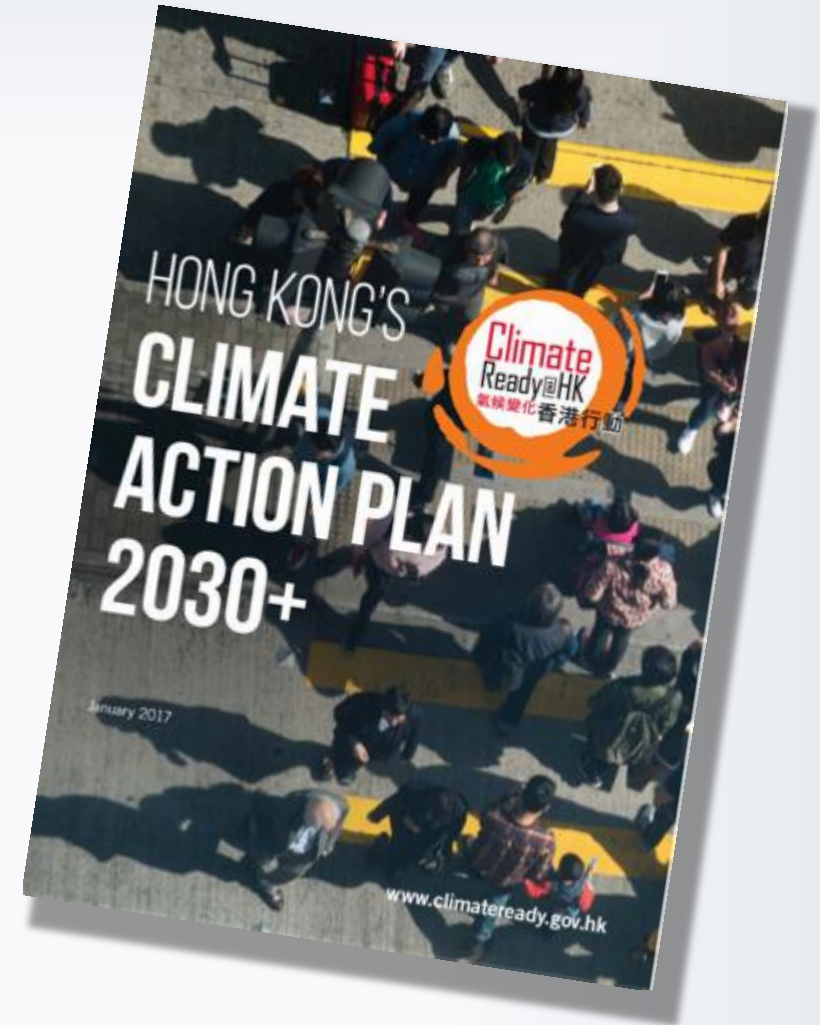
Smart Mobility – A Public Health Issue?

"A couple of decades ago, it was perfectly normal to smoke cigarettes inside. I think it is the same with cars in the city centre. One day we'll look back and ask ourselves why we ever thought that was a good idea."

Source: Hanna Marcussen, Vice Mayor of Oslo.

Smart City Blueprint

Our questions on the Blueprint are:

1. Has there been a visible impact of smart city initiatives on mobility in Hong Kong so far?
2. Data sharing has universal applications for smart city management and therefore could the lessons learned from improving mobility have wider applications?

Hong Kong Smart City Blueprint

GBA: Integrated air, land and sea transport

All-in-one ticketing arrangements for air, sea and land transport to launch under 'Greater Bay Area' plan, securing Hong Kong's aviation hub status

- Memorandum signed between city and Beijing under bid to expand intermodal transport as part of development master plan
- Scope of cross-boundary helicopter services also expected to be widened for high-end travel

The Shenzhen Baolan International Airport. Under an expanded bilateral deal, travel modes between Hong Kong and mainland cities will be integrated under one ticket, providing passenger convenience. Photo: K. Y. Cheng

Unprecedented ticketing arrangements that combine airline, rail, ferry and coach services between Hong Kong and mainland China will take place under an expanded bilateral deal to consolidate the city's status as a transport hub.

The so-called code-sharing between airlines and other transport operators was revealed on Tuesday, a day after Beijing unveiled its blueprint for the "Greater Bay Area", a plan to integrate Hong Kong, Macau and nine other mainland cities into an economic and innovation powerhouse.

"Unprecedented ticketing arrangements that combine airline, rail, ferry and coach services between Hong Kong and mainland China will take place under an expanded bilateral deal to consolidate the city's status as a transport hub [...] allow[ing] designated airlines from both sides to enter into arrangements with operators of all types of land transport, including rail services, passenger vehicles and coaches".

Source: South China Morning Post, 19 February 2019 accessed at https://www.scmp.com/news/hong-kong/transport/article/2186823/all-one-ticketing-arrangements-air-sea-and-land-transport on 19 February 2019

Regulatory & Policy Context

A diverse range of views:

"The PTOs have contractual relationships. The legacy of contractual burdens in HK transport system - how to remove? How to solve it? Through cross-company cooperation."

[we have] *"... a coordinated but not integrated system"*

"We have not moved forward ... [H]ow can you have smart mobility without data sharing"

"Intermodal (transport) coordination policy - with a defined role for each mode (to match) an increase in capacity"

Policy sandboxing

Policy sandboxing and development

Policy pilots

Policy adoption
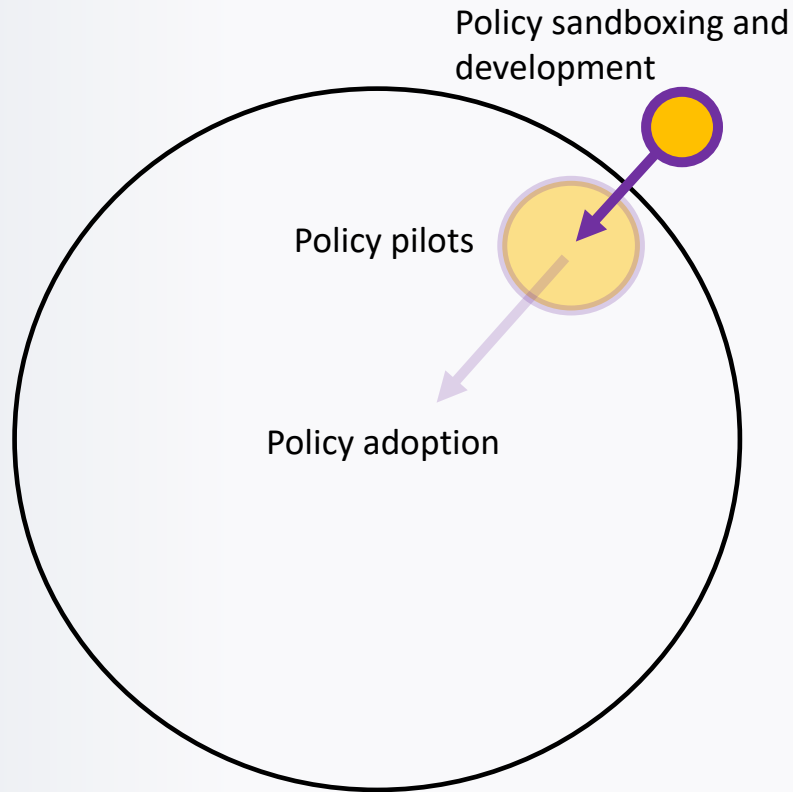
Experiment with new approaches using 'policy sandboxing'.

If they prove to be valuable then they are introduced into Government and supported to ensure more widespread use in Government Departments

Usually applied to:

- People-centric services
- Needs focused services
- Transformative in application
- Addresses complex problems
- Applicable when high rate of innovation

Mode choice from fixed to flexible

Degrees of demand-responsiveness

Fixed

Flexible

- Fixed route
- Fixed times / fixed frequency
- High demand / high volume route(s)
- Serving new demand may require new infrastructure

- Flexible, demand-driven routing and timing
- Lower demand / lower volume route(s)
- Rapidly meets new demand
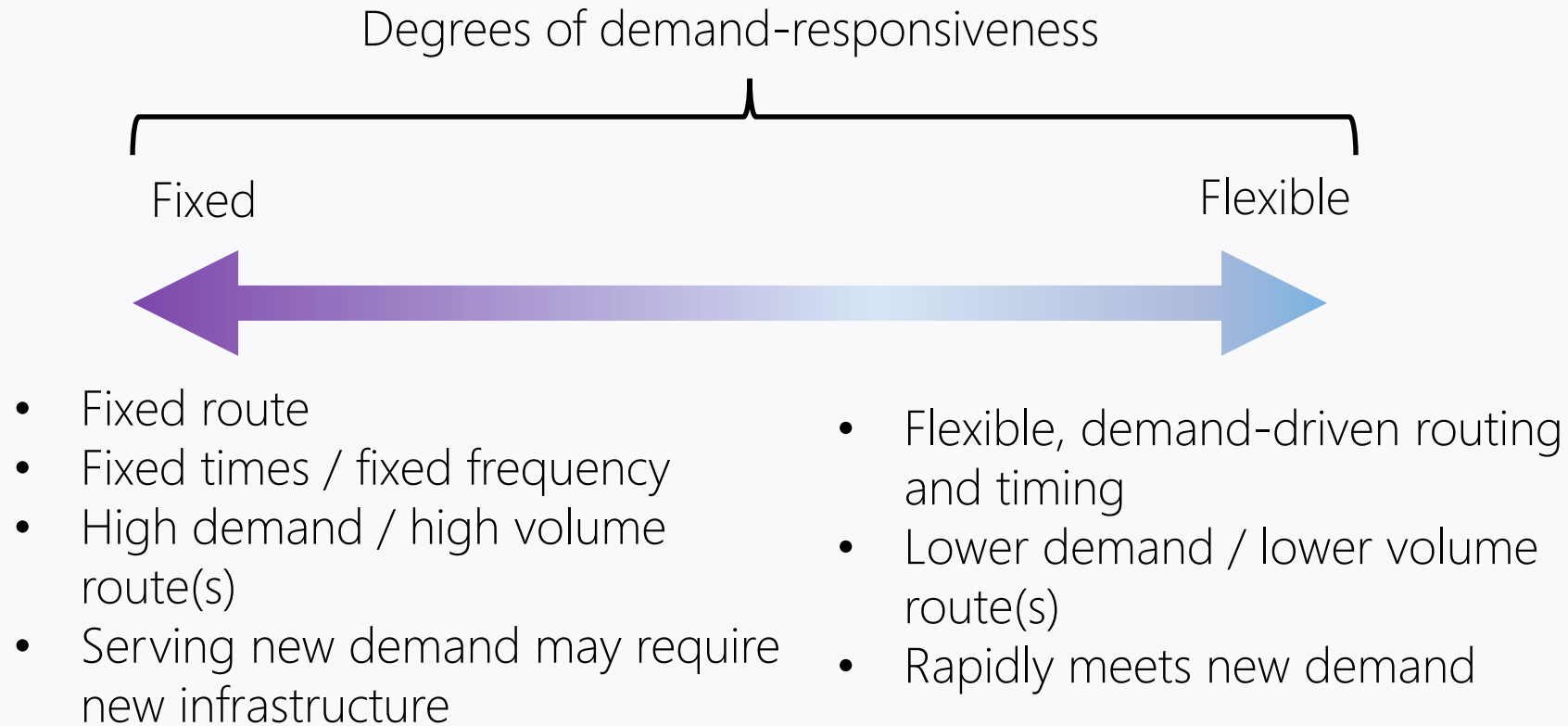
Mode choices exist at different locations on this continuum, innovation stimulates new services offerings that fill some of the gaps

Hong Kong: Mode choice from fixed to flexible

Degrees of demand-responsiveness

Fixed   Flexible

HSR   LRT   Ferries   Car pooling /   Cycling   Passenger car
                                        taxi pooling
   MTR   Buses   Walking
                                                     e-Taxi and
                                                     Taxis
              GMB   RMB
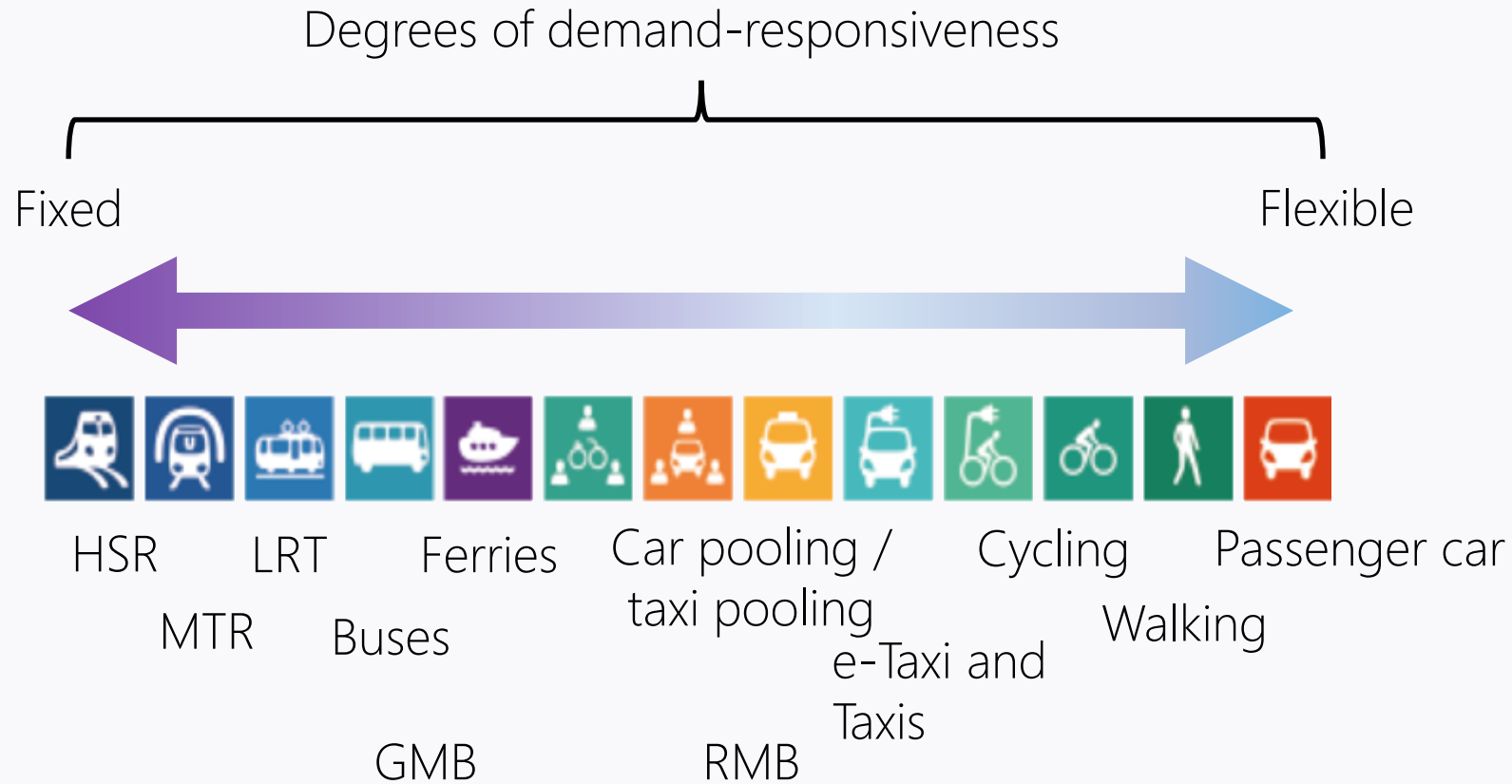
From policy to implementation: two examples of Mobility Operators
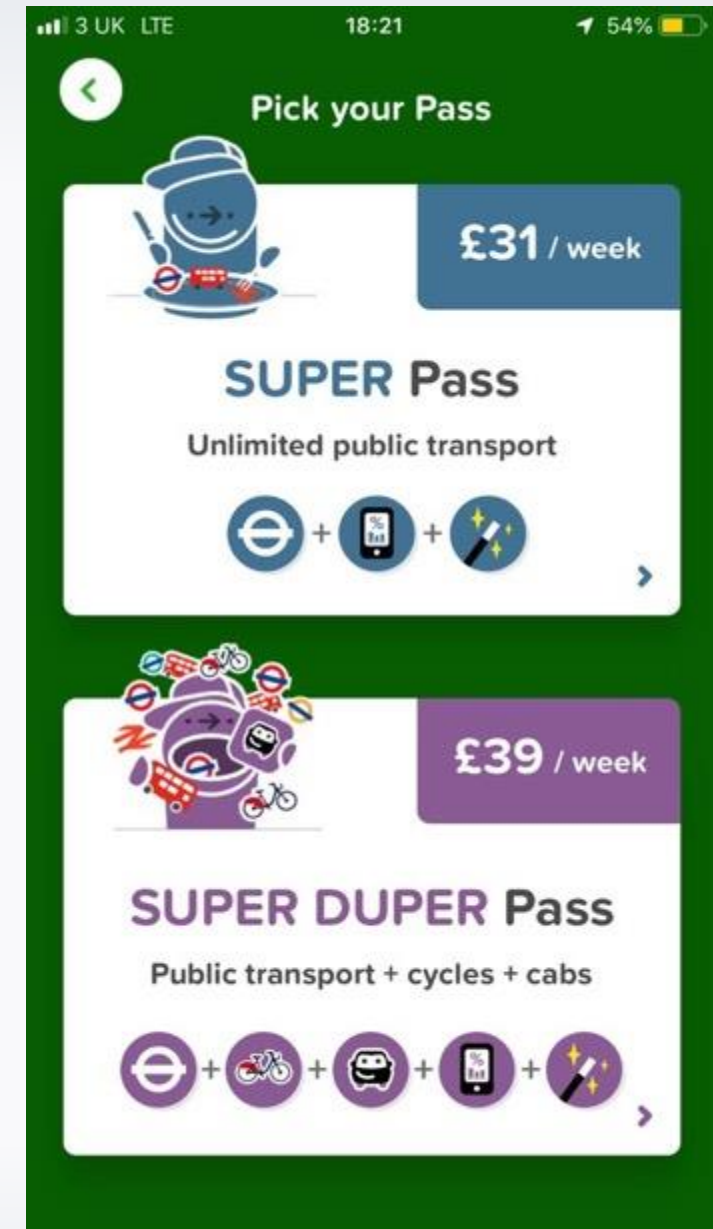
Decomposition of contributors of transport to GHG

Total GHG Emissions

System-Infrastructure Modal Choice X Fuel Carbon Intensity X Energy Intensity X Level of Activity
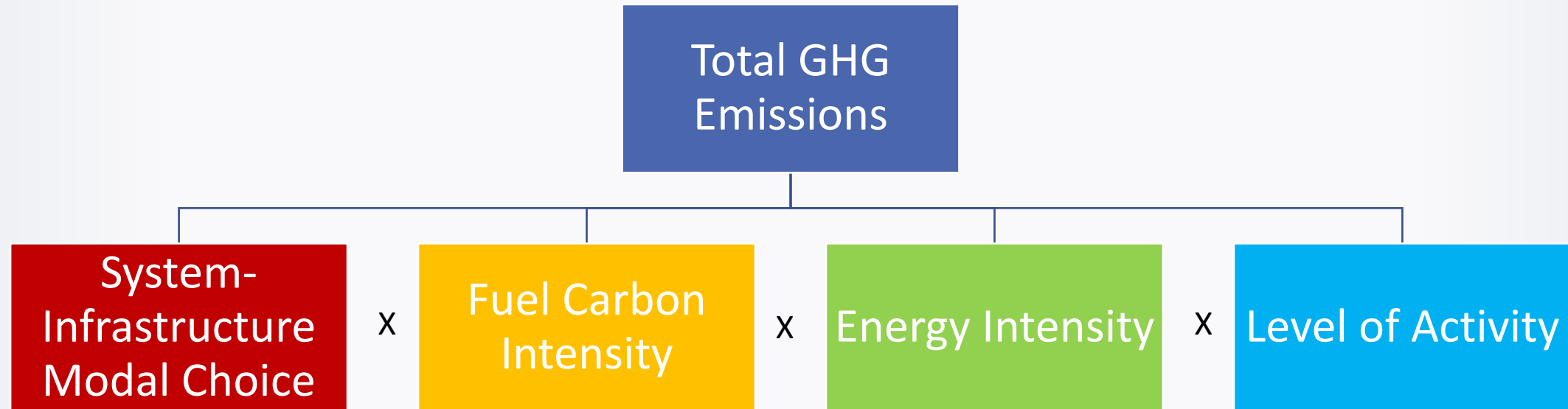
Based on: Sims R., et al. Transport. In: Climate Change 2014: 'Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change', p606 accessed at https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter8.pdf on 23 June 2019

Transport Sector Energy: end-uses, 2015

Source: Environment Bureau, 'Hong Kong's Climate Action Plan 2030+', p17 accessed at https://www.enb.gov.hk/sites/default/files/pdf/ClimateActionPlanEng.pdf on 23 June 2019
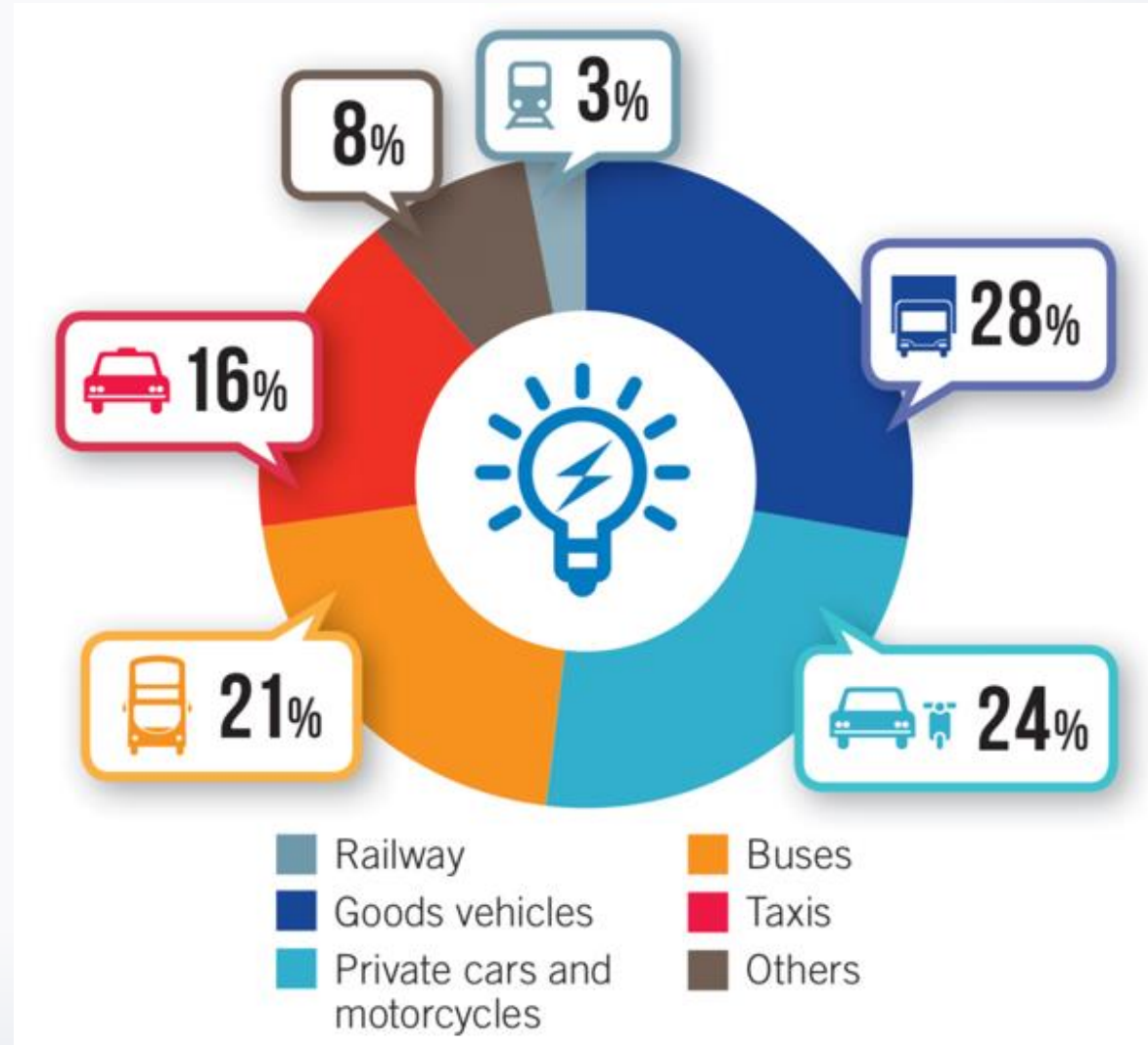
Hong Kong: forecast performance

"A study from ARUP and C40 Cities – a city- level climate action network to which Hong Kong belongs – makes clear that the target for cities with the GNP and emissions levels of Hong Kong should stand at 2.0 tCO2 [equivalent] per capita by 2030.
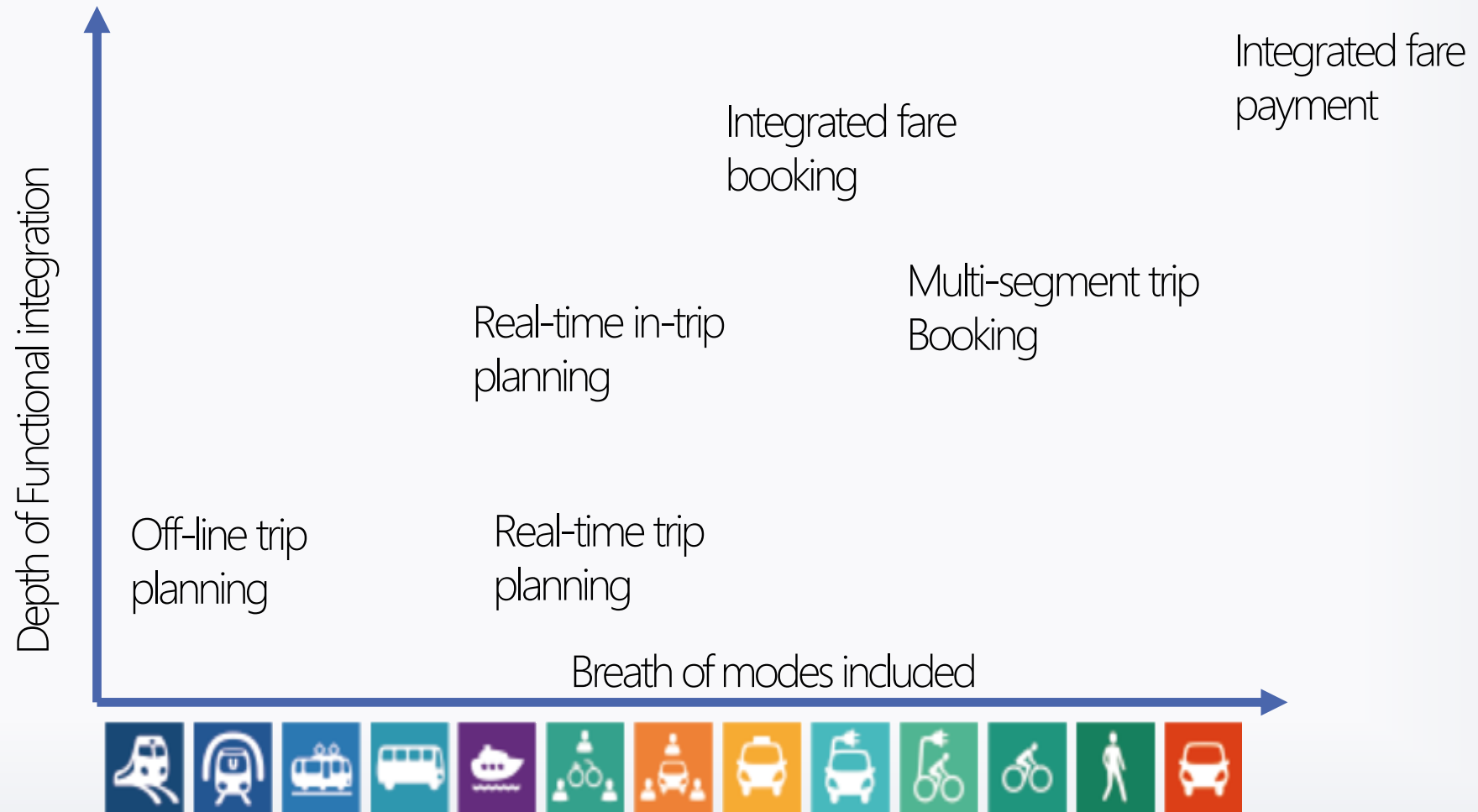
Hong Kong's 2030 target of between 3.3 and 3.8 tonnes per capita would exceed the C40 Cities pathway by some 78%".

Source: CarbonCare InnoLab Hong Kong, p17 accessed at
http://www.ccinnolab.org/upload/files/Paris%20watch%20Climate%20Action%20Report%20.pdf on 23 June 2019
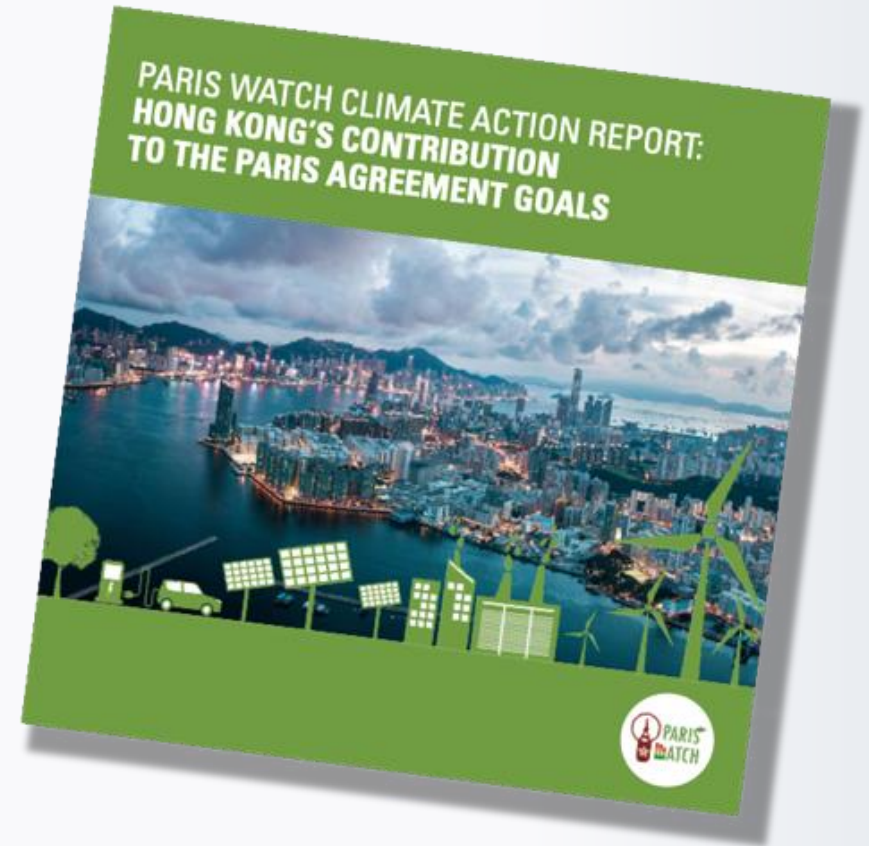
Can Data Sharing enable better transport?

- Understanding commuting patterns can support urban planning, road safety, traffic management and environmental protection
- New insights from existing and additional data and its analysis and potential revenue from exchanging and re-using data
- However, privately-held data cannot always be made open
- Need to respect value of data!

Different types of Data Sharing

- Public versus private data:
    - Public data (data.gov.hk)
    - Data controlled by private businesses
- The predicted benefits of data sharing must outweigh the costs and risks for both
    - benefits for those businesses providing the data
    - benefits for the public sector re-using the data and create benefits for the public
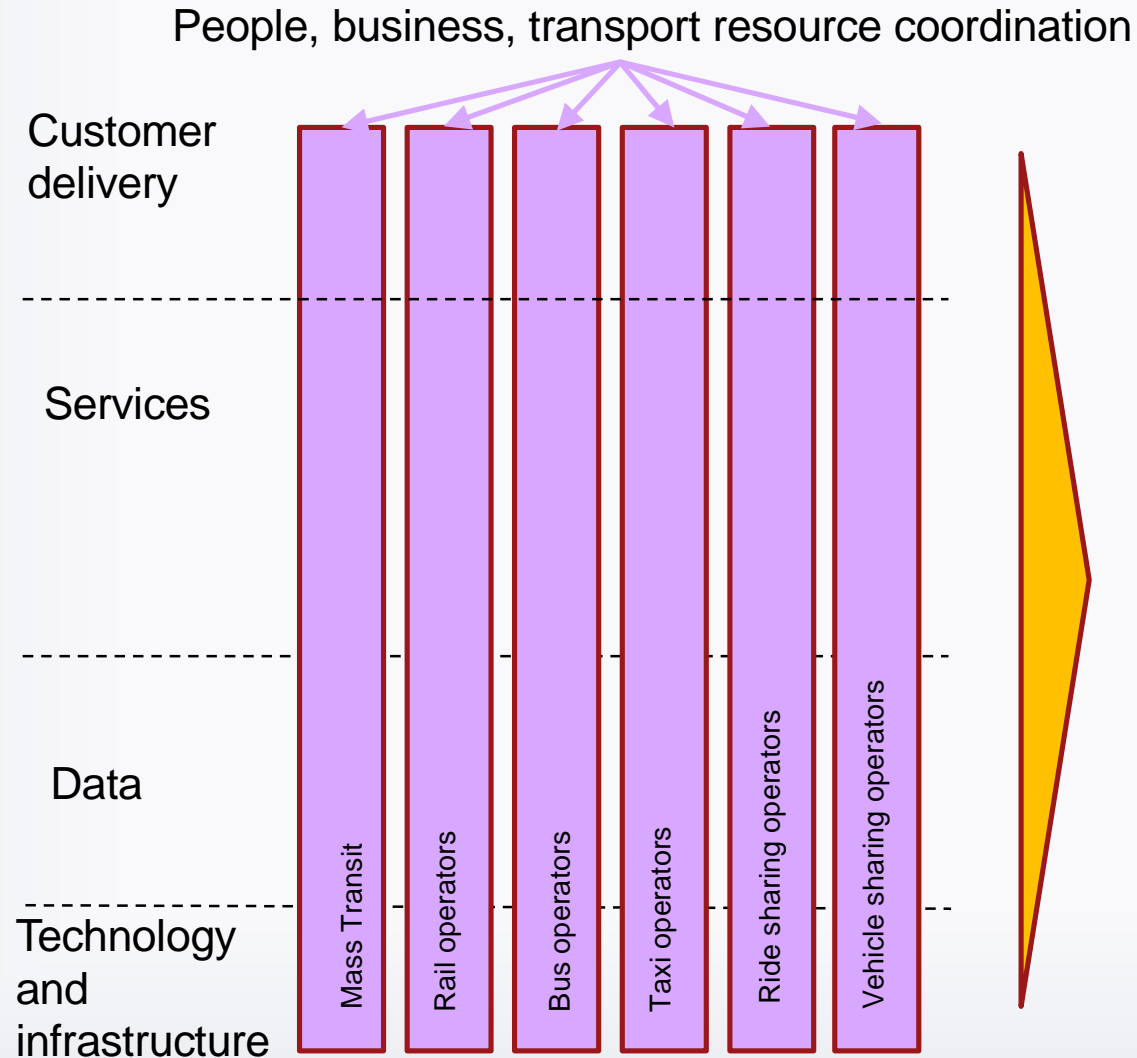
What are the principles of Business to Government (B2G) data sharing?

Degrees of data openness
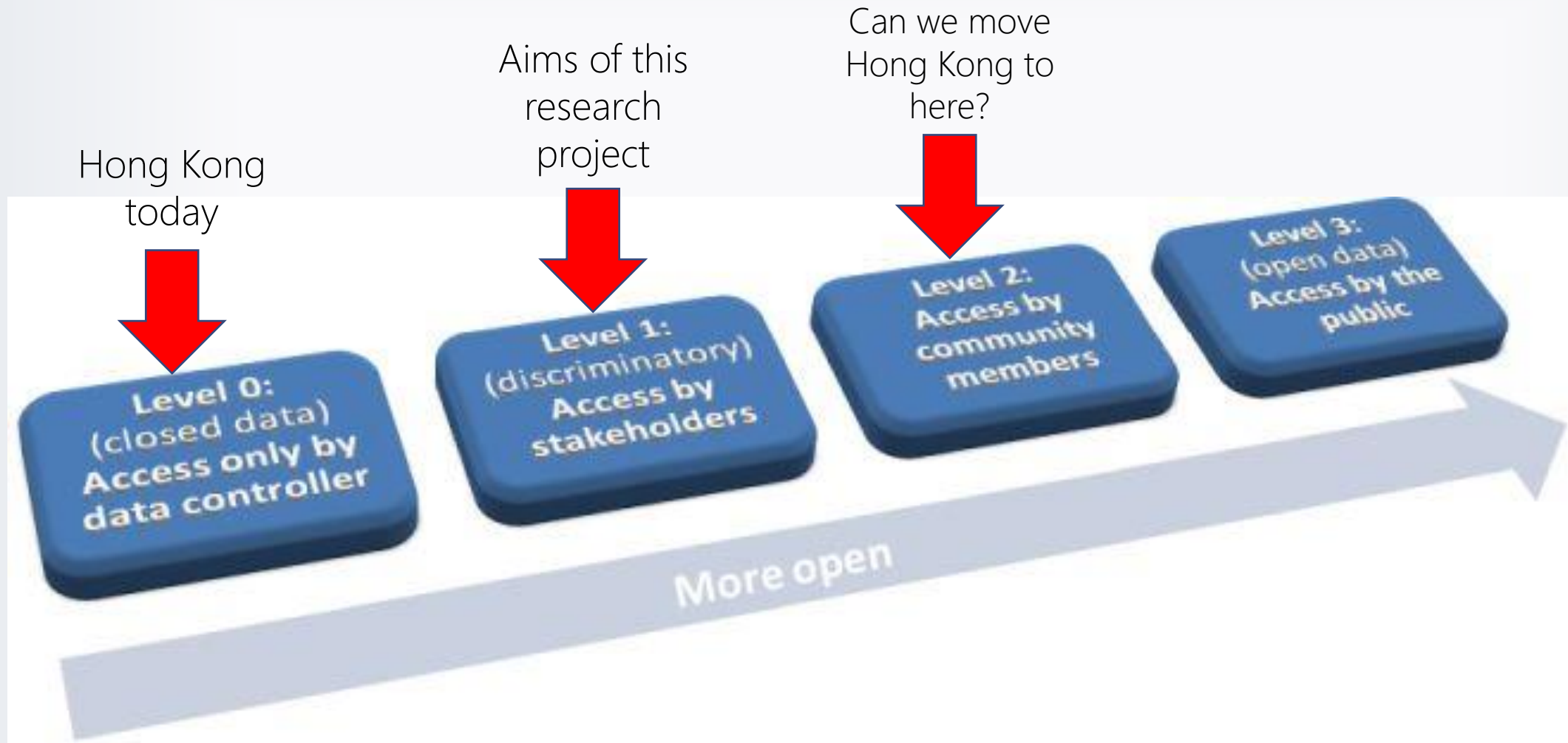
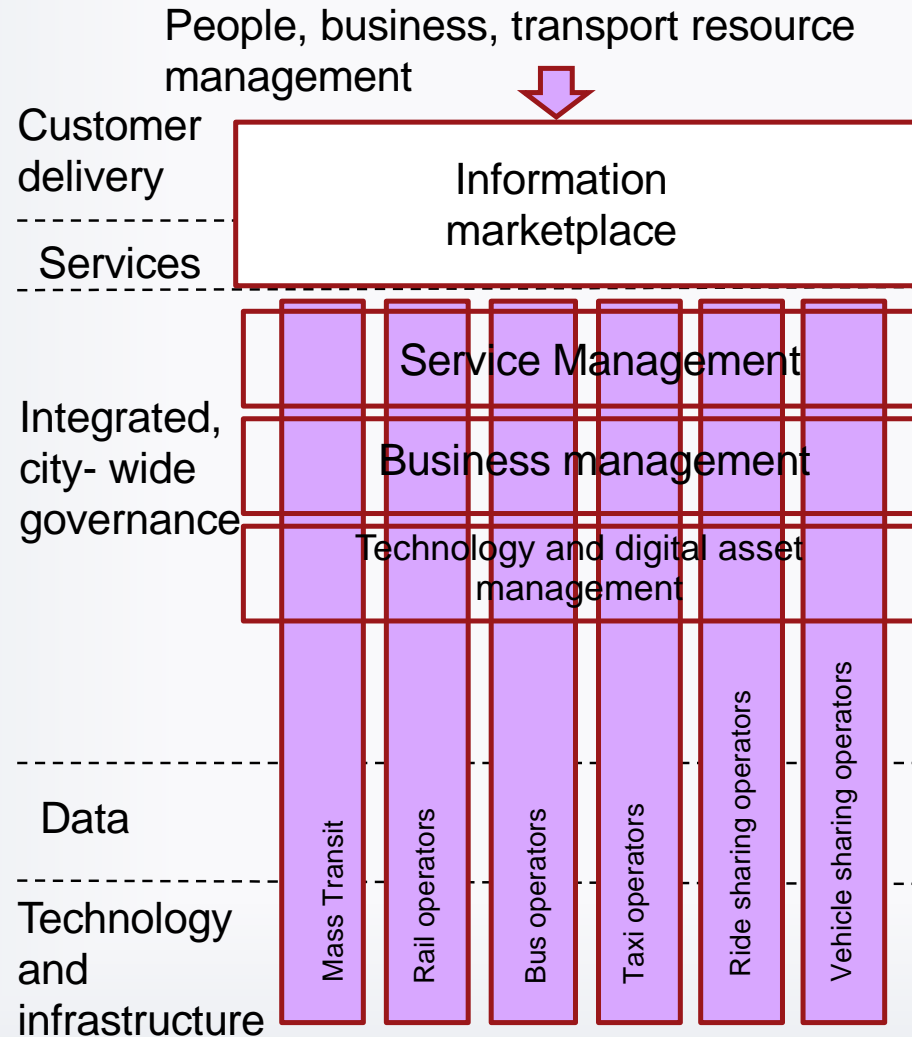Source: OECD: Maximising the economic and social value of data
http://www.oecd.org/internet/ieconomy/enhanced-data-access.htm

Organisation & Information Architectures: silos

People, business, transport resource coordination

Customer delivery

Services

Data

Technology and infrastructure

- Mass Transit
- Rail operators
- Bus operators
- Taxi operators
- Ride sharing operators
- Vehicle sharing operators

Impact:
- Disconnected
- Not customer focused / transactional
- Inefficient
- Closed systems, not available to externally stimulated innovation
- No ability to enable cross-system innovation
- No ability to scale rapidly

Based on *BSI PAS 181:2014 Smart City Framework – Guide to establishing strategies for smart cities and communities*

Organisation & Information Architectures: unlocking the silos

People, business, transport resource management

Customer delivery

Information marketplace

Services

Service Management

Integrated, city-wide governance

Business management

Technology and digital asset management

- Mass Transit
- Rail operators
- Bus operators
- Taxi operators
- Ride sharing operators
- Vehicle sharing operators

Data

Technology and infrastructure

Impact:
- Transport data unlocked from modal silos
- Logical separation of data, service and customer delivery layers
- Externally-driven innovation:
  - Enable marketplace for information and services
  - People, business and social entrepreneurs co-create new value with data
- Internally-driven innovation:
  - Improved and integrated service delivery
  - Resource optimisation
- Ability to drive city (and site-wide change) rapidly.

Based on *BSI PAS 181:2014 Smart City Framework – Guide to establishing strategies for smart cities and communities*

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Data.gov.hk

Models for B2G data sharing

- Data partnerships
- Multi-party data sharing agreement
- Data donorship / Data "CSR"
- Data intermediaries
- Data sharing by regulation to ensure public benefits and a fair share of responsibilities

Successful and sustainable B2G data sharing must be legally compliant, technically feasible, socially acceptable, financially and commercially viable, effective mitigation / apportionment of risk.

All of this is underpinned by mutual trust

Findings from Interviews: emerging themes

- Market power - data ownership imbalance
- Lack of alignment on sharing of benefit, cost and risks
- No common view of the value of data
- No common view of technology adoption amongst PTOs
- No common standards (e.g. geo-referencing)
- Technical capacity varies widely amongst PTOs
- Legal constraints used as excuse for inaction

=> Expose real needs using 'use cases'....

- Units in the same company view each other as "third parties" citing regulation as constraint for sharing

- Reliance on gut instinct and years of experience

    "I know my data – I know my demand"

    "The rider says and thinks I perfectly know there is only one bus for me that will take me where I want to go. I do not need to look at an app"

    "Experience matters and the knowledge that comes from it but it is only useful for my company"

For the time being the key benefit of data sharing remains *"... if we can adapt to the disruption in the most efficient way"*

"For us the key is adaptation – disruptions will happen, how do we deal with it?"

[we need] *"... low cost, high value Proofs of Concept"*

- The ubiquity and utility of Google

  "Why do I need you? I've got GoogleMaps"

  "The data we get from Google is very accurate. We buy Google map data. How we calculate the price is based on the fastest route and time of pick up. Google reflects real road conditions pretty well."

- The scattering of apps

  Reflects the thinking of *"my data is something to monetise"*

  "Sharing is making money off data versus 'sharing is caring'"

- A different approach? The mobility provider as a clearinghouse for capacity

  "These people might not know of our app but they might have heard of CityMapper or Google or Alipay and use that app to get information about transport services"

  "Ad revenue from app is transient"

- No lack of data but *"We do not know where to start – how to connect the dots"*
  Leads to vendor-driven data management strategies

- Information asymmetries, hierarchy of information systems, lack of local standards
  From the open and useless to the much smaller set of useful (data)
  "Many of the data source providers will show you numbers but they are averages – they are not peak numbers versus idle numbers – what would be construed as useful data points"

- Data and power imbalance between data owners
  Small streams, big streams
  The efficacy and value of data derived from a "tap in, tap out" policy

- Technology is the least of our worries when it comes to data sharing – the change in mindset – "*The technology is here – that is not the issue*"

   From skepticism and pessimism to optimism and collaboration

   "*Mindset can be changed by evidence*"

- Strong desire to better understand the <u>behaviour</u> of passengers (or customers) and HOW they plan their journey end-to-end, door-to-door, mode-to-mode

   Those that depend on MTR live furthest away from MTR catchment area

   The greying ridership – an ageing HK

- A concern with data sharing is the operating costs and expenses – who will bear them? Who will share them? The associated costs of enabling data sharing

   "*They use my data – it is like using our trademark but they pay me no royalty. I should get paid for my IP*"

Use Cases: passenger-centric stories

The many colours of Hong Kong's Transport Network:

- Trips may use one, two or many modes, including walking
- Travel may be during peak or off-peak periods
- Travel plans are made on an ad hoc basis or planned in the future
- Travel may be through familiar or unfamiliar territory
- Commuters do not often plan ahead
- Some passengers may requires special assistance (e.g. registered disabled)
- There may be unplanned incidents (e.g. congestion due to an incident)
- There may be planned incidents (e.g. a conference or a book fair)
- Passengers may prefer active mobility – when not raining and the air quality is OK

A passenger-centric view: Use Cases / Stories

Definition:

A use case is a definition of a specific business objective that the system needs to accomplish.

A use-case [... describes] the various external actors (or entities) that exist outside of the system, together with the specific interactions they have with the system in the accomplishment of the business objective.

Use cases

1. Simple, commuter, mono-modal
2. More complex trip, arriving by train and needs a taxi
3. More complex trip, arriving by ferry and needs a bus
4. A late night trip on Hong Kong Island
5. Simple, multi-modal, trip planning
6. Simple, commuter, multi-modal
7. Any others….?

Use case – example 1

Simple, commuter, mono-modal

A passenger wishes to get to a nearby destination during peak period and is familiar with the area. He / she knows has being travelling on this route for years and has always used the same modes, including walking at the start and end of the trip.

Questions:
1. How would this passenger be aware of incidents (planned or unplanned) before this trip starts – or during the trip?
2. How would this passenger be aware of new services and new fares?

Challenges
1. The passenger may or may not have a smart phone.

Use case – example 2

Complex trip, arriving by train and needs a taxi

A passenger is arriving by train from the Airport by Airport Express in Central and needs a taxi to meet him / her without having to wait. Taxis are usually available but there are typically long queues. The passenger is willing to pay a small premium.

Questions:
1.   What time will the train arrive at my destination?
2.   What time should the arrive to meet the train and where should the taxi wait?

Challenges
1.   Need to know what time the train will arrive so that the taxi doesn't waste time waiting

Use case – example 3

Complex trip, arriving by ferry and needs a bus

There are lots of passengers on a ferry arriving from an outlying island and its likely to be few minutes late. There may not be enough buses for the arriving passengers and the ferry may to be too late anyway, and it's a 30 minutes wait for the next bus and it would take many taxis to meet the demand

Questions:
1. How does the bus know what time the ferry is likely to arrive
2. How do the bus operators know how many buses are needed

Challenges
1. The bus operator needs to know the likely number of passengers arriving at the ferry terminal and how many are likely to need a bus and/or taxi

Use case – example 4

A late night trip on Hong Kong Island

A passenger has the option of MTR, tram or bus and there are many options, all with spare seats. The mode doesn't really matter as long as the journey is easy, efficient and affordable

Questions:
1. Which modes are available?

Challenges
1. From extensive experience, all of the operators know that there will be a lot of spare capacity for the whole trip
2. All of the operators are required to meet a specified frequency objective and are unable to reallocate demand at any time

Use case – example 5

Simple, multi-modal, trip planning

A passenger wishes to get from A to B now and wants to arrive by a specified time and wants to know the travel options and cost.

Questions:
1. What are the possible routes?
2. What is the cost of each?
3. What time should the passenger leave home to be confident to arrive by the specified time?

Challenges
1. The passenger doesn't want to find that bus is full since this could delay the trip so may need to leave earlier to be certain.
2. The cost of different buses for the same start and end point is different so it may cost more than budgeted.

Use case – example 6

Simple, commuter, multi-modal

A passenger wishes to get from home to the office during peak periods and is familiar with the area. He / she knows has being travelling on this route for years and has always used the same modes, including walking at the start and end of the trip.

Questions:
1. How would this passenger know about incidents (planned or unplanned) before this trip starts – or during each part of the trip?
2. How would this passenger know about delays at the PTI?
3. How would this passenger know about new services and new fares for each part of the trip?

Challenges:
1. From experience, the passenger knows what time to leave home and thinks that there are no better route options

Long-term vision

- Potential for an equivalent of the Transport Research Lab (TRL) in HK
- Data Innovation Node at Hong Kong University – an accessible resource for data analytics and visualization; promote data sharing and collaboration and development of mutual trust
- Developments of a regulatory environment that facilitates rapid prototyping of new mobility services and key enablers; policy sandboxing
- Support companies to build capacity in the collection and use of data, user behavioral data
- Desktop studies to identify division of benefits of data sharing

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