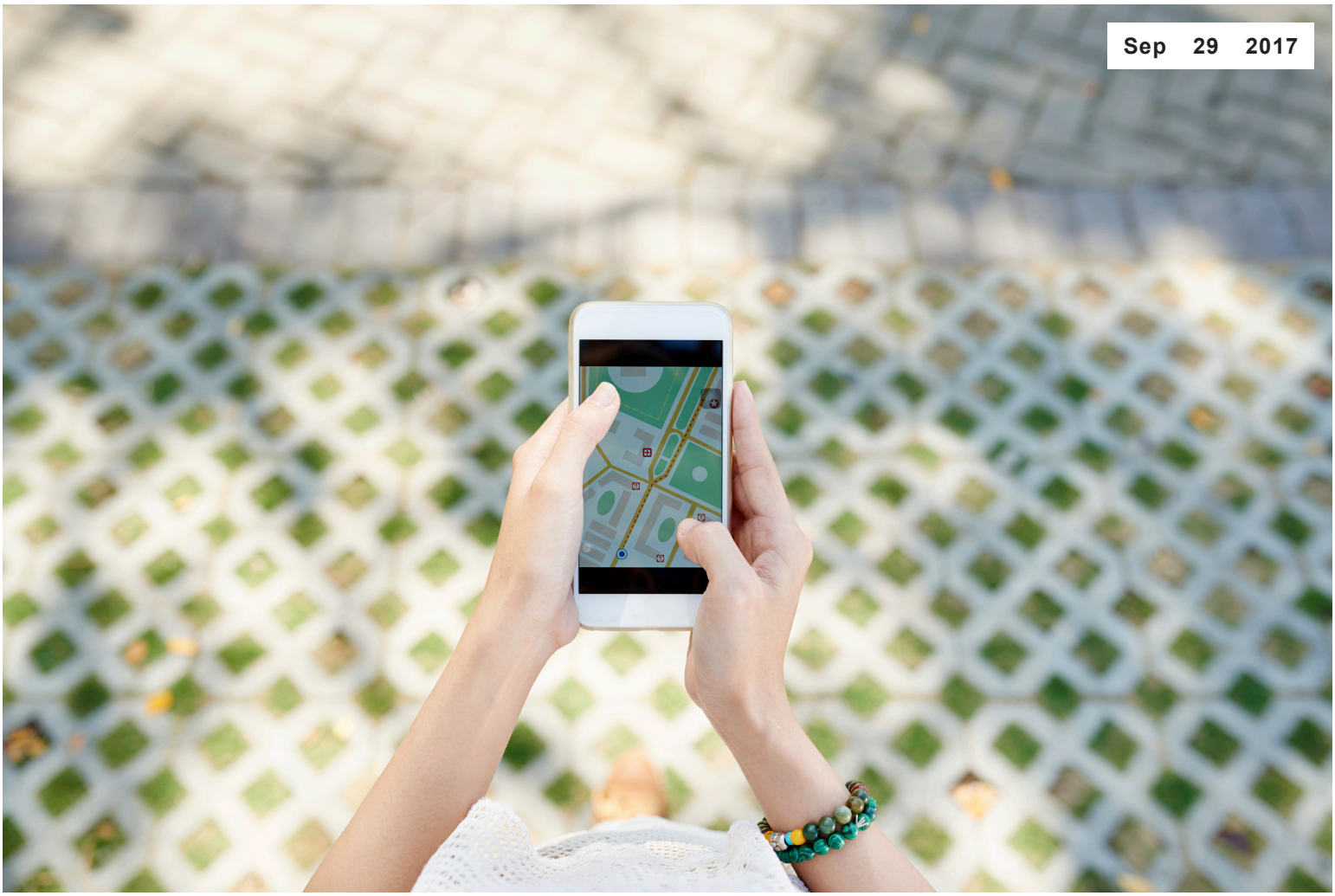

HONG KONG, 29 September 2017 — Technology is developing at breathtaking speeds all over the world, and Hong Kong needs to keep pace if it wishes to remain a global city and an international finance center.

The digital revolution affects not only business, but also citizens' wellbeing. All aspects of our daily lives – the homes we live in, the transportation we ride, the air we breathe, the food and water we consume, and the jobs we do for a living – could be improved by strategic deployment of innovation and technological advancement.

These innovations could potentially come from local solutions, but Hong Kong needs to create an environment where start-ups and new ideas can thrive. It is in this spirit that Civic Exchange, an independent public policy think-tank, offers the following recommendations:

INTRODUCTION

By calling for public input to its “Smart City Blueprint for Hong Kong”, the Hong Kong Government is recognizing the need for a coherent policy framework for the future. The concept is more than a decade old and many American, European and Asian cities have already adopted it, or have frameworks in place to inculcate it in their development plans**.** In China, municipalities like Hangzhou and Shenzhen are transforming into Smart Cities, as showcased at the current Innotech Expo in Hong Kong.

Hong Kong had certainly demonstrated leadership in many areas which could be considered harbingers of the “Smart” movement. Our public transport system is second to none. The 2014 Global Mobility Index by the International Association of Public Transport recognised Hong Kong as the world’s top-ranking city. Twenty years ago, when the world was still grappling with paper and magnetic tickets, Hong Kong adopted Octopus – a fintech concept – which to this day has not been surpassed in performance in any city.

There are a lot of things this city can be proud of, but we also need to recognize that the world is changing very rapidly, and there are many areas where we have fared poorly. Our rich, well-planned city lacks a centralised traffic management system, or even a single app as the integrated point of contact for citizens using public transportation. Our traffic enforcement is archaic. One third of our clean water is wasted. Indeed, the management of our water and food supply, and our energy mix, could be improved with better technology. Lives of the elderly and disabled could be helped with smarter homes and household appliances. Meanwhile, fintech and robotics are two areas where Hong Kong needs to catch up. New technologies could be potentially developed in Hong Kong, but tech start-ups face financial and bureaucratic barriers, while young workers may not be effectively attracted into the innovation industry.

The current Smart City document covers wide ground, and perhaps because of this appears mainly to be an aspirational document. We hope that, in its next stage of development, the Smart City framework will include a clear action plan with specific targets. Only then can the Government demonstrate its serious intentions, and prevent these plans from languishing in bureaucracy.

MISSION STATEMENT

Technological advancements now allow us to develop data-driven, fact-based systems at a fraction of the cost of older systems. While the Smart City study addresses these gains in efficiency and productivity at different parts of the findings and recommendations, we feel that these are the key drivers of the “Smart” paradigm and should be reflected explicitly in the mission statement. Greater efficiency and productivity will benefit all of the subsequent focus areas of the framework.

SMART MOBILITY

Smart mobility requires smart vehicles, smart infrastructure, smart networks, smart control systems, and smart governance. Any Smart City study must look at the entire eco-system, including policy and legal frameworks, to demonstrate how that can be achieved. We recommend that this level of planning should be the next stage of development for this framework.

The subject of fully autonomous vehicles, or self-driving cars, has been treated with heightened caution in the study, and understandably so. However, the technological advancements associated with research and development in autonomous vehicles could be useful in much wider application or adoption around the city, such as in the development of semi-autonomous systems or assistive technologies. They have the potential to greatly improve traffic safety and mobility, as well as reduce congestion. In our aspiration to become a Smart City, we need to develop an enabling legal and regulatory framework to foster innovation in this area, as well as to manage its risks.

Although autonomous vehicles have caught most public attention, the role of automation seems to have taken a back seat. We must promote use of robotics for the handling of hazardous or high-risk material, and in routine maintenance systems, to ensure universal standards and compliance. For example, every gas station could be operated through robotic

arms. In bus depots, vehicle movement, inspection and first-line maintenance can possibly be automated.

Mobility as a Service (MaaS) is finding widespread adoption in many countries. While operators have distinct commercial interests and fiduciary responsibilities, citizens simply perceive mobility as a basic need of going from point A to B. Twenty years ago, the biggest public transport innovation was the Octopus, a common platform for fare collection. A similar business aggregator could be created as a modern platform for information, journey planning, and perhaps a move to subscription-based mobility. In a city with limited space available for roads, transport systems are at the forefront of our economic growth, as well as our battle against climate change. We must optimize every last bit of their potential.

A city-wide traffic management system, with possible integration with public security systems, is something Hong Kong should have implemented 20 years ago. It would have enhanced the overall performance of our transportation system, controlled congestion, and improved our emergency and tactical response system. Most operators in Hong Kong have their own systems, but the city lacks a single-window view for planners and administrators. Just across the border, one can see the example set in Shenzhen, where the entire city's traffic can be monitored and managed from the Shenzhen Transportation Operation Command Centre.

Any personally owned vehicle, be it a bicycle or a car, remains parked and unused the majority of the time, which is highly inefficient. We recommend that the Smart City vision promote the concept of shared mobility. While we support minimizing the number of private cars on the road, we are also cognizant of the fact that every traveller has a different mobility need. An efficient delivery to meet those needs will create a better, smarter city.

A significant part of building infrastructure in Hong Kong is devoted to parking systems, which remain primitive, especially when land values are among the highest in the world. Puzzle parking systems or automated parking systems can generate up to 50% more parking efficiency and save kilometres of driving around inside parking lots. They can reduce both fuel use and air pollution. We recommend a cross-departmental liaison among the Transport Department, Planning Department, Buildings Department, Electrical and Mechanical Services Department, and Fire Services Department to validate new technological solutions and to make necessary changes in planning and building codes.

Transportation is an energy-intensive industry. The MTR is a major electricity consumer, and bus operator KMB is a major diesel consumer. Energy consumption is also directly linked to greenhouse gas emissions. Our vision of a Smart City should explore use of new, renewable energy, solar infrastructure, and even piezoelectric mats, which generate power each time someone steps on a high-tech tile or panel. Every bus stop and above-ground station presents an opportunity for harvesting clean energy and water. It must be exploited for our sustainable

future.

Vehicle to Everything (V2X) communication is correctly identified as a key component of connected mobility. This could also become the basis for proposed Electronic Road Pricing (ERP). Another major area where this capability could be applied is traffic and parking enforcement. We completely support the noble idea of enhancing bus services by providing more information to passengers. But in our opinion, even at present, it is not a technological but institutional issue. For example, MTR stations do not provide information on bus routes except for those it considers feeders serving the station. How could our policy framework promote commercial corporations to societal good?

Data is the new currency of the future. It is transforming operations, engineering and customer engagement processes. However, Hong Kong's operators have not provided leadership on this frontier. We must have standard frameworks for data capture, data storage, and ensuing data analytics. There is a huge opportunity for innovation and discovery, which society may not currently recognise. Our maintenance systems must move from a proactive or preventative maintenance approach, to predictive maintenance initially, and to prescriptive maintenance eventually. The Big Data concept is not just limited to mobility, but can be applied to all city-wide utility delivery systems.

SMART LIVING

The Smart City study overlooks the subject of universal access and the role of technology in improving the daily lives of citizens with special mobility needs. A key advantage of new technology is its ability to create low-cost solutions and granular, personalized customization. This can be leveraged to create specific solutions for people with disabilities, improving their quality of life and socio-economic participation. For example, there could be a tool on Google Maps for wheelchair users or those who are hearing- or visually-impaired. If this is created as an open platform layer, a large amount of information can be crowd-sourced and may lead to innovative gestation of social enterprises.

Smart homes and the Internet of Things (IoT)-based appliances should be included in the Smart City framework, as they can help Hong Kong households, especially for those with elderly citizens who are living alone.

Hong Kong has shown its leadership in the areas of public safety and security, but we also know that the world is facing completely new types of threats. Technology allows cities to better target threat detection and its isolation. Especially with a city-wide Transport Command Centre, there may be opportunities to integrate a security system for public safety.

Hong Kong depends mostly on food imported from other countries. As we have seen in the past, our food supply chain is susceptible to contamination, mis-labelling or mis-declarations. The Government should encourage innovation in the areas of food supply chain, labelling and contamination detection systems, and product certification.

SMART ENVIRONMENT

The issues of the environment and climate change are linked to almost everything we do as a society. Due to their importance on the global agenda, they need to be part of every aspect of Smart City framework. A fundamental focus of the Smart City study must therefore be on managing energy consumption. However, energy source decisions are also important. Technological advancements are making renewable energy a real possibility. China, in its 13th Five-Year Plan, is targeting that 15% of its energy mix will derive from non-fossil fuel sources. Hong Kong appears to be missing this opportunity. We must innovate to use our unique landscape and urban infrastructure to capture non-land-intensive renewable energy. We should create a framework for encouraging a smart grid approach where innovators and ordinary people have an incentive to participate.

Smart metering (both of usage and potential feed-in to the electricity network once this becomes institutionalised) is a valuable component of achieving the efficiency and resource wastage goals of the Smart City. As such, the barriers towards widespread adoption of such technology should be removed as far as possible, allowing market forces to drive its rollout. Specifically, this might include removing the requirement for qualified electrical engineers' involvement in installations that do not require re-wiring of mains circuits, or implementing incentives to increase the speed of adoption, and improve the payback period for the earliest adopters.

The majority of a building's carbon footprint, close to 70%, comes from its operations. Hence, promoting smart ongoing operations and considering occupants' behaviours in the maintenance of the building are critical to achieving the goals listed under Smart Environment. Commercial or institutional buildings should be required to disclose energy consumption levels to occupants through smart sub-meters, in addition to the utility-level smart meters. Projects in other global cities have indicated that providing real-time energy consumption information to end-users can effectively drive users to conserve energy consumption and to shift their peak usage. To encourage building owners to install smart sub-meters for their tenants or occupants, incentives might be provided to encourage early adoption. In the long run, the building code could require sub-meters to ensure adoption and drive market innovation in services on energy management.

The Smart City report looks to the future by recommending the use of sensors and drones to monitor marine, roadside and aerial pollution. Another area which could be addressed is indoor exposure to emissions; according to our research, Hong Kong office workers may spend more than 80% of their time indoors. Civic Exchange and City University of Hong Kong recently conducted a pilot study with next-generation sensors to track individual pollution exposure to harmful $PM_{2.5}$ particles, particularly indoors. Developing technology to monitor specific populations' pollution risk – based on home, school, work, and commuting environments – could help individuals become more educated and make better choices. The Big Data compiled through this technology could also inform Government decisions on how to reduce the health risks associated with emissions, particularly though building codes.

From a resource utilization perspective, where we are dependent on other parts of the world or China, we must minimize any wastage or inefficiencies. Fault detection systems and / or the predictive maintenance of utility infrastructure, such as water pipes and distribution systems, should be an integral part of our Smart City framework. Civic Exchange's recent research has shown problems with the management of the city's water supply, about one-third of which may be lost due to leaks or other reasons between public and private facilities. The Government is already developing and testing a Water Intelligent Network and smartphone app, and is using underground sensors to collect data. However, managing the water supply has not been a major focus in Smart City planning, and such technology is not being implemented to its full capacity. This is a significant missed opportunity to capitalise on past investment while also boosting the resilience of our public resources through technology.

SMART PEOPLE

This may be one of the most difficult areas to address, due to the complexity and diversity of individual needs. The key is to make the user interfaces (UI), or touchpoints, for even the most complex technological delivery as simple as possible through intuitive design. While the Smart City framework focuses on technological aspects, its widespread adoption and success will depend on the human element. For example, the Transport Department's journey-planning app has huge amounts of information, but is also the least-used app because of a non-intuitive UI. The Smart City framework should recognize the importance of ergonomics, aesthetics and UI and ensure that these are key considerations in any non-commercial (e.g. government department) initiatives under this framework.

SMART GOVERNMENT

We support a smart technologically-driven Government; but this change also means that back-

end processes, decision-making, information flow and implementation may all need a complete overhaul. A fundamental review of existing bureaux and departments could be considered. For the success of a Smart City, we must strive to achieve a flatter, more collaborative workforce within the Government rather than isolating the objectives of the Innovation and Technology Bureau. The Government's work ethics and mindset will need to change from one that is driven by rules, to one driven by innovation.

Smart government is also small government. For the sake of best utilization, the role of the Government should be limited to defining common technological standards and protocols, so that private enterprise and innovators can experiment with ideas and make new discoveries or inventions.

One common complaint among residents is having to deal with multiple departments with unclear responsibilities. As a part of review of governance, the study must address how technology can help to break the silos of departments and bureaux, such that citizens and business perceive Government as a single unified entity.

SMART ECONOMY

Economic progress, like environmental impact, is an outcome of wider good practices, innovation, efficient infrastructure, and highly productive processes. This can only happen when there is high workforce participation in the innovation industry, which in turn can only be realized by lowering the entry barrier for start-ups. Such barriers are a key reason for Hong Kong's current brain-drain. Start-ups need to be fostered and nurtured through incentives and incubation programs. The Government does have many programs of this type, but they are bureaucratic, complex and often highly risk-averse. The delivery systems must be reconsidered to match the speed and flexibility with which the industry is moving.

The Smart City study sets a "short-term" timeframe ending in 2020 for the advancement of fintech. It is in this period that the Government proposes to "enable innovative means of raising money" and consider new legislation. Given the fast pace of development, both in the region and globally, a three-year process could make our city lag behind in competitiveness as an international financial centre, and we recommend that the timeframe be adjusted to set this as the worst-case scenario rather than the expectation, with as much as possible done to accelerate this process.

DIGITAL INFRASTRUCTURE

The quality and success of our digital infrastructure is dependent on the quality of data that

drives it. Sensors and systems can capture a lot of transactional data, but generally lack the capability of sentiment data or non-structures data. The crowdsourcing of data, opinions, and patterns is perhaps the easiest means to generate huge amount of usable information. This would require addressing ownership, licensing and liability issues. We believe that the Smart City study or its corollary should make recommendations on creating a robust legal framework to make this a reality.

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