



For Immediate Release

## LSCM and PolyU jointly forecast the development of COVID-19 with technical design for district-based Compulsory Universal Testing

**Suggestions for completing district-based Compulsory Universal Testing in 8 days while reopening the border to help economic recovery, bringing Hong Kong back on track**

28 April 2022, Hong Kong — The Logistics and Supply Chain MultiTech R&D Centre (LSCM) has collaborated with The Hong Kong Polytechnic University (PolyU) to conduct researches on the forecast of the development of COVID-19 in Hong Kong, aiming to foster the social and economic recovery. The two researches were conducted by the teams led by **Professor CHEN Wu**, Head of Land Surveying and Geo-Informatics of PolyU, and **Professor John W.Z. SHI**, Director of PolyU-Shenzhen Technology and Innovation Research Institute (Futian) respectively. The results indicate that it is necessary to maintain a certain level of social distancing measures at the moment, while the reopening of the border is expected to bring a slim chance of a sharp pandemic rebound. It is also recommended the Compulsory Universal Testing to be carried out on a district-by-district basis, from the districts with the highest predicted COVID-19 onset risk to those with the lowest, and completed within 8 days to reduce the impact on the daily life of the public.

“We are committed to collaborating with different sectors to combat COVID-19. Apart from developing innovative technology to facilitate the anti-pandemic measures, LSCM has collaborated with PolyU this time by providing data and research support, with an aim to foster the social and economic recovery in Hong Kong with feasible recommendations,” said **Mr Simon WONG, Chief Executive Officer of LSCM**. “Moving forward, we will continue to initiate various research projects so as to foster the development of the logistics and supply chain industry in the post-pandemic era.”

**Gradual relaxation of social distancing measures will provide a strong impetus for economic recovery**

**Prof. CHEN Wu** and his research team, including **Dr ZHU Xiaolin**, **Dr LIU Xintao**, and **Dr ZHUGE Chengxiang**, conducted the research on “Forecast of the Development of COVID-19 in HK”. Combining the latest data of infection cases and recovery status since the onset of the fifth wave of the pandemic, the Susceptible-Exposed-Infectious-Removed (SEIR) model analysed the conditions of COVID-19 transmission, while extrapolating the impact of relaxation of social distancing measures in different period.

Based on the latest social distancing measures, including resumption of face-to-face classes, partial relaxation of permitted group gatherings, reopening of designated public premises and increasing the maximum number of people per table to four in restaurants, the research showed that there is a risk of causing the pandemic to rebound under such gradual relaxation. The peak number of infections per day is estimated to be below 10,000, with 300,000 cases in total in the following 90 days. In this case, the overall situation is expected to be manageable.



If the anti-pandemic measures are completely lifted, the estimated number of infections per day would reach 350,000 in mid-May, and decrease to below 100,000 per day in late May to early June with more than 4.7 million aggregated infection cases in the following 90 days. Thus, withdrawal of all the existing measures in the short term will probably lead to a significant pandemic rebound in Hong Kong. Hence, it is necessary to maintain a certain level of social distancing measures in order to strike the right balance between combatting the pandemic and facilitating economic recovery.

The research also assessed the risk of the border reopening at this stage. With the suitable border control, the compulsory quarantine period in hotels could be shortened. But the regulations of entry-exit inspections have to be continued to avoid a drastic rebound of infections. Besides, if the total local infections exceed 4 million, the research team sees little chance of the sixth wave of COVID-19 outbreak to happen.

### **Compulsory Universal Testing could be completed in 8 days, from the districts with the highest predicted COVID-19 onset risk to those with the lowest**

**Prof. John W.Z. SHI**, Director of PolyU-Shenzhen Technology and Innovation Research Institute (Futian), and his research team, including **Dr ZHANG Anshu**, **Dr ZHANG Min**, **Mr TONG Chengzhuo**, and **Mr YAO Yepeng**, shared the technical design of dynamic Compulsory Universal Testing in Hong Kong based on spatiotemporal COVID-19 symptom onset risk. This work analysed the feasibility and implementation method of Compulsory Universal Testing by using the E-WKDE model developed by the research team. The analysis was conducted based on the footprint of confirmed cases, the vaccination rate, social distancing measures, real-time effective reproductive rate of the virus, daily population mobility, areas of sewage surveillance yielding positive results and the data provided by LSCM.

According to the study, the research team suggested that Hong Kong can be divided into multiple districts and the order of Compulsory Universal Testing will be arranged based on the onset risk level and population mobility, from high to low. Given the current testing capacity of completing 200,000 tests per day in Hong Kong, by adopting the “5-in-1 sampling method”, it is estimated that a daily testing compacity of 1,000,000 people could be achieved and it is expected that the one-off COVID-19 nucleic acid tests could be finished within 8 days. The suggested daily testing districts based on the onset risk level are as follows: -

- Day 1: Kowloon Central, including Kowloon City, Kowloon Tong, Sham Shui Po, Cheung Sha Wan, etc.
- Day 2: New Territories West and Kowloon Central, including Kwai Chung, Tsuen Wan, Ngau Tau Kok, Lam Tin, etc.
- Day 3: New Territories West and Kowloon West, including Tin Shui Wai, Tuen Mun, Tai Wai, Tsim Sha Tsui, Yau Ma Tei, etc.
- Day 4: New Territories West, Kowloon East, and Hong Kong Island, including Tuen Mun, Shatin, Ma On Shan, Tseung Kwan O, North Point, Sai Wan Ho, etc.
- Day 5: New Territories West, New Territories North, Kowloon East, and Hong Kong Island, including Yuen Long, Tai Po, Kai Tak, LOHAS, Wan Chai, Central, Sheung Wan, Aberdeen, Ap Lei Chau, etc.



- Day 6: New Territories North, New Territories East, New Territories West, Lantau Island, Kowloon East, and Hong Kong Island, including Sheung Shui, Fanling, Tsing Yi, Shatin, Kwun Tong, Kennedy Town, Pok Fu Lam, Sai Wan, Chai Wan, etc.
- Day 7: New Territories West, New Territories North, Lantau Island, Kowloon East, and Hong Kong Island, including Yuen Long, Tuen Mun, Tai Tong, Pak Pak Heung, Hung Kiu, Tai Po, Tung Chung, Discovery Bay, Sai Kung, Sau Mau Ping, Deep Water Bay, Repulse Bay, Wong Chuk Hang, Stanley, Shek O, etc.
- Day 8: The rest of New Territories North, New Territories East, Lantau Island, and Islands Districts.

### **LSCM strives to develop innovative technologies to help fight against COVID-19**

During the pandemic, LSCM has been committed in backing the Hong Kong community in the battle against COVID-19. In the early stage of the pandemic outbreak, the Electronic Wristband and Monitoring System for Hong Kong's StayHomeSafe" Home Quarantine Support Solution was developed by LSCM and used to support the Government's home quarantine measures. LSCM has also developed and utilised other innovative technologies, including the "Real-time Vaccine Inventory Control and Management System", "E-lock System" and "Isolation Facilities Service Logging System" etc., to support the Government's various anti-epidemic measures.

Recently, LSCM has been providing technology support for the development of "Declaration System for individuals tested positive for COVID-19 using Rapid Antigen Test (RAT)" in response to the fifth wave of COVID-19 in Hong Kong. The platform allows the public to report their positive RAT result online. The system subsequently issues the isolation order and quarantine order to the infected persons and their household contacts respectively. In addition, LSCM has developed the "StayHomeSafe e-Support System" which enables the Centre for Health Protection to better understand the pandemic situation and provide support services to the public.

(Please see Appendix for more information on the LSCM technologies.)

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**Appendix: Technologies LSCM developed to support the anti-pandemic work in Hong Kong**

<b>1.</b>	<b>Electronic Wristband and Monitoring System for Hong Kong’s “StayHomeSafe” Home Quarantine Support Solution</b>
	<p>The “StayHomeSafe” solution, consisting of an electronic wristband (e-wristband) and a monitoring system, provides a tracking mechanism to ensure the confinee’s presence in the designated quarantine premises during the quarantine period. The solution was developed to facilitate the compulsory home quarantine arrangement implemented by the Hong Kong SAR Government to combat COVID-19. By installing a tracking device in the residence and pairing it with an e-wristband worn by the confinee, the system monitors the tracking device remotely via the received signals emitted from the e-wristband to ensure that the confinee is nearby and the tracking device is within the residence. Alerts will be triggered if there are any abnormalities.</p>
<b>2.</b>	<b>LSCM’s technology support in the COVID-19 Vaccination Programme</b>
	<p>LSCM developed the Real-time Vaccine Inventory Control and Management System to manage the stock of vaccines in the Community Vaccination Centres (CVCs). Labels with QR codes are affixed to the vaccine vials and syringes to enable the staff to record the distribution, collection and usage of the vaccines using handheld devices. With the traceable information, the inventory and ordering of vaccines can be managed more easily and effectively to ensure that adequate vaccines are available in each CVC daily. LSCM has also developed cloud-based platforms for the Enrolled Healthcare Providers (EHCPs) and Visiting Medical Officers (VMOs) to place orders for COVID-19 test kits and vaccines, as well as reporting their vaccine usage.</p> <p>The E-lock system developed in collaboration with the Hong Kong Customs and Excise Department, was also applied in the Programme to secure the transportation of vaccines from the warehouse to CVCs. The system tracks the real-time location of the trucks. An alert will be triggered if there is any anomaly, e.g. if the E-lock is tampered with or the geofencing is violated.</p>
<b>3.</b>	<b>Isolation Facilities Service Logging System</b>
	<p>To enable a more efficient admission and discharge process at the Isolation Facilities as well as to provide better service to the confinees, LSCM developed a Management System consisting of a wristband distributed to the confinees, a mobile application used by the staff, and a QR code placed outside the confinees’ rooms. The registration, room transfer and discharge process for confinees can be done with the mobile application right at the door of the room, thus eliminating the need for the confinees to queue up for registration. During initial registration, the personal details of the confinees are recorded in the system and paired with the wristband, as well as the QR code for quickly identifying the confinees in case of emergency. After being admitted to the quarantine facilities, the confinees can submit an online health declaration form daily with their personal mobile phone. The relevant date, time, room number, personal details and health declaration details will be recorded in the system to facilitate the staff to make the corresponding arrangements.</p>



4.	<b>LSCM’s technology support in anti-pandemic work under the fifth wave of the COVID-19 pandemic</b>
	<p>LSCM utilises IoT, status monitoring and notification, track-and-trace, and data analytics technologies to support the development of the “Isolation Order and Quarantine Order (IOQO) Issuance System” and “StayHomeSafe e-Support (SHS e-Support) System”. The systems enable the corresponding departments to closely monitor the COVID-19 situation in Hong Kong and to provide timely support to the public.</p> <p>The IOQO Issuance System issues the Isolation Order and Quarantine Order documents to the infected persons and their household contacts respectively after the infected persons have reported their Rapid Antigen Test (RAT) positive results via the “Declaration System for Individuals Tested Positive for COVID-19 Using Rapid Antigen Test” under the Centre for Health Protection (CHP). Prior to issuing the documents, the IOQO Issuance System verifies the person’s identity and validates his/her isolation or quarantine period before generating the corresponding order for downloading.</p> <p>The “StayHomeSafe e-Support (SHS e-Support) System” facilitates all the confinees under quarantine to submit their daily health status and RAT results for CHP’s follow-up actions.</p>

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**About LSCM**

The Logistics and Supply Chain MultiTech R&D Centre (LSCM) was founded in 2006, with funding from the Innovation and Technology Fund of The Government of the Hong Kong SAR, and is co-hosted by the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong University of Science and Technology. It aims to strengthen the local logistics sector and related industries by providing a one-stop resource for applied research and technology transfer, and to reinforce cooperation between the industry and research institutes, to bring about meaningful and significant benefits to the industry and the community. For more information, please visit [www.lscm.hk](http://www.lscm.hk).

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