

## Smart Infrastructure Conference 2021

13 May 2021

### Imaginnovating Smart Infrastructure: Mezzo to Macro

**Ir Eric PANG JP, Director, EMSD**

Good afternoon, Ir Derek LEUNG, distinguished guests, ladies and gentleman.

#### Opening

It's my great pleasure to share with you EMSD's vision on Smart Infrastructure in this dedicated session of "Embracing Smart Living."

In the First Industrial Revolution, human beings began to use steam to power mechanise production. Next came the Second Industrial Revolution, in which electricity and motor were introduced to enable mass production. In the Third Revolution, electronics and control technology, coupled with computerization, were adopted to automate production. Now, we are in the Fourth Industrial Revolution, or simply called "Industry 4.0", in which digital transformation is applied together with technological innovation. Established in 1948, EMSD had evolved along with the Industrial Revolutions in a similar pattern. We progressed with time in sustaining the government's electrical and mechanical infrastructures to satisfy the public demand. Amid the evolution, EMSD leverages our expertise on Electrical, Mechanical, Electronics and Information Technology to bring top-notch services to the public in the new era.

#### Mezzo Smart Infrastructure

EMSD is a service provider and a regulator. On one hand, we serve the government and the public in maintaining the safety and reliability government's E&M facilities, and on the other hand, we devote ourselves to improve energy efficiency and safety of E&M systems as a regulator in tandem with the remarkable development of Hong Kong. In providing our diversified services closely related to the public's daily life, we have our own Mezzo Smart Infrastructure, embracing the 3 "C" - "Connecting data", "Conceiving idea", and "Cultivating culture", for this mission.

### **Connecting Data**

The first “C” of our Mezzo Smart Infrastructure is “Connecting Data”. From social media network to working and learning from home during the pandemic, data creation and transmission have gone up to the hilt. Digital access recorded through broadband and network in Hong Kong surged to nearly 1 exabyte in Q3 2020, that is 1 followed by eighteen zeros!!! Vast amounts of invisible data are everywhere which makes “Connecting Data” a challenging task. EMSD has actively promoted the Internet of Things on both new and existing government infrastructures to collect and analyze the big data to enhance facility monitoring and operation. We have installed the emerging integrated building management system, or iBMS in short, with IoT sensors and data analytics software in over a hundred government buildings through our digitization journey. Big data collected from the iBMS are integrated and analyzed at the Regional Digital Control Centre (RDCC) located in the EMSD Headquarters for remote monitoring of the government E&M assets on round-the-clock basis.

Riding on “Connecting Data”, our big data infrastructure enables predictive maintenance to reduce labour-intensive and unexpected corrective maintenance, improve operational efficiency and reliability, and enhance the quality of public service.

### **Conceiving Idea**

The second “C” is “Conceiving Idea”. According to the United Nations’ World Intellectual Property Organisation, there are more than 3 million patent applications every year. An effective way to manage the “Conceived Idea” is vital before we can put ideas into real-life applications. In 2018, EMSD launched the E&M InnoPortal platform to enable innovation and technology collaboration and downstream incubation. The E&M InnoPortal comprises an I&T wish list from government departments, public bodies and the E&M trades. Through the InnoPortal’s open e-platform, startups can match their innovative technologies with potential enduser partners and try out the matched wish and technology in government infrastructures. Today, over 730 I&T solutions, 340 I&T wishes and 130 trial projects are posted on the InnoPortal, and the number is kept on growing. We sincerely welcome academia and startups to put their cutting-edge innovations on the EMSD InnoPortal to look for a fruitful match.

Furthermore, EMSD provides testbeds for the demand-driven innovations from the innovators, such as the touchless technology for lift calling and robot for disinfection, to visualize and materialize the ideas. Riding on the synergy effect brought by the InnoPortal, we are partnering with startups, academia, government departments, and the public to expedite the development of the smart infrastructure.

### **Cultivating Culture**

In driving for technology innovations in EMSD, we have the last “C” - “Cultivating Culture” in our daily operation. 15 seconds maybe a glimpse of the time to most of us. However, 15 seconds can mean a lot. A study reveals that if a video clip cannot attract the attention of the watcher in 15 seconds, it will be closed prematurely. This is the rule of “TikTok” users, be it for the watcher or the video creator. With over 2 billion users within three years, “TikTok” is a tremendous success to cultivate a new spontaneous culture globally. It demonstrates how an innovation culture stimulates everyone at every opportunity in every second. Culture drives people to pursue vivid imagination passionately.

EMSD nurtures our in-house innovation culture through many ways. We organize the “InnoChallenge” for colleagues to submit innovative proposals on whatever topics they are interested in, and EMSD will select the winning and promising ideas and assist them to materialize the ideas. The InnoChallenge motivates colleagues to be imaginative and innovative to enhance our daily operations in providing public services. Moreover, EMSD underwent a re-organisation in 2018 to establish the “Digitalisation and Technologies Division” and the “Inno-Office” to facilitate, promote and drive the innovation culture throughout the department.

Not only do we drive technological innovation among our colleagues, we also collaborate with our partners in creating values, which include, among others, the local universities and research institutes, the institutions in the Guangdong Province for our strategic partnership in the Greater Bay Area, as well as our green partners in the APEC.

In the Inventions Geneva 2021, one of the world's most recognised signature event for inventors, we are honoured to receive four Gold Medals and four Silver Medals, with many of them in collaboration with our innovation partners.

### **Marco Smart Infrastructure / Imaginnovation**

With our 3 “C” “mezzo” infrastructure, we relentlessly connect big data, conceive smart ideas, and cultivate innovation, and leverage them as competitive edge for EMSD to become an "Innovation Facilitator" to support the Government Pro-innovation Procurement Policy promulgated in 2019.

We further strive to leverage our mezzo smart infrastructure and apply it to a macro scale for our ultimate vision, the 3S, or namely “**Safety**”, “**Sustainability**“ and “**Smart City**”.

### **Safety**

A safe living environment is of paramount importance to the community. We are the safety regulator of various essential E&M systems, including lift and escalator, electricity and gas supplies, railways, etc. in Hong Kong. As a smart regulator, we apply the latest consortium blockchain technology in developing the digital logbook system for the triple benefit of the lift owner and manager, the lift contractor and worker and the safety regulator. Let me show you how the digital logbook will eventually look like and benefit all parties.

Apart from the digital logbook, EMSD has also developed the Cloud-based Predictive Maintenance System for Lifts and Artificial Intelligent Nylon Optical Fibre Sensing Escalator Combs, for heightening safety performance, both of which received Gold Medals at the Inventions Geneva. Using advanced sensing and AI cloud analysis technologies, our innovations are able to monitor real-time system operation, and schedule predictive maintenance to prevent faults and breakdowns swiftly.

### **Sustainability**

Apart from “Safety”, EMSD commits to environmental “Sustainability” in achieving carbon neutrality.

We collaborated with global expertise in developing the Building Semantic Artificial Intelligence, which won another Gold Medal at the Geneva. —Here is a video about the Building Semantic AI.

Combating climate change is an enduring and exceptionally challenging task. Even with an exponential growth of photovoltaics projects in the past decades, only 2% of the

world's electricity was generated from solar power. The world is eager for some breakthroughs to unleash the potential of green power generation.

China adopts innovation to build a PV highway to collect solar energy on the road, and at the same time, melt the snow on the road in winter to create a safe driving environment. PV panels can also be found in greenhouses as Agrivoltaics. Plants that grow faster in warm greenhouse but susceptible to excessive sunlight are protected by PV panels, thereby raising the crop yield on one hand, and on the other hand, the cooler microclimate of the plants enhances the light to electricity energy conversion efficiency of PV panels.

“Floatovoltaics” is another innovation where power is generated by floating solar panels above the water, with fishes and water plants bred underneath. Our Water Supplies Department has deployed floating photovoltaic systems in Shek Pik Reservoir and Plover Cove Reservoir in 2017 for supplying electricity to the nearby facilities. It creates the double benefit of reducing evaporative water loss and enhanced energy conversion efficiency through the cooling effect of the water.

To encourage wider adoption of renewable energy to combat climate change, the Government has also introduced Feed-in Tariff (FiT) Scheme. Under the Scheme, owners installing PV panels at their premises can sell the generated energy to the power companies at a higher rate. Over 10,000 applications have been received last year.

HKUST is one of the significant contributors in combating climate change. The HKUST's plan to build its solar power system with 8,000 solar panels on this campus will become, when completed, Hong Kong's largest single owner of the Feed-in Tariff scheme. I would like to take this opportunity to show my gratitude to the HKUST for her devotion and as an inspiring exemplar of academic institutions to integrate research and education with environmental innovation and technology. We keep on engineering our sustainable future.

### **Smart City**

“Safety” and “Sustainability” are not the only focus of EMSD. We are also building the “Smart City”. The Government released the Smart City Blueprint 2.0 for Hong Kong with more than 130 initiatives last year. Among them, EMSD co-innovates with other

departments on over 30 initiatives to enhance city management and people's livelihood. We also build the Government-Wide IoT Network (GWIN) to serve as a backbone to collect big data to serve the public better.

Taking advantage of the merits of IoT technology, data analytics and cloud computing, we enhance our operational continuity, agility, and connectivity under the shadow of the epidemic. In February this year, we left our footprints in Lunar New Year flower markets by deploying a cloud-based IoT Crowd-control Management System with the support of our GWIN. We applied various sensing technologies for automatic people counting, GWIN for wireless secured data transfer, and cloud computing for data collection and analysis. The system enabled effective control on visitor's density in the flower markets and displayed information on crowdedness on the web to help visitors plan their visit, and to protect them against coronavirus. Over 870,000 counts were recorded, with no visitor reported being infected.

EMSD has also joined hands with peer departments to launch the "Smart Toilet" initiative. Applying the GWIN, "Smart Toilet" collects and analyze real-time data, including occupancy, sanitation level, consumable utilisation, user experiences, etc. for facility planning, consumables management, and timely cleansing and maintenance services. It will also enable users to find a nearby vacant toilet.

For toilet attendants, we have developed the Smart Toilet Bowl Cleaning System, which won another gold medal at the Inventions Geneva. It is an automatic toilet cleaning robot with IoT-based sanitation monitoring and a data-driven cleaning strategy to keep toilet hygienic and clean.

### **Way Forward**

As an innovation facilitator of the Government and a collaborator with bureau, departments, trades and innovation partners in driving and applying innovative technologies, we embrace our 3C – "Connecting data", "Conceiving idea" and "Cultivating culture" for the 3S – "Safety", "Sustainability" and "Smart City" to drive Hong Kong forward.

Albert Einstein once said, "the true sign of intelligence is not knowledge, but imagination". Acquiring knowledge or learning the basics is not enough. The motive of

life is our imagination. We shall continue to co-imagine, co-innovate and co-create our smart infrastructures for a smart city.

This year, our EMS Trading Fund is celebrating the 25th anniversary. Echoing the theme of our celebration, we will continue to collaborate with our clients, trades, co-workers and other stakeholders to “co-innovate and co-create our future”. I sincerely appeal for your support in building a better Hong Kong.

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