CALL FOR INNOVATIVE SOLUTIONS (CFIS) FOR SMART ESTATES

INDUSTRY BRIEFING

29 JULY 2019

AGENDA

- **Welcome Note**

  Ms Daphne Boey
  Assistant Director, Built Environment, Sectoral Transformation Group, IMDA

- **Sharing by National Parks Board (NParks)**

  Mr Koh Soon Kiong
  Director/ JLG Operations & Development, Jurong Lake Gardens, NParks

- **Overview of Call for Innovative Solutions for Smart Estates**

  Ms Florence Lau
  Assistant Manager, Built Environment, Sectoral Transformation Group, IMDA

- **Q&A**

  Mr Koh Soon Kiong / Ms Daphne Boey
  Director/ JLG Operations & Development, Jurong Lake Gardens, Nparks /
  Assistant Director, Built Environment, Sectoral Transformation Group, IMDA

GROWTH OPPORTUNITIES FOR SMART ESTATES
FOR BOTH REGIONAL AND LOCAL MARKETS

Smart Cities Development in Asia
1. US$45.3 billion investment by 2021 in smart cities tech @ Asia-Pac (excl. Japan)
2. Increase in demand for tech solutions for cities to add new services & scale up faster at lower costs

Focus on Smart Estates Development
1. Articulate clear problem statements & desired outcomes
2. Estates function as test-sites & innovative solutions can be adopted & scaled up once successfully tested & deployed

Source: Worldwide Semi-annual Smart City Spending Guide, International Data Corporation (IDC), 2018

Inter-connected smart estates of the future will enrich community's experiences through greater accessibility to technology & enable innovative digital services with greater connectivity

Smart Environment

a. Predictive maintenance to reduce down-times
b. Detection of anomalies for immediate response
c. Integrated utilities management

Enhance Estate's Environment

Smart Living

a. Integrated platform for data aggregation & exchange
b. Facilitate greater community collaboration & interaction
c. Smart mobility solutions for commuting

Enrich Community's Experience

WHAT IT MEANS TO DIFFERENT STAKEHOLDERS

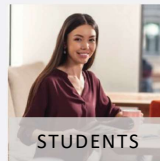## ESTATE OWNERS

DEVELPOERS   FACILITY OWNERS

- ❑ Productivity enhancements, cost reduction or enhancement in user experience for the developers, building owners, facilities management companies or tenants
- ❑ Integrated data and enhanced estate connectivity
- ❑ Differentiation through technology

ENTERPRISES

RETAIL   F&B

LIVING

ENTREPRENEURS/ IT EMPLOYEES   FAMILIES

STUDENTS   ELDERS

- ❑ Enhanced unique experiences
- ❑ Seamless & personal

TECH COMPANIES
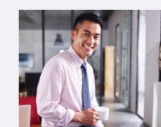
IT BUSINESS   Built Env

- ❑ Develop deep tech & smart estates related capabilities
- ❑ Cross-pollination & co-innovation through consortiums or partnerships
- ❑ Scalable business models for internationalisation

SG:D EMPOWERING POSSIBILITIES

IIM INFOCOMM MEDIA DEVELOPMENT AUTHORITY

DRIVING THE SMART ESTATES INITIATIVE

THREE STRATEGIES & DESIRED OUTCOMES

Strengthen business partnerships & ecosystem

Support Smart Urban Co-Innovation Lab & forge strategic partnerships

Build technology & innovation capabilities

Work with industry partners via Calls for Innovative Solutions (CFIS)

Develop talent in smart estates & drive thought leadership

Establish talent development programmes to build competencies

Smart Urban Co-Innovation Lab
27.5.2019

**Smart Estates
Call for Innovative Solutions
[SE-CFIS]**

Launched Nov 2018, for next 3 years

✓ **Develop Tech Capabilities**
✓ **Create new & skilled job opportunities**
✓ **Position SG as Thought-leader**

STRONG PARTNERSHIPS AND VIABLE SOLUTIONS

Developers & BE companies

Innovative capabilities in AI, Cybersecurity, Immersive Media, IoT

Tech & Solution providers

Test-bedding of smart urban solutions at various trial sites

OUR AIM:
Commercially viable solutions with strong market & user acceptance

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  Director/ JLG Operations & Development, Jurong Lake Gardens, Nparks / Assistant Director, Built Environment, Sectoral Transformation Group, IMDA

Jurong Lake Gardens

July 2019

Jurong Lake Gardens

- The third National Gardens of Singapore, in the heartlands
- 90 ha gardens central to the image of Jurong Lake District, Singapore's 2nd CBD
- Model for sustainability in green developments featuring Smart Technology
- Restoring natural habitat and landscape in the area

JURONG LAKE DISTRICT

1 A Hub for the Future Economy

2 A District of Gardens & Water

3 A New Paradigm for Mobility

4 A Smart & Sustainable District

GARDEN OVERVIEW

- Water Play
- Lawn, BBQ pits
- Arrival Plaza & Carpark
- PassionWaVe@ Jurong Lake Gardens*
- Nature Trail
- Nature-themed Play Area
- Alstonia island
- Dog Run
- Community Hub & Garden*
- Grassland
- Lawn
- Rasau Walk
- Southern Carpark
- Southern Streams
- Swimming Pool & Gym*
- Heron Island
- Nature Trail

0 100 200 300

Streams

Grasslands

12

DEVELOPMENT PHASING

LAKESIDE MRT

CHINESE GARDEN MRT

Future Science Centre`

(Chinese Garden)

JLG East

JLG Central

(Japanese Garden)

JLG West

(Jurong Lake Park)

AYER RAJAH EXPRESSWAY

N

PHASE 1-JLG West
- **Opened on 27 April 2019**

**PHASE 2 -JLG Central & East
To complete from 2021 onwards**

Problem Statement 1

Background of Current Process & Challenge Statement

The current practice of rubbish bin clearance is a manual process involving regular inspection of bin fullness. For bins that are full, rubbish is tied up in garbage bags and hauled away to the bin centre by the contractor's buggies. As the cleansing contractor may not be in the Gardens all the time (e.g. late at night, early in the morning), bins may become filled during these hours.

JLG's bins are currently equipped with bin fullness sensors that will send alerts to contractors to clear the bins once a set threshold is reached, reducing the need for workers to constantly patrol the Gardens to inspect bin fullness. However, once bin fullness sensors are triggered, the contractor would still need to physically clear the bin.

Desired Outcomes

Automated self-clearing bins that send rubbish to the bin centre once bin fullness is reached.

Mobile bins that return to the bin centre to be cleared once bin fullness is reached, or via an autonomous tug that exchanges full bins with empty ones, hauling away the full bins back to the bin centre.

Reduction in manpower by an automated system that provides 24-hour monitoring and bin clearance services.

Requirements

Easy to maintain, weatherproof, low cost

Interfaces with the Gardens' integrated management system (BMS command centre)

Background of Current Process & Challenge Statement

Wayfinding within Jurong Lake Gardens is currently provided for via a 2-D map on the Gardens' website, and also through mapboards located around the Gardens. Visitors may still have difficulty locating specific attractions without real-time directions.

Desired Outcomes

Augmented reality wayfinding via an app/link plugin on Jurong Lake Gardens' website. Such a wayfinding app would allow Gardens visitors to either type in or select their desired destination (e.g. Twin Pagodas), following which instructions would display in real time on their smartphone screens directing visitors on how to walk to the destination (e.g. arrows appearing with directions augmented over the smartphone's camera view)

It should also include additional features that would enhance visitors experience, such as :
a) A.I. engine to recommend visitors specific sites to visit in JLG if they only have 2 hours, for example.
b) In-app push notifications to inform people on F&B promotions and other exciting activities/activities/ programmes in
    JLG
c) Function to allow people in JLG who are keen to engage in a group activity to find other like-minded people (e.g.
    nature photography, bird-watching, exercise groups, otter spotting)

Requirements

Can be inserted as a link on the Gardens' website
Should not consume excessive phone battery

Problem Statement 3

Background of Current Process & Challenge Statement
Operations staff perform routine patrols of the Gardens to look out for situations deviating from normal operating conditions. Some examples of things that operations staff look out for include situations requiring enforcement such as feeding of fish and wildlife or smoking within the Gardens. Operations staff also keep a look out for faulty or defective facilities, especially lights and vandalism.

Desired Outcomes
An autonomous device or solution that can identify anomalous situations along Gardens patrol routes such as illegal activities or damaged/malfunctioning facilities, and trigger alerts for enforcement or maintenance immediately. . It should also trigger emergency services as well, such as robots to transport AED or safety kit to person in need. It should also trigger emergency services as well, such as robots to transport AED or safety kit to person in need.

Requirements
Able to identify non-functioning lights
Able to identify vandalised or damaged facilities
Able to identify suspicious behaviour, including drunken behaviour
Able to identify crowds
Able to identify smoking
Able to trigger alerts
Interfaces with the Gardens' integrated management system (BMS command centre)

Problem Statement 4

Background of Current Process & Challenge Statement
Visitor services are only available at visitor arrival counters during work hours between 8.30am to 6.30pm. Outside of these hours, basic visitor service information can only be found on mapboards and brochures. Visitor services staff are also not present in other parts of the Gardens.

Desired Outcomes
A visitor services robot would provide visitor information either outside of working hours, and can also assist visitor services staff should there be a large number of visitors requesting assistance. Such a robot should be able to provide basic wayfinding directions, event information, public transport information, record feedback, etc.

Requirements
Mobile
Weatherproof
Functions in several language options

Background of Current Process & Challenge Statement

The movement of service vehicles through the gardens requires a manual escort in the form of a security staff on buggy. The security escort's role is to firstly verify that the vehicle requires entry to the gardens, unlock and lower the entrance bollards, following which he escorts the vehicle to its destination, ensuring that the vehicle stays within a speed limit of 10km/h and does not stray off its pre-approved path. This is a manual process that takes up vital manpower. If there are multiple vehicles requiring an escort at the same time, security staff may not be able to attend to all of them simultaneously. An automated solution that can perform the above tasks would reduce reliance on manpower without compromising service standards.

Desired Outcomes

A vehicle robot would perform the following tasks:

Be able to identify vehicle licence number, and check vehicle against a list of pre-approved vehicles for entry

Lower bollards (bollards would need to be automated as part of this solution)

Escort the vehicle according to a pre-programmed route set in advance by park officer

Capture photographs of vehicle if it strays from pre-programmed path and send alerts to park officer

Requirements

Mobile

Weatherproof

Self-docks for charging

Problem Statement 6

Background of Current Process & Challenge Statement

Jurong Lake Garden consists of many internal ponds or water bodies that require constant monitoring of water quality parameters, as well as underwater inspection of facilities. Currently, monitoring of water quality requires manual sampling of individual water condition parameters, while inspection of underwater facilities often requires draining of the pond. A device that is able to constantly monitor and relay water quality parameters to an existing central integrated management system, while simultaneously providing an augmented reality view of underwater facilities when required would be beneficial for the gardens' operations.

Desired Outcomes

Such a device or robot would perform the following tasks:

Be able monitor water quality parameters such as pH, temperature, turbidity, dissolved oxygen, conductivity, total dissolved solids, salinity, ammonia, chloride, nitrate, chlorophyll-A levels

Trigger alerts when the threshold for a particular parameter is going to be reached

Trigger an action to rectify the water quality if the threshold for a particular parameter is reached e.g. Dissolve oxygen has reached a dangerously low level, pumps should be activated to pump more oxygen

Be able to transmit water quality data to JLG's existing integrated management system (IMS)

Can be remotely controlled for movement

Can provide augmented reality underwater view for facilities inspection

Requirements

Mobile

Weatherproof and robust

Light and transportable

Background of Current Process & Challenge Statement
Existing BMS in JLG provides visual and threshold data of systems in the gardens such as ammonia levels in toilets, pH level in water body, bin fullness, faulty lamps etc. However, there is no detailed information on particular or specific items such as transaction/maintenance history

Desired Outcomes
To have a digital twin integrated with JLG's existing BMS which merges live data from its physical counterpart with an interactive visual interface. Some possibilities for a digital twin could include:

1. By clicking on a particular bin, information on its fullness level, when it was last emptied etc. can be accessed. Info on all the bins in JLG can also be presented.

2. By clicking on a particular lamp-post, information on its energy consumption, when it was last maintained, can be accessed. Info on all the lamp-posts in JLG can also be presented.

Requirements
Integrated with existing BMS

Trial Sites

Jurong Lake Gardens

Key Development Details

Address: 50 Yuan Ching Road, Singapore 618661
**Area:** 53 hectares (Phase 1) 27 hectares (Phase 2)

Amenities

Food & Beverages: 1
Playgrounds: 2
Fitness Corner: 1
Event Spaces: >10
Parking lots: 350
Bin Centres: 2
Visitor Service Counters: 1

Core Maintenance Team

Cleaners: 15
Security Guards: 5
Visitor Service Staff: X

SG:D
EMPOWERING POSSIBILITIES

IMDA
INFOCOMM
MEDIA
DEVELOPMENT
AUTHORITY

Challenge Statement 1: Trial site for automated bin clearance
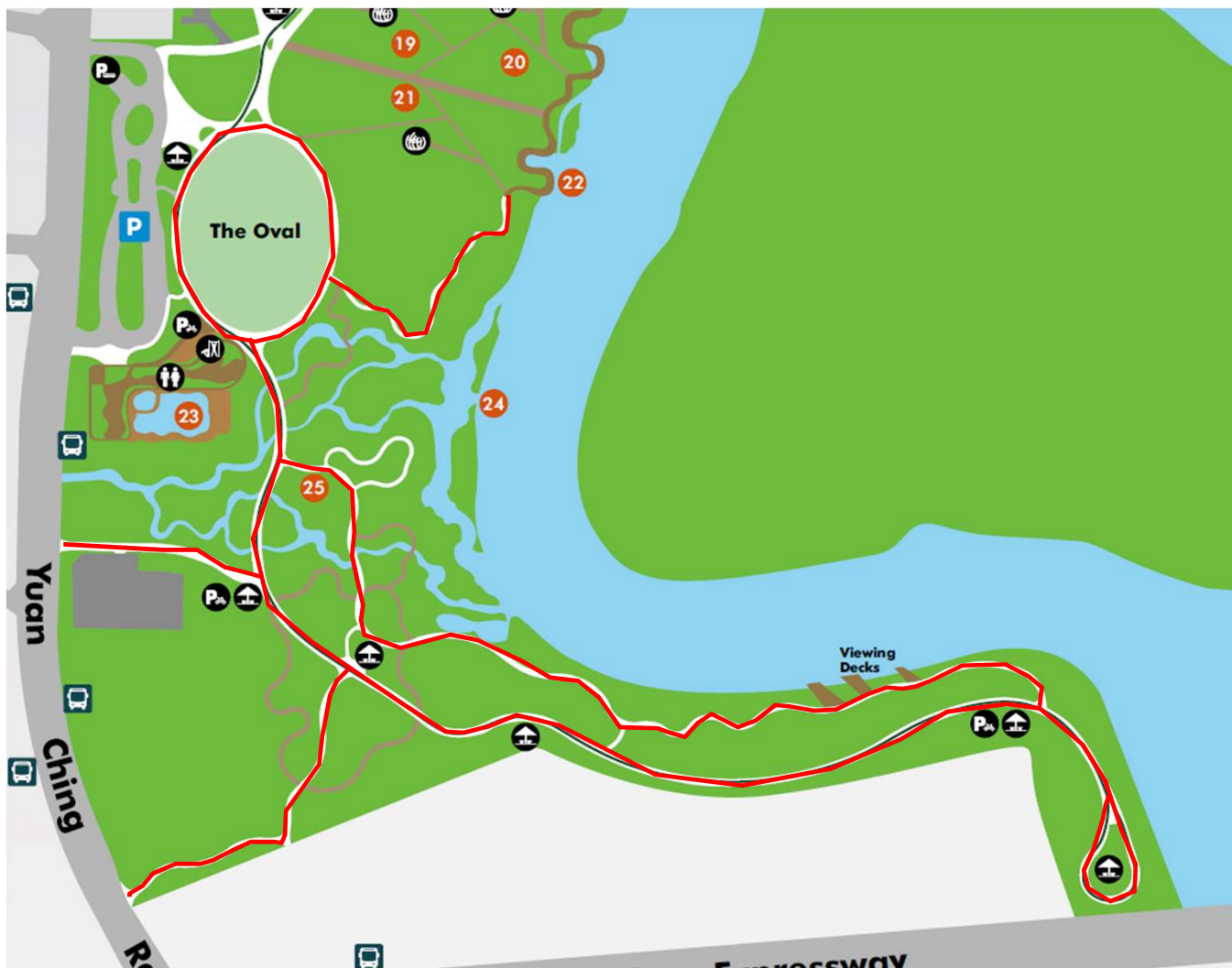
Challenge Statement 3: Trial site for autonomous fault checking device/robot

Challenge Statement 4: Trial site for visitor services robot

Challenge Statement 6: Trial site for water quality monitoring robot

Challenge Statement 2, 5 and 7: Trial sites for AR wayfinding and vehicular escort robot – entire garden

Site Visit to Jurong Lake Gardens

Assembly Point: Jurong Lake Gardens
South Carpark Drop off Point
11 Japanese Garden Road
Time: 12.30pm
POC: Nicholas Kee

CALL FOR INNOVATIVE SOLUTIONS (CFIS) FOR SMART ESTATES

AGENDA

- **Enabling the Smart Estate Technologies**
  - Call for Innovation Solutions
  - Possible Tech Areas

- **Evaluation Parameters & Scope of Support**

- **Key Milestones & Timeline**

What does it mean for individuals, enterprises & estate owners

① Estate Owners: Smart Environment

Efficient & proactive

Energy efficiency

- On demand lighting, cooling, cleaning

Integrated FM

- Central command, control & surveillance
- Digital Twin for modelling and simulation

Anticipatory

- Predictive maintenance

② Businesses: Smart Enterprises

Innovative and scalable

Resource-Lite

- On demand stocking through real-time tracking and footfall analytics

Labour-Lite

- Network of UAVs/AGVS for food/goods delivery
- Unmanned stores

Differentiated business

- Innovative retail/F&B concept by leveraging on technology, e.g. AR/VR

③ People: Smart Living

Seamless & Personal

Your Face, Your ID

- Biometric payment, access, reservations

On demand service

- Autonomous transport
- Last mile delivery

Personalisation

- Seamless personal experience

Open API & data exchange to be connected to Estate Level Digital Platform

▼ Illustrations of Solutions to Test

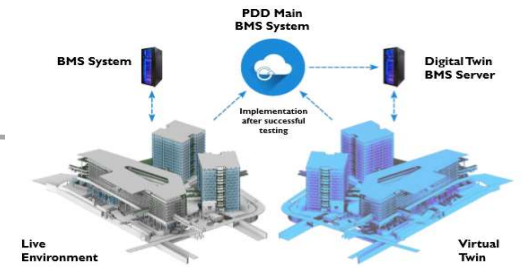## Unmanned security & surveillance

For anomaly detection

Digital Twin

For modelling and simulation

Integrated Facility Management - Central command and control

Smart Environment

Predictive analytics

For proactive maintenance

How can the technologies be augmented for hyper-connectivity?

Smart Parking

For resource allocation & use convenience

31

Illustrations of Solutions to Test

Biometric ID
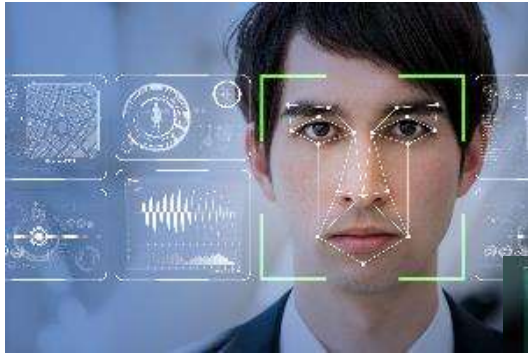
Smart Living

AR Way Finding

ACCESS
Destination-based access using biometric technology.

PAY
Payment using face or fingerprint.

How can the technologies be augmented for seamless experiences?

POINT
Consumer point camera at surrounding.

GO
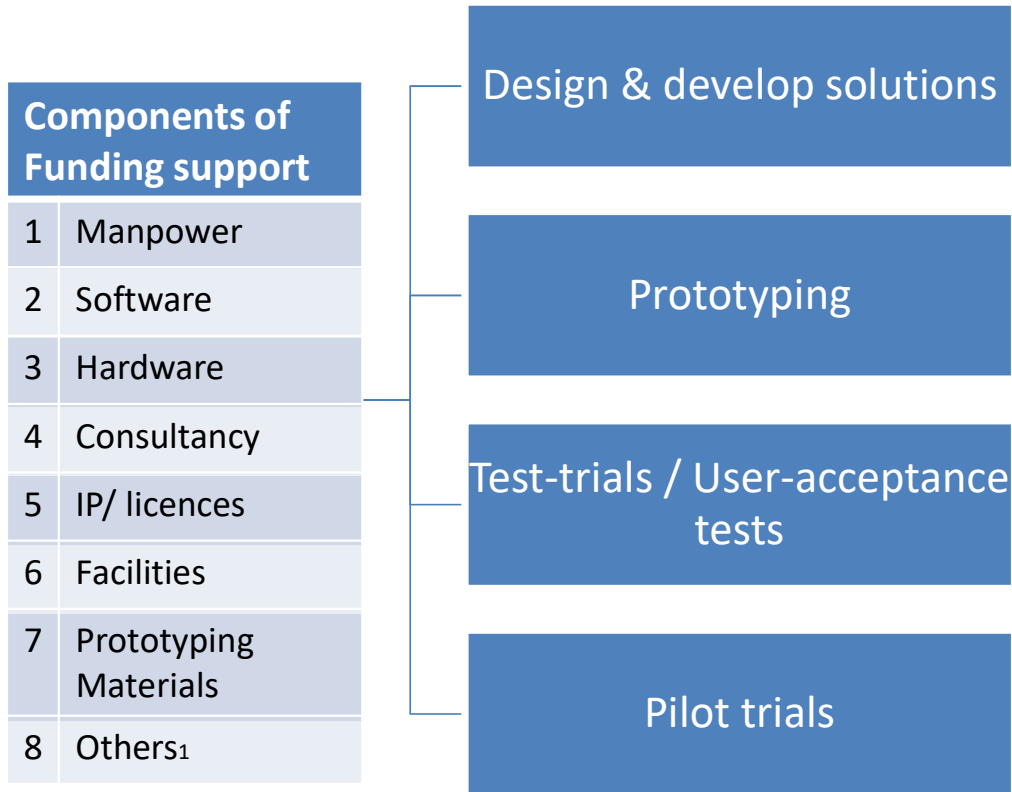Instant recommendations and directions.

AGENDA

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Scope of Funding Support & Eligibility

Components of Funding support	
1	Manpower
2	Software
3	Hardware
4	Consultancy
5	IP/ licences
6	Facilities
7	Prototyping Materials
8	Others[1]

- Design & develop solutions
- Prototyping
- Test-trials / User-acceptance tests
- Pilot trials

50% project cost support, capped at $300K grant support per project[2]

Consortiums / Strategic Partnerships (led by a local company[3])

- Consortium of technology companies, facility management companies, telco etc., or
- Strategic partnership of technology companies with complimentary capabilities

1. Cost components must contribute directly to the product development.
2. Projects should not exceed 18 months.
3. Local companies are defined as **companies with 30% local shareholdings and core activities in Singapore**

Evaluation Parameters

	Assessment Area	Considerations
1	**Business Viability**	• Sustainable & scalable business model • Adoption viability
2	**Technical Feasibility & Innovation**	• Novelty and innovativeness • Sound technical specifications, concise plan in solution development and prototyping • Interoperability • Data collection and data security integrity • Modular design for ease of scaling • Comply to industry standards
3	**User Acceptance**	• Direct positive outcome to users' business or experience: quantifiable or qualifiable outcomes in productivity, enhanced user experience or cost savings • Ease of adoption for users
4	**Competency of Project team / Consortium**	• Technical expertise and capabilities • Sound financial standings (or investments) • Complimentary capabilities and sustainable collaboration model (for consortium)

AI   Predictive Analytics   IoT   AR/VR   Cybersecurity

SG:D EMPOWERING POSSIBILITIES
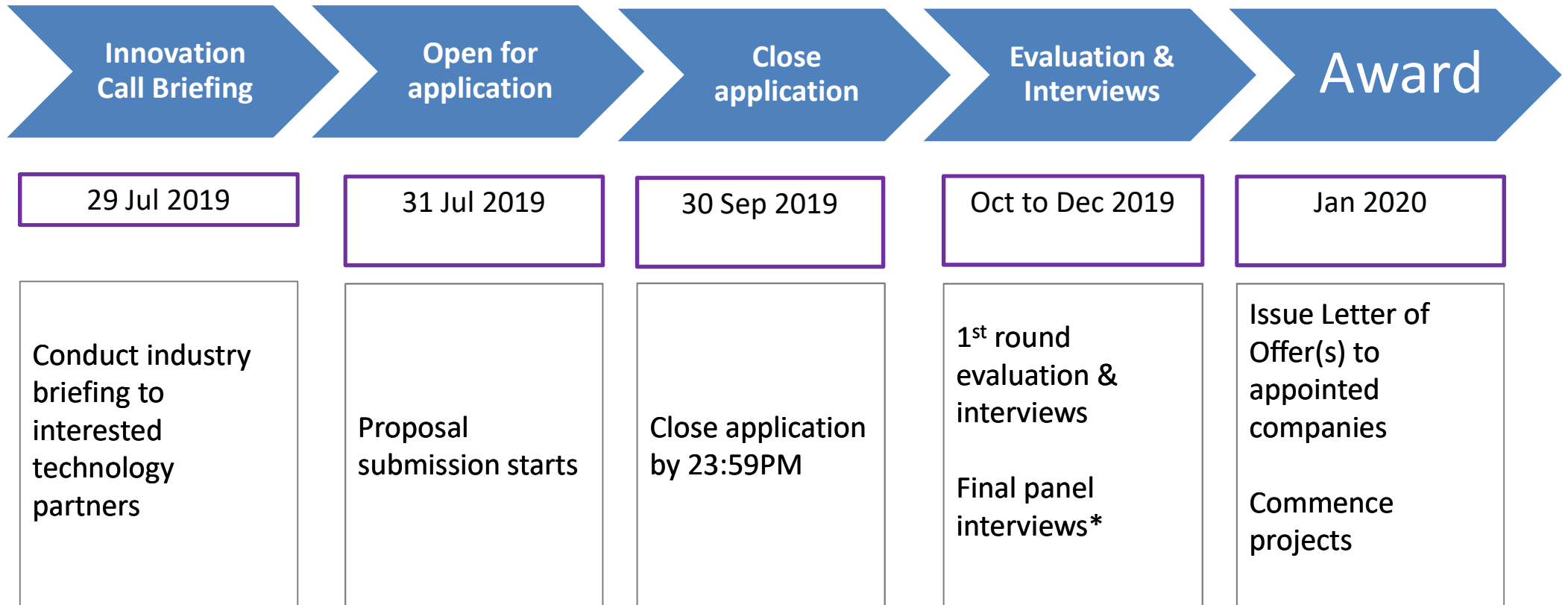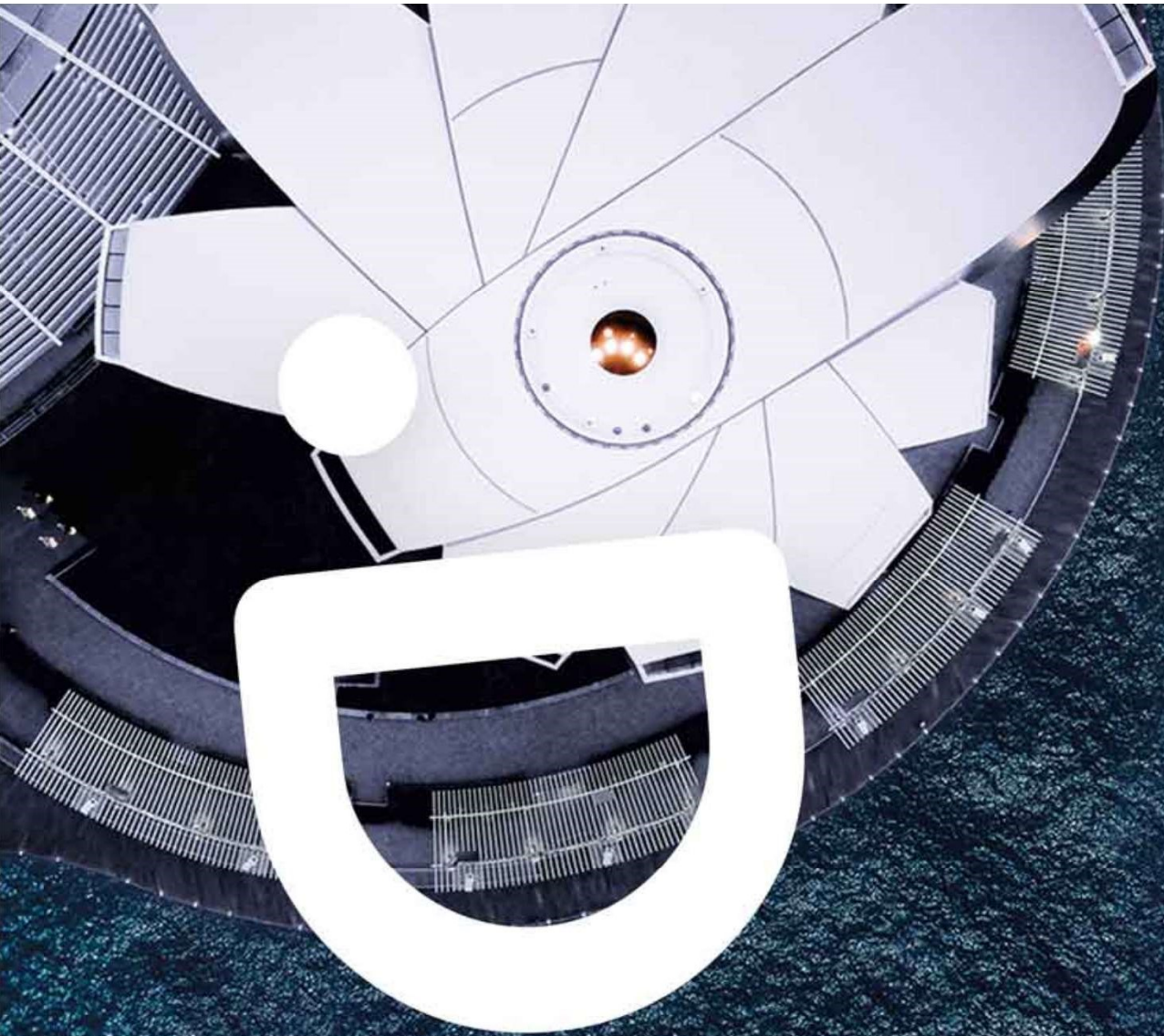
INFOCOMM MEDIA DEVELOPMENT AUTHORITY

AGENDA

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Key Milestones & Timeline

Innovation Call Briefing	Open for application	Close application	Evaluation & Interviews	Award
29 Jul 2019	31 Jul 2019	30 Sep 2019	Oct to Dec 2019	Jan 2020
Conduct industry briefing to interested technology partners	Proposal submission starts	Close application by 23:59PM	1st round evaluation & interviews Final panel interviews*	Issue Letter of Offer(s) to appointed companies Commence projects

*Panel consisted of IMDA, NParks and academic or industry experts.

THANK YOU

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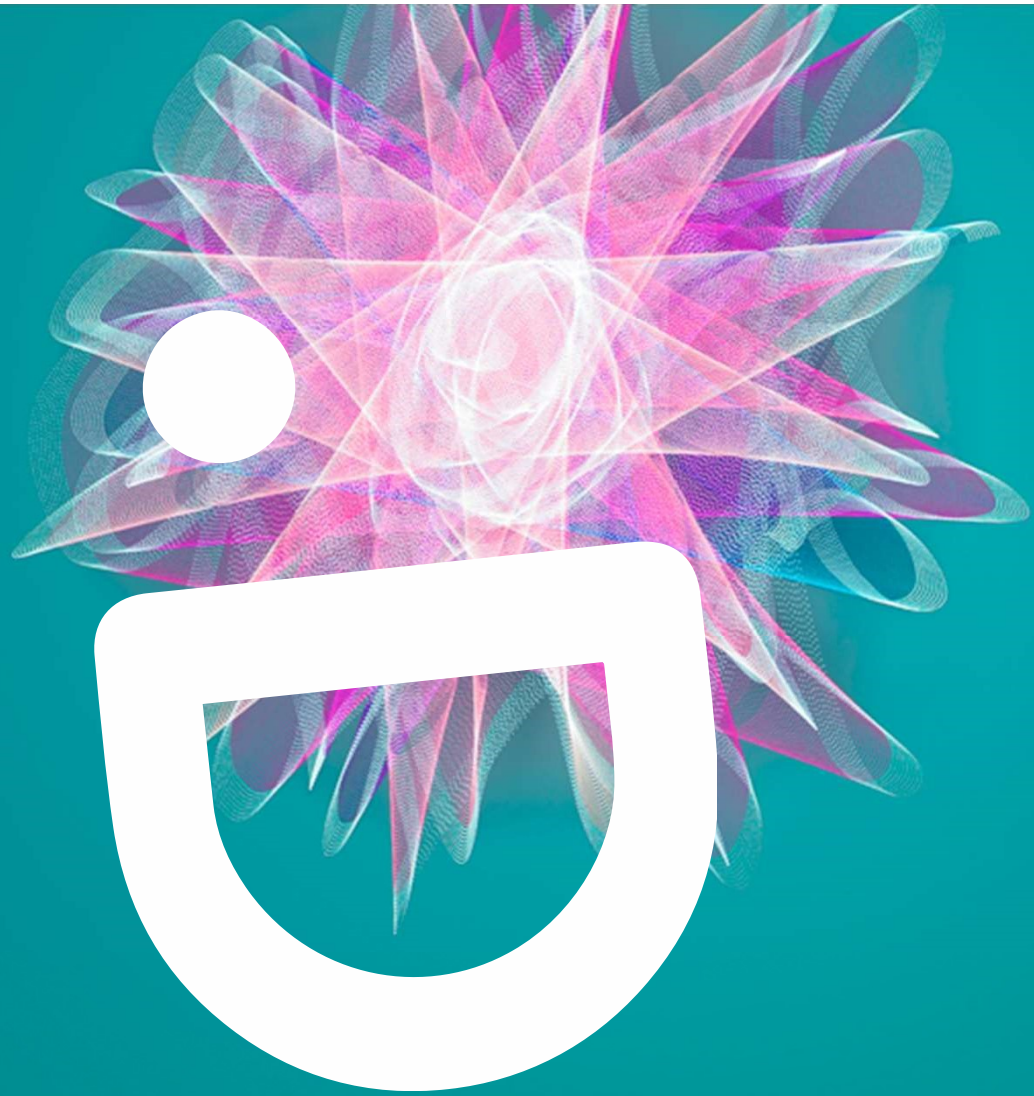
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Q&A PANEL

Thank You!