## Problem Statement/Title: Data-driven Environmental Services Operations

**Desired Outcomes:**

A central monitoring and analytics platform that supports Keppel Land's push to adopt the Internet Of Things (IoT) —data driven Environmental Services (ES) operations. The outcome is to effect services on demand, better planning in administration and operations and elimination of repetitive tasks leading to a reduction in reliance on labour, while maintaining consistency in the level of cleanliness through at least an overall 80% cleaning productivity improvement *(i.e. increase time efficiency for cleaning and/or reduce manpower to complete same work scope while maintaining existing cleanliness standards resulting in an overall reduction in net operation cost of system).*

Such platform must also have the ability to be upgraded/scaled-up to perform broader level integration to include other facility management (FM) components *(e.g. chiller plant units, lift monitoring, security surveillance systems, etc)* for broader level analytics to enhance the value proposition to Keppel Land and its service providers (SPs).

**Background of Problem:**

Keppel Bay Tower [KBT] currently relies heavily on manpower to clean its premises, with limited usage of smart solutions and robotics automation.

Cleaning services in KBT are routine-based, operating on 2 shifts on weekdays and 1 shift on weekends deploying between 8 and 13 cleaners and 1 supervisor per shift on site to perform cleaning of toilets, common corridors, building surroundings, lobbies, carparks, bin centres, staircases, lifts and escalators as well as general high touch point areas.

Waste collection and pest management services are performed on a routine-based arrangement with limited monitoring and tracking capabilities, resulting in limited information for KBT to pursue targeted sustainability initiatives such as recycling.

KBT currently relies on its SPs to maintain its property. Reporting and documentation is done with limited traceability, tracking and evidence-based documentation of the service and performance level of the SPs.

**Project Scope:**

1. Solicit ES smart solutions suitable and impactful for deployment in KBT *(including smart toilet monitoring system, monitoring of common areas for cleaning needs and digitalising waste disposal collection on demand basis, etc).*
2. Development of an integrated monitoring and analytics platform capable of integrating different functional smart solutions and presented in a user-friendly visualisation console.
3. Analytics and intelligence capability of the console to suggest optimisation of workflow, analytics of equipment and/or SP's service performance, predicting maintenance needs, easing administrative needs of contract administration & planning and repetitive process automation.

**Technical Requirements:**

1. Ability of integrated platform to synchronise and harmonise all types of ES smart solutions deployed on site to effect a real-time visualisation of all services rendered in the property.
2. Ability of the system to eliminate current repetitive tasks performed on a periodic basis such as manpower scheduling, monthly service provider performance documentation, calculation of disbursement of contract sums etc.
3. Ease of installation of any sensors or smart solutions on existing infrastructure without affecting aesthetic of building outlook *(e.g. all devices to be flush-mounted without exposed trunking).*

4. Ease of operation of system/products for different levels of users *(e.g. cleaners, cleaning supervisor, FM staff and managers through web-based and app-based platforms).*

**Timeframe for development of proposed solution/product**
12-15 months

**Requirements of prototype**

**On top of fulfulling the technical requirements stated above, the prototype will need to ensure:**
1. 99% availability of software/product operation
2. Predictive analytics capability in ES tasks
3. Capability to integrate with smart solutions deployed on the ground
4. Capability to track ES performance and service delivery
5. Capability to suggest areas of improvement in ES management
6. Ability to automate or transform current backend repetitive and administrative tasks

**Business model for proposed solution/product**

To propose business model to be adopted by SPs and service adopters for the implementation of the solution.