Smart Technologies Implemented in Punggol Northshore

In September 2014, HDB announced the "Smart HDB Town Framework", which mapped out how HDB intends to harness Information and Communication Technology (ICT) to introduce the "Smart" element in public housing to achieve a more liveable, efficient, sustainable, and safe living environment. The framework covers 5 key domains: Smart Planning; Smart Environment; Smart Estate; Smart Living; Smart Community.

2   Punggol Northshore, one of 7 waterfront housing districts in Punggol town, will be the first district to incorporate smart features across the whole district. Envisioned to be "A Smart and Sustainable District", it is Punggol's first district to test-bed smart technologies in public housing right from the design stage, to enhance the planning, design and maintenance of HDB estates.

3   The smart technologies implemented in Punggol Northshore under these five domains are:

i.   *Smart Planning*
   • The use of computer simulation and data analytics will enable HDB to improve the way it plans and designs its towns, precincts and buildings, and also derive optimal and cost-effective solutions to achieve sustainability goals. Real time data is integrated into simulation models to derive the optimal and most cost-effective solutions for urban design technologies in HDB towns.

   • For example, environmental modelling of microclimatic conditions facilitates the urban planning and design process to create a green and comfortable living environment. Studies on wind flow, temperature, the amount of sunlight falling on a surface, and shadow casting were carried out at Punggol Northshore District to aid decision-making during the planning and design process. Through environmental modelling, we could identify potential hotspots where greenery could be introduced to bring down ambient temperature, well-shaded locations

to place outdoor amenities such as playgrounds and fitness corners, and optimal locations for future installation of solar panels.

The Integrated Environmental Modeler (IEM) builds on the design technology that HDB has been developing through the years. Before this, Treelodge@Punggol was the first HDB project to be planned using simulation tools that optimise environmental factors. The IEM was previously trialed on a small scale in Punggol, and later used in enhancing the planning of Bidadari.
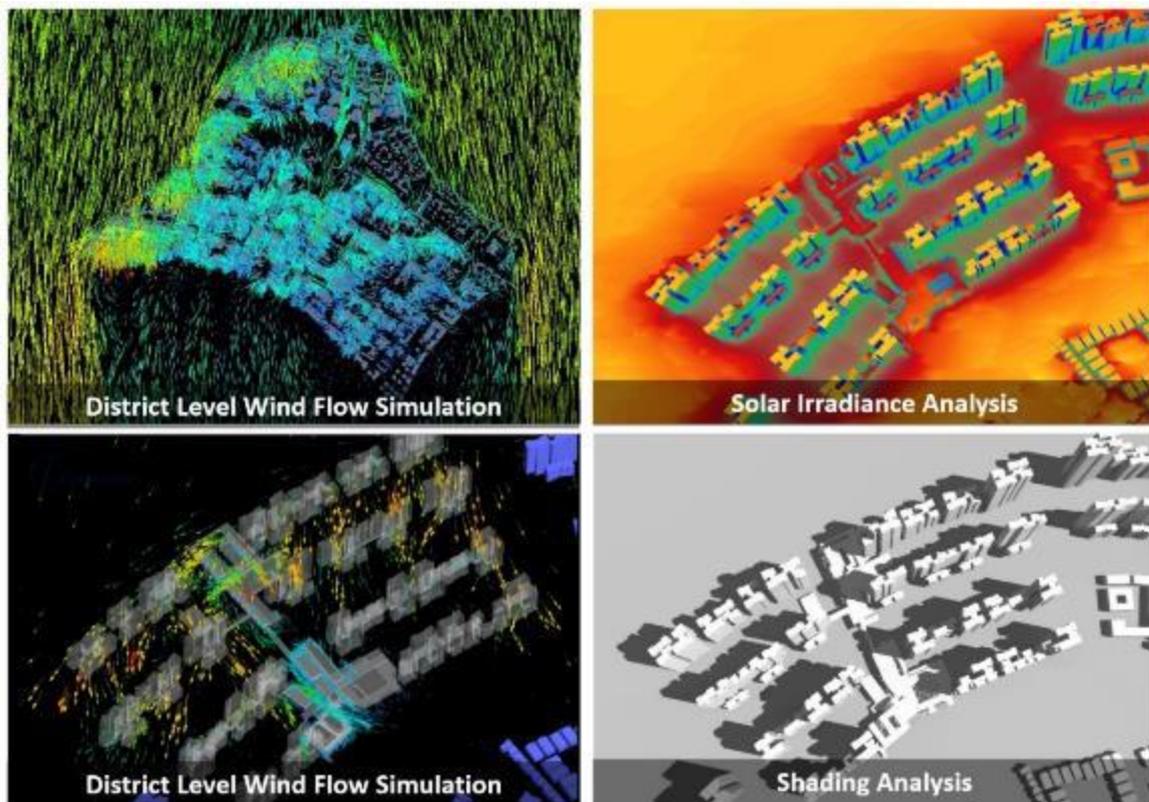
Environmental modelling aided decision-making during the planning and design of Punggol Northshore District

ii.   *Smart Environment*

- Smart initiatives have been deployed in Punggol to **improve estate maintenance**. For example, through the implementation of a network of sensors, a 'Smart Environment' can be created. The sensors will capture real-time information on factors such as resource utilisation (energy & water), waste generation and the environment, providing insights that can help improve estate services by integrating, managing, and analysing data from various sources.

Sensors have been deployed in Punggol to improve estate maintenance.

iii. *Smart Estate*

- To **improve estate services**, HDB will leverage Smart technologies to collect and analyse data which help to optimise maintenance cycles and pre-empt potential problems.

- A central data repository for the collection, integration, management, processing and analysis of data collected from a network of estate sensors in key functions e.g. lighting, water pumps, lifts, solar panels is being developed. This will enable HDB to monitor the health of estate services in real-time, allowing for quick detection of issues, optimised maintenance cycles, proactive upgrading and replacement of systems, and identifying opportunities where resources could be saved. This could, in turn, help to minimise disruption of services and reduce inconvenience for residents.

The Smart Hub, akin to a 'brain' of estate operations,
enables HDB to monitor estate services in real-time.

- **Smart Lighting** in common areas will be sensor-controlled and equipped with predictive data analytics tools to understand human traffic patterns. Lighting in common areas with little or no human traffic detected could be reduced to 30%, potentially saving as much as 60% on energy usage.

- **Smart Irrigation** uses moisture sensors and considers the various factors that may affect the amount of water retained in the soil (e.g. rainfall, exposure to sunlight) to optimise plant watering schedules and usage. This is a water-efficient and less labour-intensive approach to maintain greenery and landscapes.

- **Smart Parking** uses automation and real-time technological capabilities to provide for seamless entry and exit of the vehicles, dynamic allocation of available lots, and in-app alerts for the ease of payments, or reminders that the user has parked in an unauthorised lot.

iv. Smart Living

- **Smart-Enabled Homes** will be equipped with additional infrastructure such as additional power and data points at strategic locations, as well as smart sockets and a smart distribution board in Northshore Residences. The smart distribution board replaces the conventional distribution board in HDB flats, enabling residents to monitor electricity usage across household appliances. Similarly, smart sockets are provided in every bedroom, living room and kitchen within the flat for residents to track the energy usage of home appliances when they are plugged into the smart socket. With the appropriate ICT infrastructure in place, residents will be able to enjoy more convenience and energy savings when they adopt compatible smart home solutions and applications developed by commercial companies.
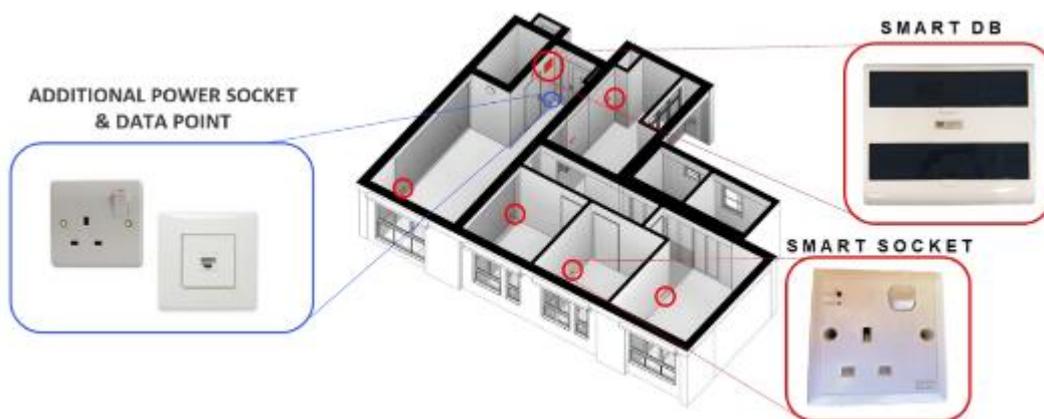
Smart-enabled flats are equipped with the necessary infrastructure to support residents' adoption of smart devices and applications

v. Smart Community

- HDB also leverages data analytics and ICT to better understand and engage residents based on their demographics, social trends and lifestyle preferences. This can enhance our community-building efforts and empower communities to co-create their living environments with us.

- HDB launched the **Pulse of the Heartlands** initiative in collaboration with tech companies to develop an ecosystem of applications and services that will be useful to residents. The development of such an ecosystem will leverage the digital capabilities of a new Artificial Intelligence (AI) and data platform, which

comprises information on HDB towns such as shops in the neighbourhood. Over time, the platform will be enriched with more datasets as other public agencies and private companies come on board to offer more types of data, such as location and availability of transport and car park facilities. App developers can tap on the platform's data to build more applications, and as users interact with these applications over time, the data platform will collect more insights on residents' interests, which could inform future planning and management of community facilities.

*HDB launched the Pulse of the Heartlands initiative in 2018 to develop
an ecosystem of useful applications and services for residents*

- HDB also embarked on a social behavioural study called the **New Urban Kampung** research programme with SUTD in 2017. This in-depth multi-disciplinary study combines the fields of behavioural studies, Computational Social Science and Urban Informatics, to predict how the demographics in HDB towns are likely to evolve. It also attempts to forecast residents' behaviour and responses to initiatives introduced in their living environment so as to help HDB improve their design.

Tapping on data from traditional surveys, sensor networks around the estate and through engaging the community, we can better understand residents'

preferences and create new housing solutions in tandem with their evolving needs and aspirations.