Smart Planning for a Sustainable and Resilient City
Sharing Singapore's Experience

LOH Teck Hee
Group Director
Design & Planning Lab
Urban Redevelopment Authority
Singapore’s National Land Use Planning and Conservation Authority

MISSION: To make Singapore a Great City to Live, Work & Play
SINGAPORE IS A SMALL ISLAND WITH MANY DIFFERENT NEEDS TO ACCOMMODATE

LAND NEEDS
- Housing
- Commerce
- Industry
- Port
- Defence
- Airport
- Water Catchment
- Greenery & Parks
- Culture & Heritage

SEA NEEDS
- Anchorage / Fairways
- Aquaculture
- Landfill

Land Area: 734.3 sq km
Population: 5.64 mil (2022)

London (2x) New York City (1.7x) Hong Kong (1.5x)
LAND USE PLANNING WORKS WITHIN A COMPLEX ECO-SYSTEM

Over multiple dimensions, space, and timescales

Involving multiple stakeholders with diverse objectives

- Different Government Agencies
- Businesses
- Interest / Civic Groups
- Residents / Communities

Varying Activity Locations, Travel Modes & Route Options

Varying Types of Activities Induced by Different Land Use Mix

Compound Behaviour & Heterogenous Distribution of Flows of People, Goods, Resources

Large-scale aggregated impact on economy, society, and environment
WE ADOPT A **LONG-TERM PLANNING APPROACH**

TO STEWARD OUR LIMITED RESOURCES

AND DEVELOP SUSTAINABLY

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**ECONOMIC**

Sustain a robust and vibrant economy

**SOCIAL**

Provide a good quality living environment

**ENVIRONMENT**

Develop in an environmentally responsible manner

**LAND & SEA**

Optimise our limited land and sea space

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WE USE DATA AND ANALYTICS TO
MANAGE COMPLEXITY AND INCREASE AGILITY

High dimensionality of problems
Qualitative nature of problems
Rapidly changing environment
Need for flexibility in the future
Numerous stakeholders and trade-offs

Model & simulate “what-if” scenarios
Frame issues with quantitative indicators
Respond quickly and decisively to emerging events
Generate scenarios to optimise across multiple needs
Collaborate iteratively with many stakeholders
DIGITAL PLANNING AS AN ECOSYSTEM: COLLABORATING WITH AGENCIES

Community Network for Seniors
Identify locations/concentrations of elderly with different profiles

Strengthening Social Services
Understanding the spatial distribution of Community Care Facilities clients

Infrastructure Planning
Land use and mobility simulation with localised scenario testing for traffic

All diagrams are for illustrative purposes only.
USING TRANSPORT DATA TO ASSESS CONNECTIVITY AND CATCHMENT

**Descriptive**
E.g. What is the commuter volume boarding / alighting at a MRT station?
E.g. How many people can commute to work by public transport in 45 mins?

**Diagnostic**
E.g. Are facilities sited within 30 mins by public transport from all residential areas?
E.g. Where are imbalances in Job Provision Ratios based on public transport reach?

**Predictive**
E.g. How does public transport travel time change with a new MRT line?
E.g. How does redistributing workers and jobs improve workers’ job reach?

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USING NETWORK DATA TO IMPROVE ACCESSIBILITY AND BETTER INFORM ROUTE PLANNING

Improving the accuracy of our understanding of accessibility between homes and amenities

Example of discrepancy between straight-line Euclidean buffer (in blue) and walkability buffer (in green)

Mapping Singapore’s Walking and Cycling Network with our collaborators

Agency Data

Ground Mapping

Walking & Cycling Network

Single Source of Truth

Feedback

Feedback

Walking Cycling Network Routing Engine

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USING DEMOGRAPHICS TO BETTER INFORM FACILITIES PLANNING

Identifying facility provision gaps due to accessibility or capacity issues

ePlanner: a GIS portal enabling quick visualisation & analysis of planning data

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<th>Existing Capacity</th>
<th>Pipeline Capacity</th>
<th>Planned Capacity</th>
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</tr>
</tbody>
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USING SIMULATIONS TO DESIGN FOR COOLER ENVIRONMENTS

Wind flow study at Lentor Hills Estate

- To study effects of site porosity and optimise wind corridors through the parcels
- Findings were then translated into urban design guidelines and Technical Conditions of Tender (TCOT) for land sales sites

Baseline: No safeguarding of site porosity

Revised Option: Safeguarded site porosity & wind corridors

Translation to Technical Conditions for Development Site

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INTEGRATING DIGITAL TOOLS THROUGHOUT THE PLANNING FRAMEWORK

STRATEGIC PLANNING
- Geospatial Analytics
  - Flow rates, provision, trip counts, trends

URBAN DESIGN
- 3D Visualisation & Analytics
  - Viewshed, wind flow, shadow, solar irradiation

MASTER PLANNING
- Analysis + Optimisation
  - Massing studies, modelling & simulations

DEVELOPMENT CONTROL
- DEVELOPMENT COORDINATION & LAND SALES
- BIM Submission Auto-Checker
  - 3D control plans

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HARNESSING TECHNOLOGY TO PLAN THE FUTURE OF THE JURONG LAKE DISTRICT

Jurong Lake District
The largest mixed-use business district outside of the city, with quality offices, housing, amenities and green spaces

Key Sustainability Outcomes

Towards Net Zero Emissions
Towards Zero Waste
Pursuing Sustainable Transport
Enabling Healthy Living
Building a City in Nature
Advancing Sustainability through Partnership and Technology

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INTEGRATED INFRASTRUCTURE AT THE DISTRICT SCALE IN JURONG LAKE DISTRICT

Integrated Infrastructure and Facilities
- District cooling
- District pneumatic waste conveyance system
- Common services tunnel
- Solar panel deployment
- Smart electrical meters

Green Mobility
- 4 MRT (metro) Lines by 2030s
- Public transit priority corridors
- Comprehensive cycling network
- Pedestrian friendly streets
- Interconnected basement carparks
- Significant reduction in car parking

Autonomous Vehicle & Electric Vehicle ready
- Charging provisions for EV fleet
- Autonomous vehicles for both people and goods
TOGETHER, WE CAN ENABLE EACH OTHER WITH TOOLS AND EXPERTISE FOR A MORE SUSTAINABLE & RESILIENT FUTURE