FUJITSU-SMU URBAN COMPUTING & ENGINEERING CORP. LAB
都市计算工程企业研究所

Enhancing Maritime and Public Safety with AI and Optimization

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School of Information Systems (SIS)
Singapore Management University (SMU)

Fujitsu-SMU Urban Computing & Engineering (UNiCEN) Corporate Lab

- Established in Oct 2014
- Funded by Fujitsu Ltd and National Research Foundation (NRF) under its Corp Lab scheme
- "Adding Capacity without Building Capacity“

  To build capabilities and technology to manage urban problems, while constrained by existing resource capacities

- Research Project Clusters:

Project Cluster A: **Dynamic Mobility Management**

Project Cluster B: **Maritime & Port Traffic Management**

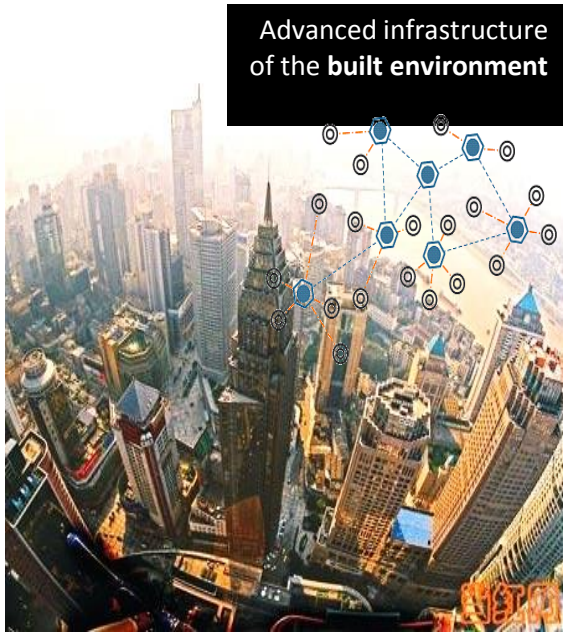
Project Cluster C: **Urban Logistics**

Project Cluster D: **Public Safety and Security**

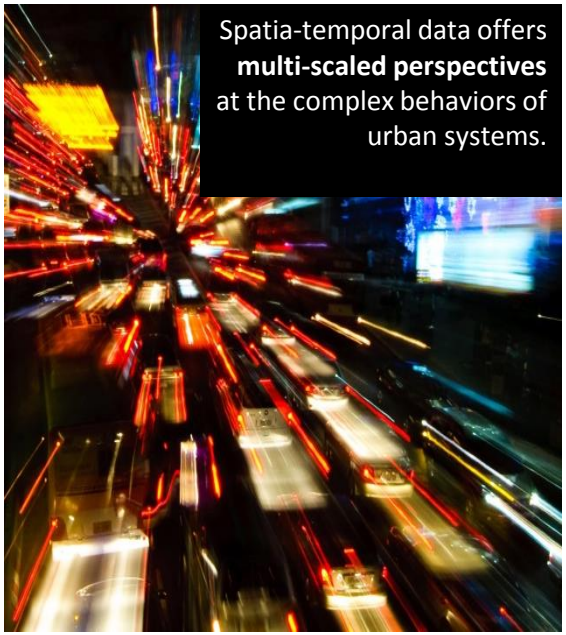





By 2050, **67%** of the world's population (6 billion people) would live in urban areas[1].



Advanced infrastructure of the **built environment**



Spatia-temporal data offers **multi-scaled perspectives** at the complex behaviors of urban systems.

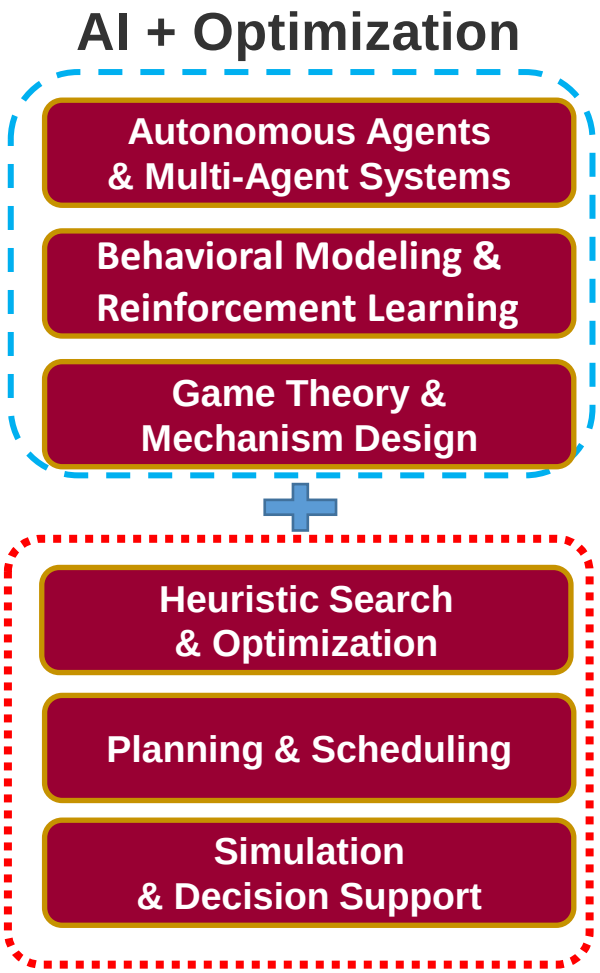
Multimodal **transportation networks**

Use AI + Optimization on spatiotemporal data to make cities smarter and safer

Big Data and the City

From Data to Decisions with AI + Optimization

- Data Analytics
  - Historical and real-time
  - Demand & Supply Analysis
- Prediction
  - Demand & Supply Prediction
  - Identifying supply/demand imbalances
- Decision
  - Recommendations / actionable decision support (to match demand with supply)

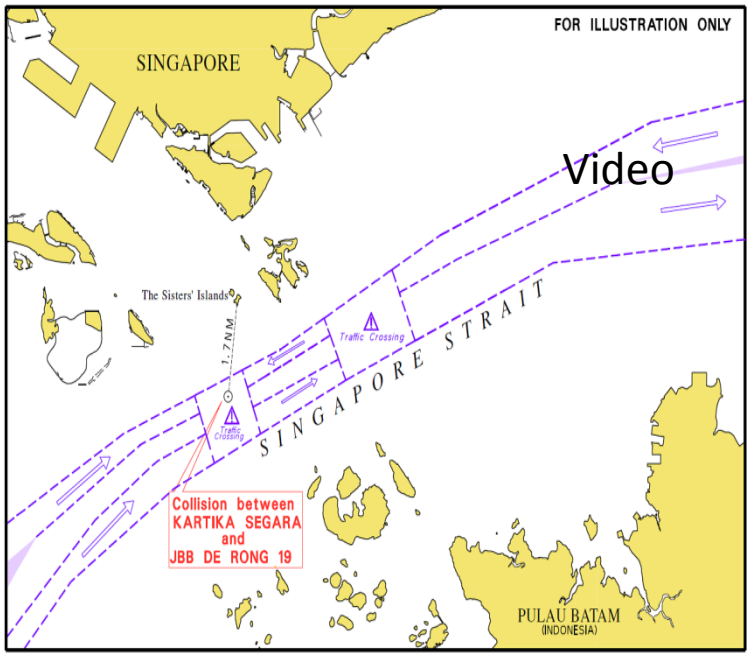


Enhancing Safety with AI+Optimization

- Maritime Traffic Safety
  - Global trade activities are causing congestion of maritime traffic in ports in major cities where resources are limited
  - With autonomous ships, movement of vessels can be better coordinated to improve safety and efficiency of maritime traffic
- Public Safety
  - Densely populated urban areas puts pressure on law enforcement agency's manpower resources trying to meet ever-rising demands
  - Law enforcement resources can be better staffed and deployed to maximize resource utilization that guarantees response time

Recent Collision Incidents

- 21 Aug 2017
- 13 Sep 2017



MHA-SMU Merlion Initiative

SMU SINGAPORE MANAGEMENT UNIVERSITY

MINISTRY OF HOME AFFAIRS

ManagemEnt of Resources using anaLytics and OptimisatION (MERLION)

AI + Optimization

- Autonomous Agents & Multi-Agent Systems
- Behavioral Modeling & Reinforcement Learning
- Game Theory & Mechanism Design

+

- Heuristic Search & Optimization
- Planning & Scheduling
- Simulation & Decision Support

Singapore Civil Defence Force
Robust resource optimization for emergency response

Police Coast Guards
Principled randomisation of patrols for improved security

Singapore Police Force
Optimization of Ground Response Forces

Singapore Police Force (Counter Terrorism)
Randomization of dedicated police patrols for sensitive locations

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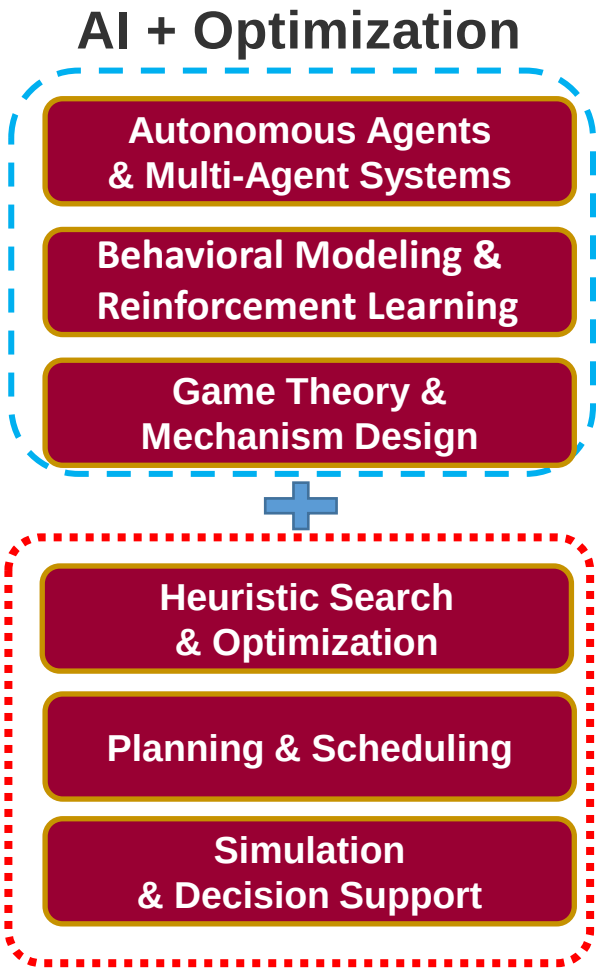
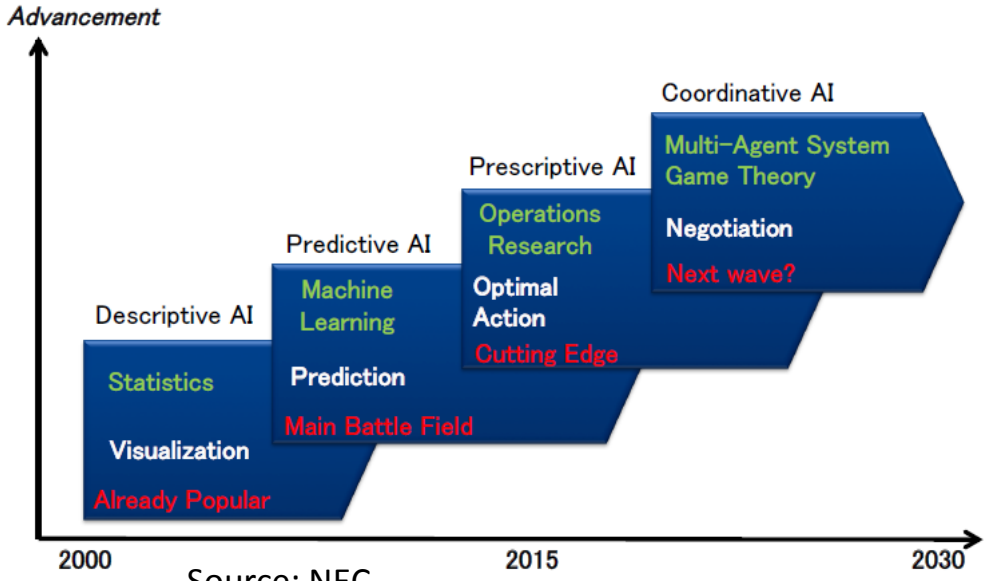
Summary and Future Prospects
From Data to Decisions with AI + Optimization



Challenges in:

- Data Analytics
- Prediction
- Decision



Source: NEC