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

Incentive-based Crowd Management (ICM)

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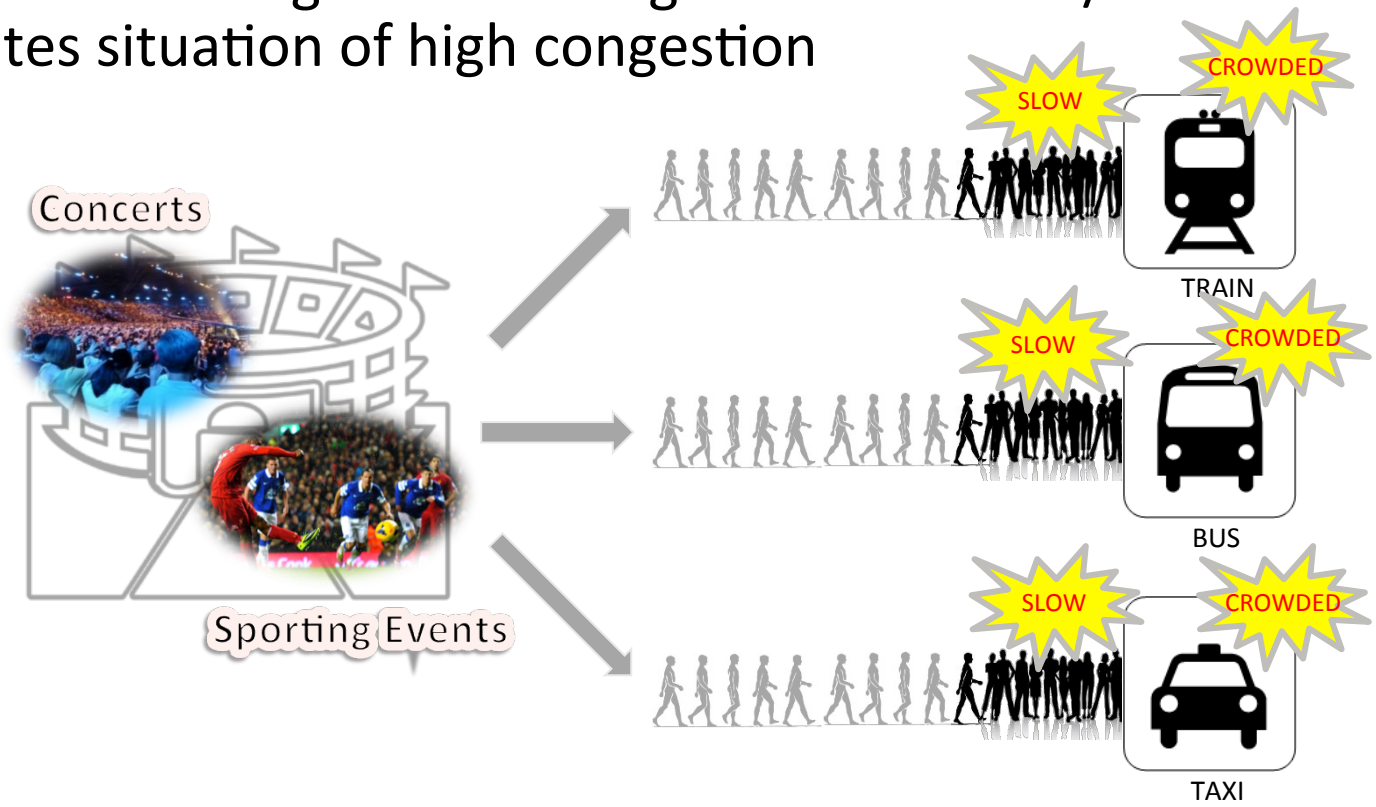
Egress problem

- Simultaneous egress from large scale event at/near a venue, creates situation of high congestion



- Example: Jam-packed congestion situations at Stadium MRT and platform after a large scale event at Singapore Indoor Stadium

Objective

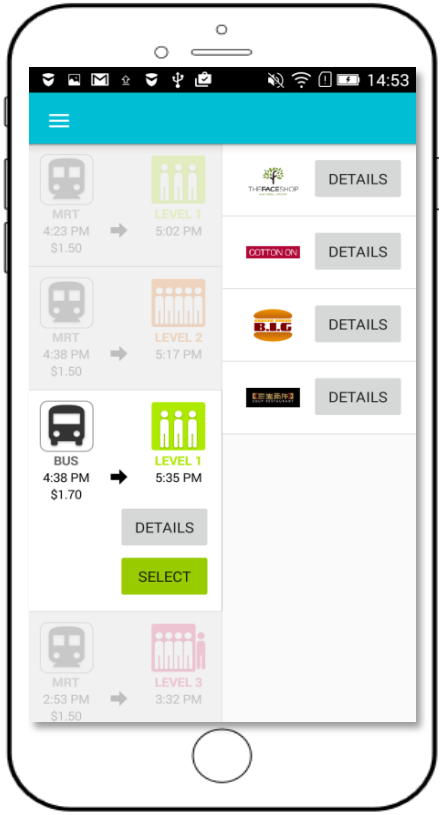
Change visitors' behavior to disperse congestion providing intelligent incentives considering three main objectives

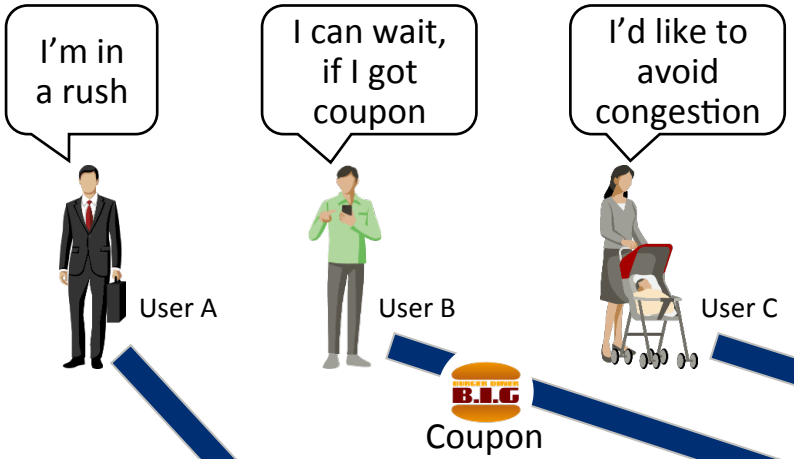
- Mitigate congestion during egress from venue
  - Peak shift
  - Modal shift
- Enhance visitor experience at venue
  - Comfortable egress
  - Enhanced visitor satisfaction
- Maximize revenue of retail in venue
  - Longer dwell time of users

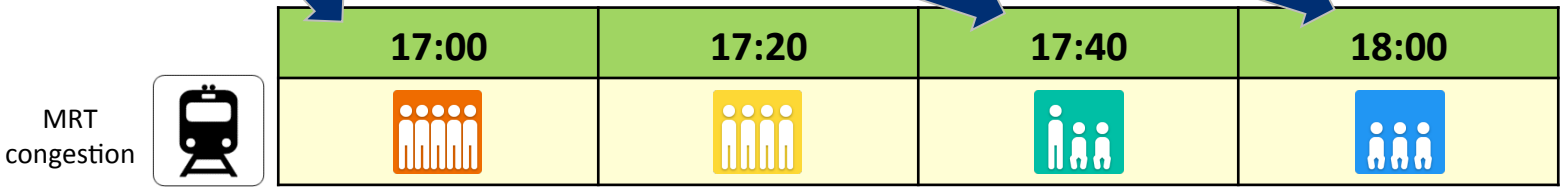
Approach

Provide optimized recommendation using mobile App

Recommendation
- Transportation mode & time
- Congestion information
- Incentives







Overview

FUJITSU

Human Centric
Crowd Management Technology

ICM framework

User Requests
for recommendations

preferred departure time,
Current location,
destination

ASSORTMENT
TO
USER

1. Coupon selection

2. Assortment optimization

3. Choice model learning

ICM

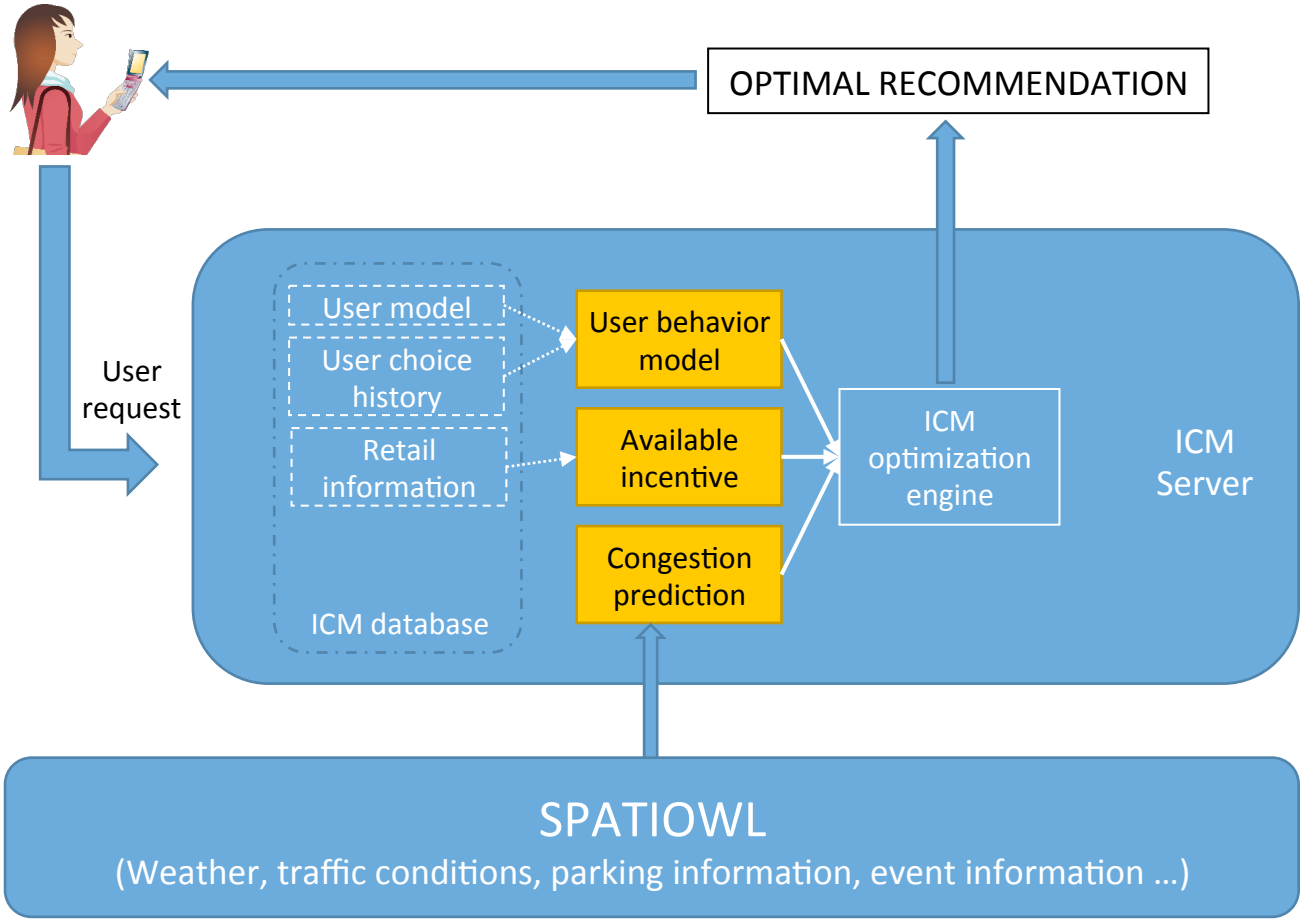
Recommendation system
(Collaborative-Filtering)

User behavior model
(Choice model)

User behavior learning
(Maximum likelihood)

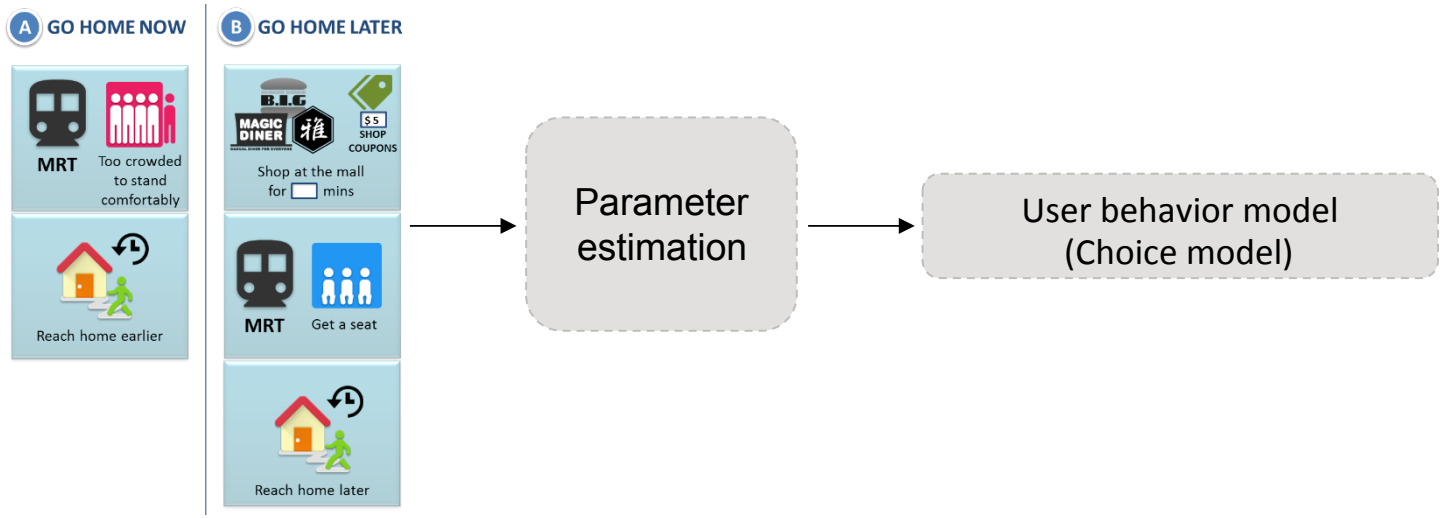
Underlying technologies

ICM and SPATIOWL



ICM: User behavior modeling

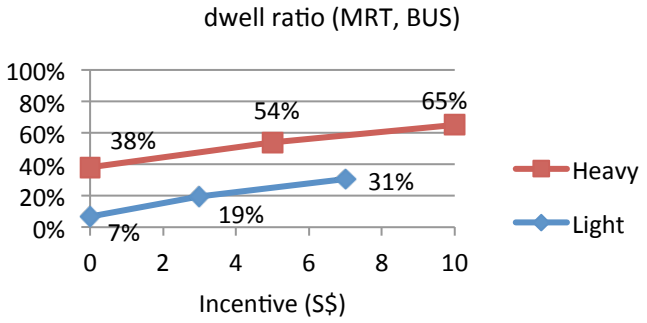
- User behavior modeling is essential for generating smart recommendations catered for a particular user
- Approach involved: Stated preference survey

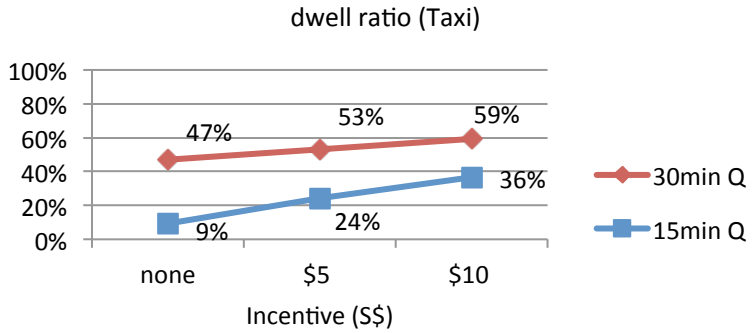


  - Survey carried out at end of large scale events at Suntec Singapore International Convention and Exhibition Centre (SICEC)
  - Target people: Visitors egressing from SICEC
  - Survey population: 200

Experiments

- Stated preference (SP) survey conducted at SICEC
  - Survey carried out at end of large scale events at SICEC
  - Target people: Visitors egressing from SICEC
  - Survey population: 200
  - Incentives: Shopping discount coupons, congestion prediction information
  - RESULTS:

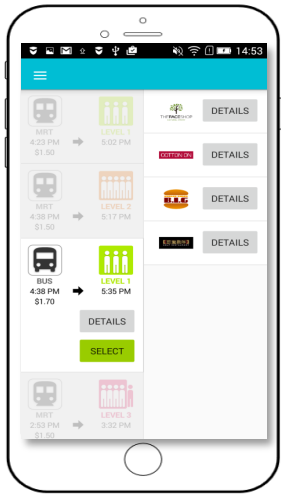


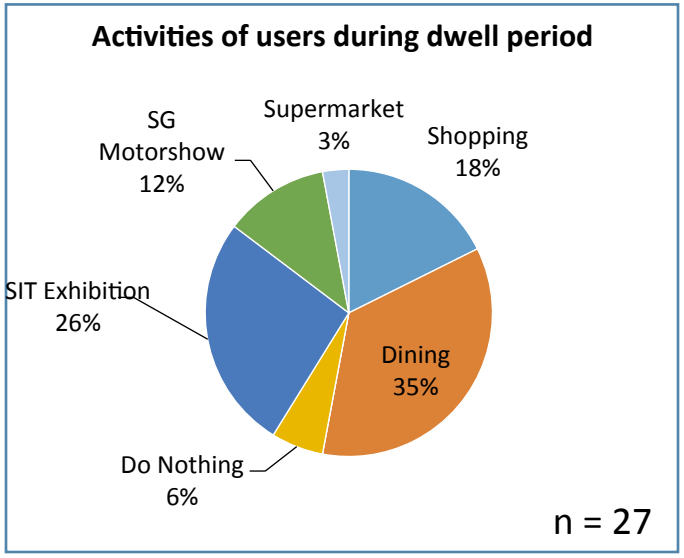


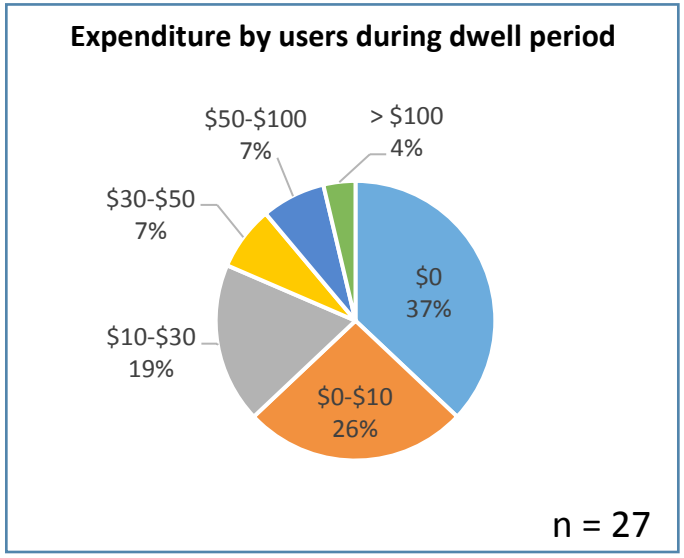
  - ❖ Users are willing to modify their egress behavior: users were willing to dwell given shopping incentive.
  - ❖ Even WITHOUT shopping incentive, some users were willing to dwell when congestion information is provided.

Experiments

- Small scale field test using “Hurry or Dwell” application
  - Location: SICEC
  - Target people: Visitors egressing from SICEC
  - Incentives: Cash discounts, congestion prediction information
  - RESULTS:
    - Number of participated users: 101
    - Number of people who changed behavior: 27







Experiments

- Small scale field test using “Hurry or Dwell” application
  - RESULTS:

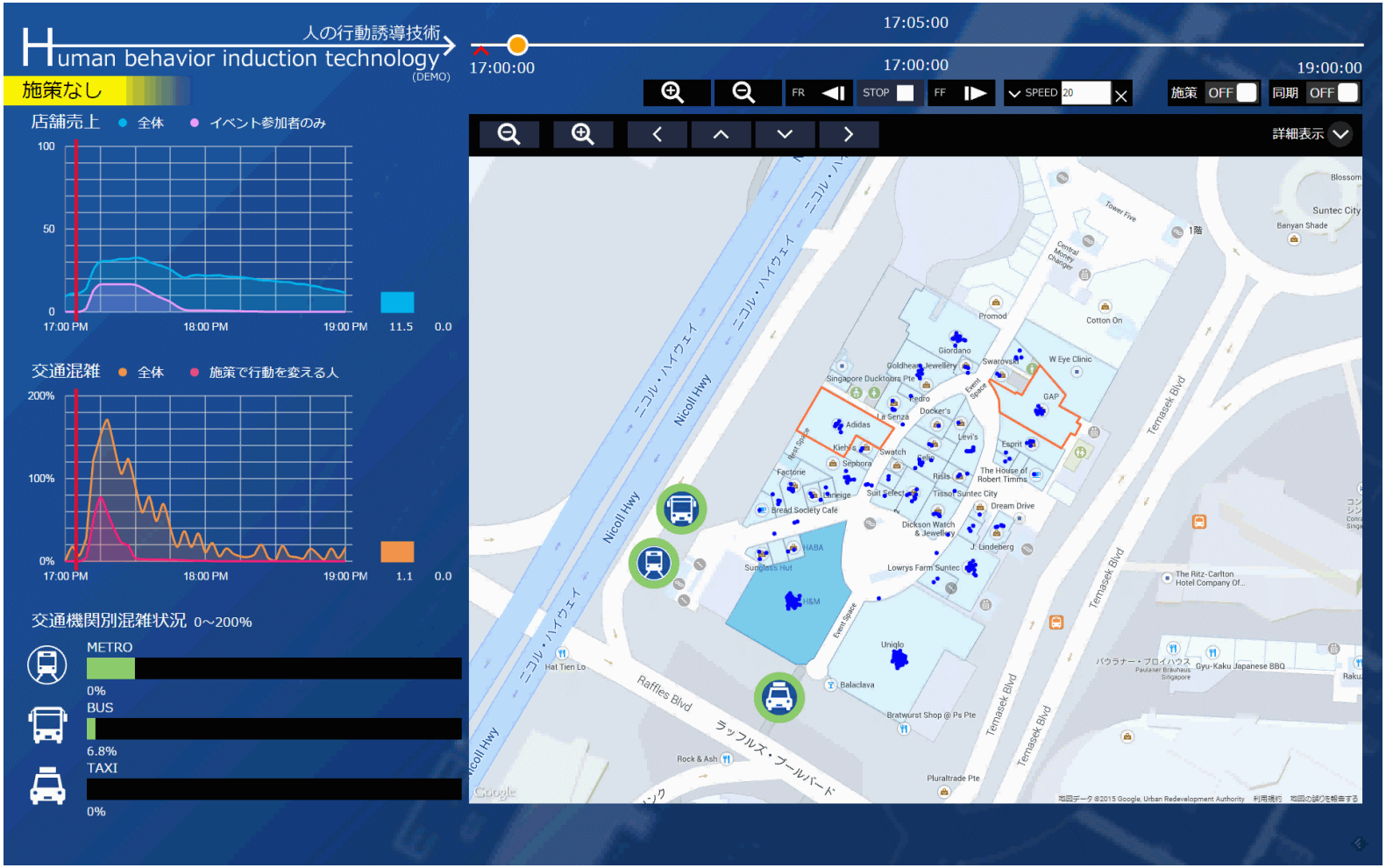
FIELD TEST STATISTICS				
Number of people participated	101			
Number of people who changed behavior	27			
	Total	Min	Max	Average
Dwell time		0:15	3:40	1:57
Amount of incentive used for dwelling (S$)	296	2	12	10.96
Amount of money spent during dwell period (S$)	435 (exptd)	0	100	16

Conclusions

- Total amount spent by users > Total amount offered as incentive
- ICM technology can increase revenue of retail shops

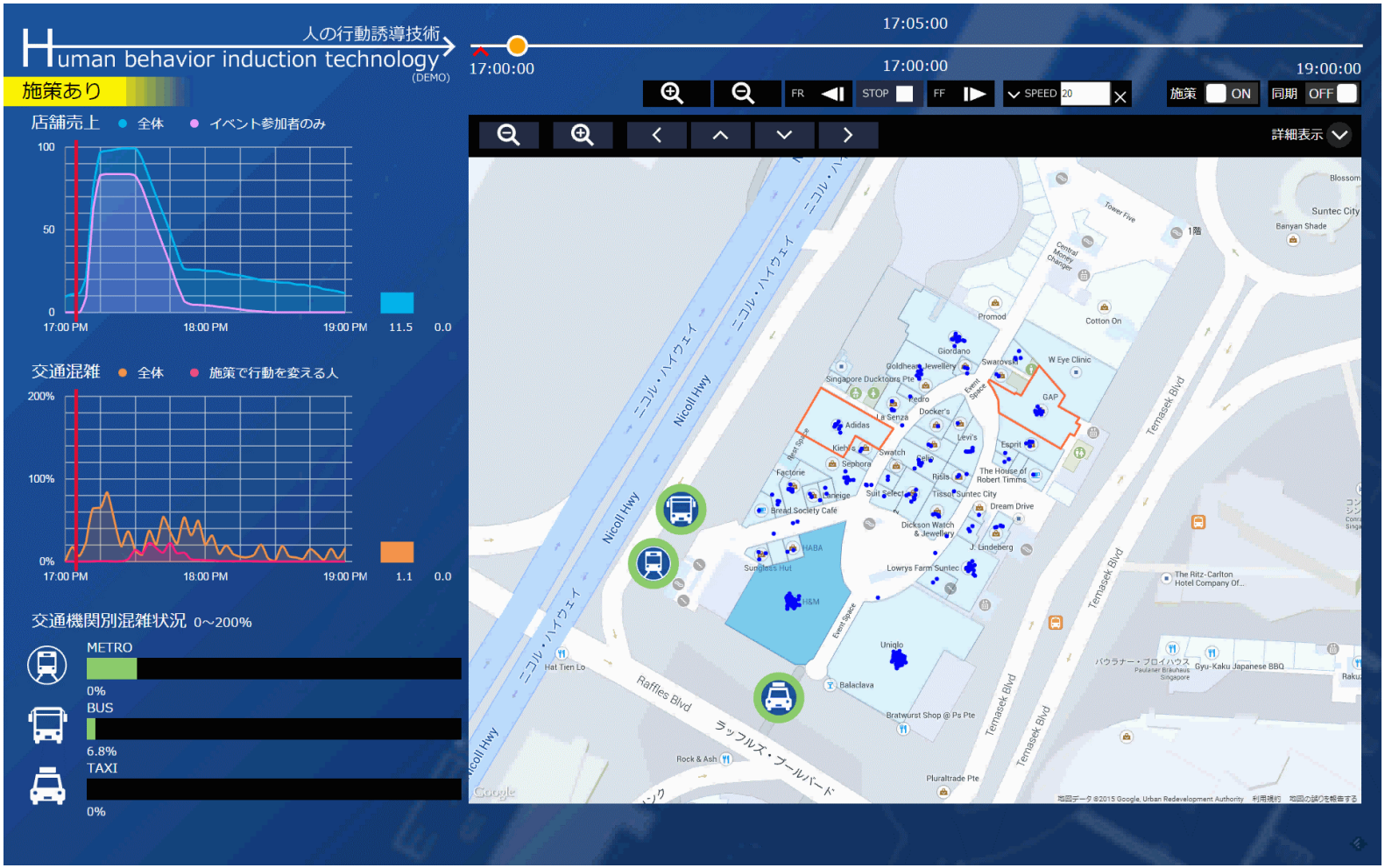
Experiments

- Simulated condition without ICM



Experiments

- Simulated condition with ICM



Q&A

- Questions?
- Comments?
- Suggestions?

Demonstration

- Please visit our demonstration booth

Thank You

Visit us @ www.unicen.smu.edu.sg

Smart Nation

- Infocomm Development Authority (IDA) wants to develop Singapore as world's first truly Smart Nation.

- Harness advancements in infocomm technology (ICT), growing networks and big data.
  - Wireless connectivity
  - Singapore ranks highest globally for smartphone penetration

- One of the key components – Smart Mobility
  - Increasing congestion – 1 million cars on the roads, while the roads take up 12% of land space.
  - Multiple Apps have been developed to address ease mobility, such as MyTransport.sg, Beeline