



# SINGAPORE 2019

26<sup>th</sup> ITS World Congress  
21–25 October

## Smart Mobility, Empowering Cities

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# *A Sampling* of Highlights and Observations

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**HNTB**

# Presentation

- Some Interesting Singapore Facts
- The 26<sup>th</sup> ITS World Congress
- Voloport/Volocopter
- Special Interest Session (SIS) 24
- Technical Session (TS) 68
- A Few Other Interesting Observations and Things Heard
- Conclusion

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# Singapore

- Among the 20 smallest countries in the world. About half size of LA.
- One of three surviving city-states in the world (Monaco and Vatican City)
- ~90F year-round (with about 200% humidity!)
- Chewing gum banned since 1990s. \$70,000 fine for selling.
- A “fine” city! \$150 for not flushing.
- Second busiest port (behind Shanghai)
- Super clean - street food - architecture - shopping!

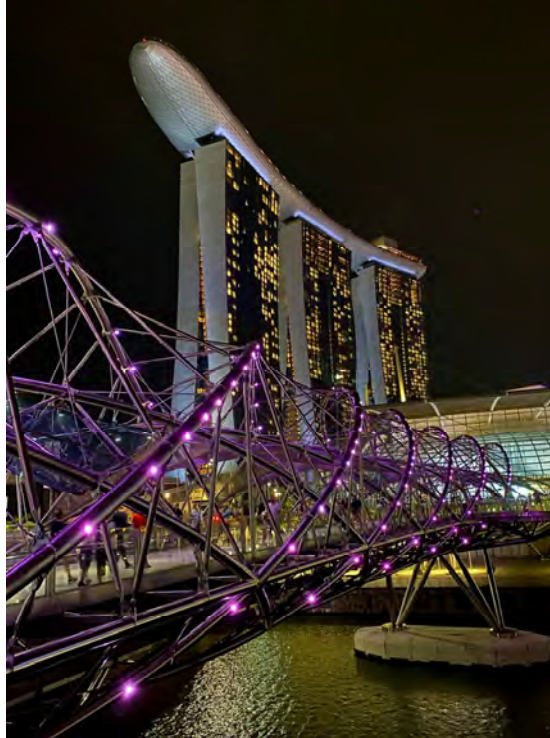


# Singapore

- Approximately 9081 lane-km of roads taking up 12% of the land
- Car ownership (Toyota Corolla Altis)
  - ~\$70,000 initial cost
  - Price includes Certificate of Entitlement (only a limited number of certificates/quota issued by Land Transport Authority through bidding process, good for 10 years)
  - Annual insurance and maintenance costs typical to US, +\$500 road tax



# Singapore



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# 26<sup>th</sup> ITS World Congress

- Extensive technical program centered around eight themes
- 148 technical, scientific paper, commercial paper and special interest sessions
- Plenary and executive sessions, demos
- up to ~14,000 participants (unofficial) from Asia-Pacific, Europe and North America

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## Technical Programme Themes & Sub-Topics

The 2019 congress aims to deliver a comprehensive five-day programme centered around eight broad themes.



Intelligent, Connected & Automated Vehicles



Crowdsourcing & Big Data Analytics



Sustainable Smart Cities



Multimodal Transport of People & Goods



Safety for Drivers & Vulnerable Users



Policies, Standards & Harmonisation



Innovative Pricing and Travel Demand Management



Cybersecurity & Data Privacy

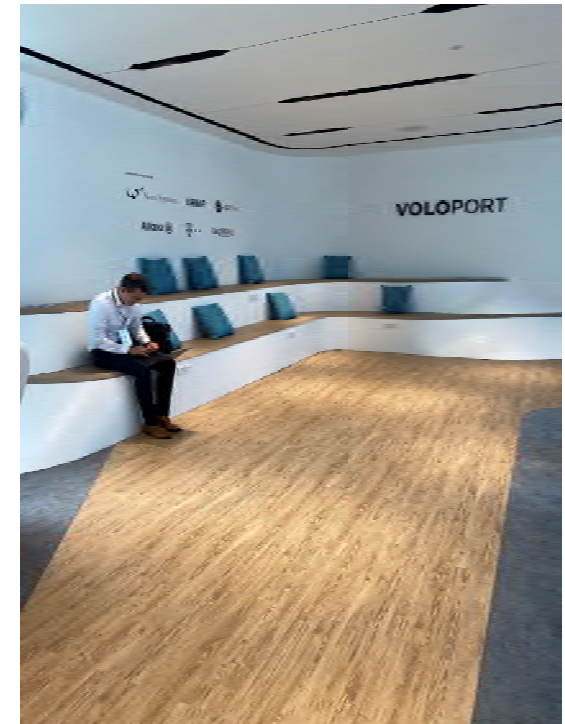
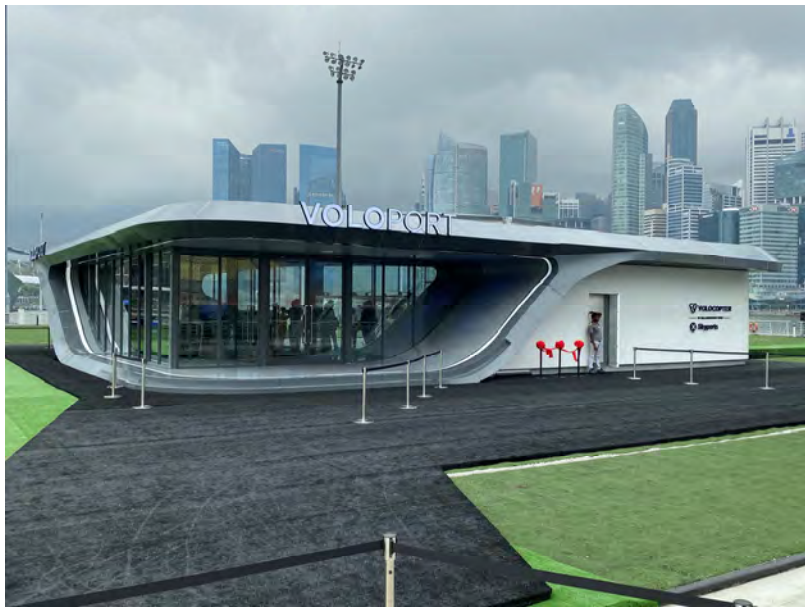
# Highlights and Observations – Voloport/Volocopter

- On demand Urban Air Mobility (UAM) / Air Taxi Services
- (Congested) Intra-city commercial air transport
- Fully electric (quiet), energy efficient
- Two passengers (+pilot/attendant)
- ~20-25 mile range, speed 50-60 mph
- JFK to Midtown example
- Investors include Daimler and Intel
- Singapore final test series to validate operations for the area





# Highlights and Observations – Voloport/Volocopter



# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

- Speakers representing USDOT FHWA, State DOTs (TN, MD), Singapore Land Transport Authority (LTA), Rijkswaterstaat (Dutch DOT)
- A sampling of some of the take-aways...



# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

Establishing the relationship between TSM&O activities and emerging Automated Driving Systems (ADS)

**Developing Typology**

Process for developing the typology for Transportation Systems Management and Operations (TSMO) and Connected Automated Driver Systems (ADS):

1. Specify TSMO
2. Define Use Cases: Basic Travel, Traffic Incident Management, Road Weather Management, Work Zone Management.
3. Define Travel Areas: The areas that ADS-equipped vehicles, response vehicles, and work vehicles typically pass through when interacting with non-recurring roadway issues (e.g., during traffic incidents, road weather events, and work zones).

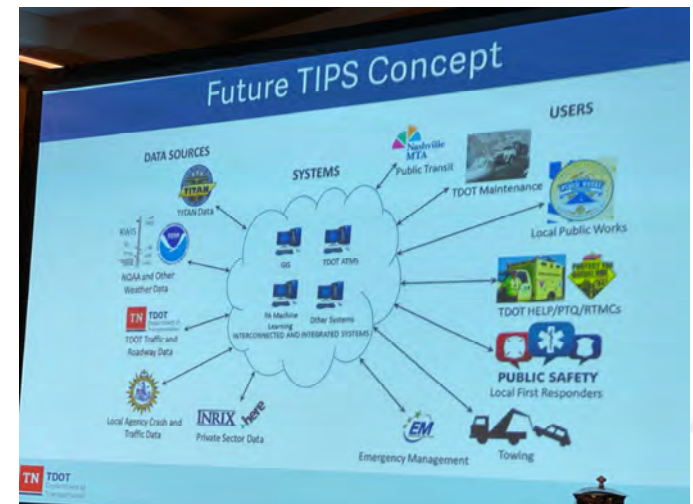
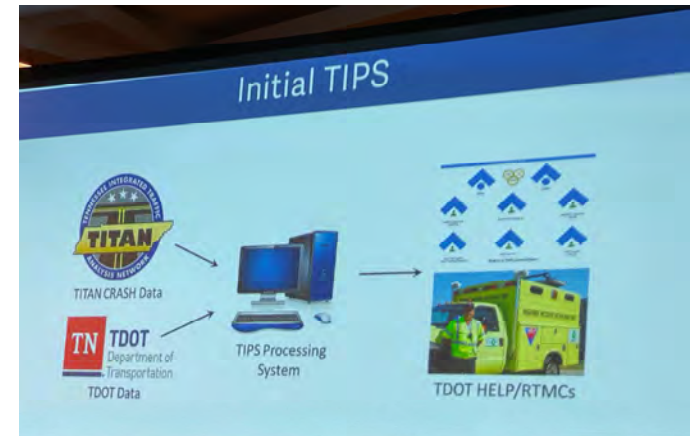
Advanced Warning Notification Area → Transition Area → Activity Area → Termination Area

U.S. Department of Transportation  
Federal Highway Administration



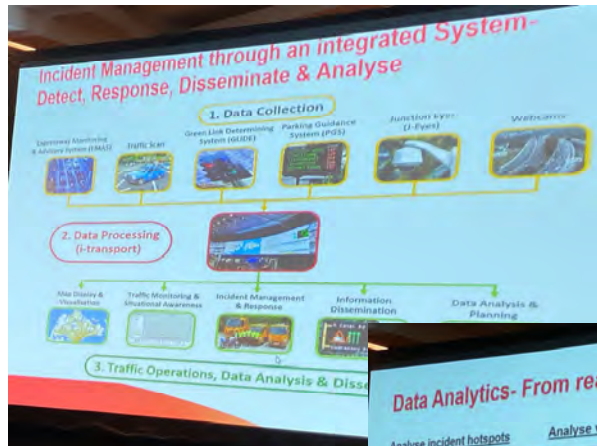
# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

Using predictive analytics to take TIM to the next level by getting ahead of incidents



# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

Singapore LTA: Integrating systems, reactive to proactive data analytics - resulting in improved TIM systems and processes



**Improved systems - Detection & Dissemination**

Visual graphics to improve detection

Automated information dissemination

Traffic Alerts provide quick alerts of incidents and congestion

Speed graph

LTA traffic news messages

Turf Club Rd

SWISS CLUB Rd

Chu Kang

**Data Analytics - From reactive to proactive.**

Analyse incident hotspots

Analyse vehicle on fire data

Analyse vehicle breakdown

All Vehicle Type Breakdown Incident Count: Mechanical Fault

Charts & Graph for Illustration

**Improved processes - From Operators to Ground Officers**

- Customised console to allow seating or standing
- Audio headset for communications & typing
- Single mouse & keyboard
- Ergonomic design curve screens

Water Tank stores 2000 of water

Water pump and water jet gun

Twin cabin

Enhanced capabilities

Roller shutter

Water tank

Water jet

Airbags recovery systems

Roller shutter door to encroaches into

Swing door the

# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

Rijkswaterstaat: Validation of TIM priorities, collaboration (Insurance Sector), “playbook” for safety/uniformity and results reporting.

## Order of priority:

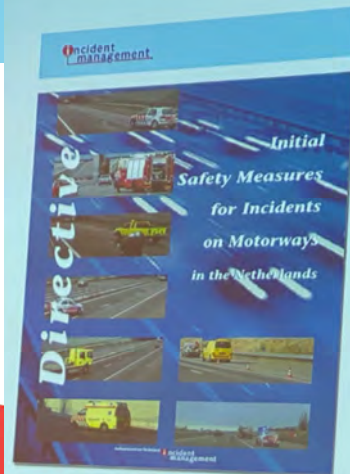


- Safety of the IM emergency workers
- Traffic safety
- Assistance to the victims
- Evidence collection
- Restoring traffic flow
- Salvaging cargo/vehicle

## The effects:

- Reduction of handling time of incidents:
  - Passenger cars: 15 minutes faster
  - Lorries: approximately 60-90 minutes faster.
- Reduction of congestion caused by incidents: approximately 35%. (150 M € society money)
- Reduction of secondary accidents:
  - Accidents at the tail end of the traffic jam,
  - Rubbernecking accidents on the other carriageway.

## IM Safety Measures



### Target groups:

- Police
- Fire brigade
- Ambulance
- Highway Authority
- Recovery services
- Breakdown services

### Goal:

- Safety
- Uniformity

## Incidentmanagement in practice

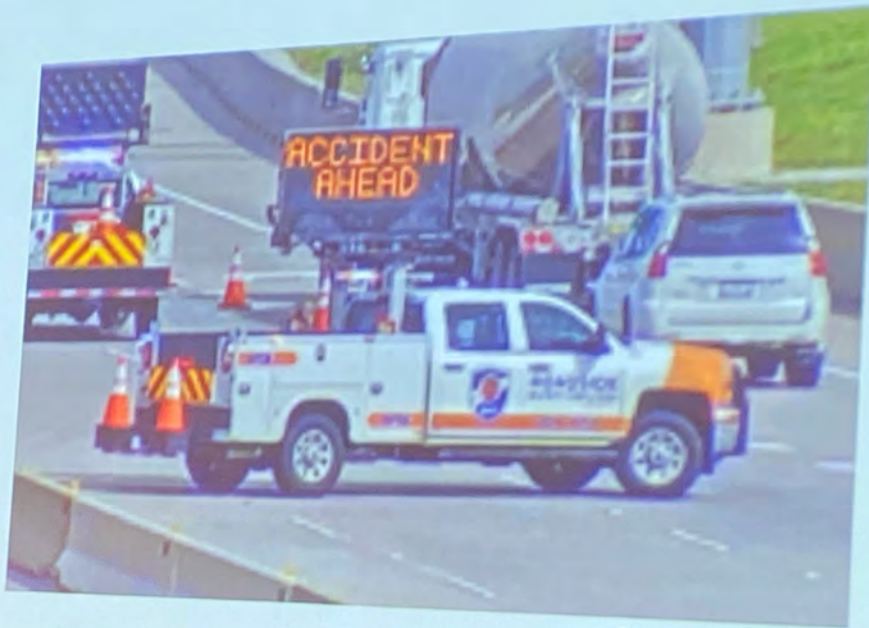
The power of coordination, co-operation and collaboration:

- Police
- Ambulance service
- Fire department
- Recovery/breakdown
- Road authorities
- Transportation sector
- Insurance sector
- Emergency call centres



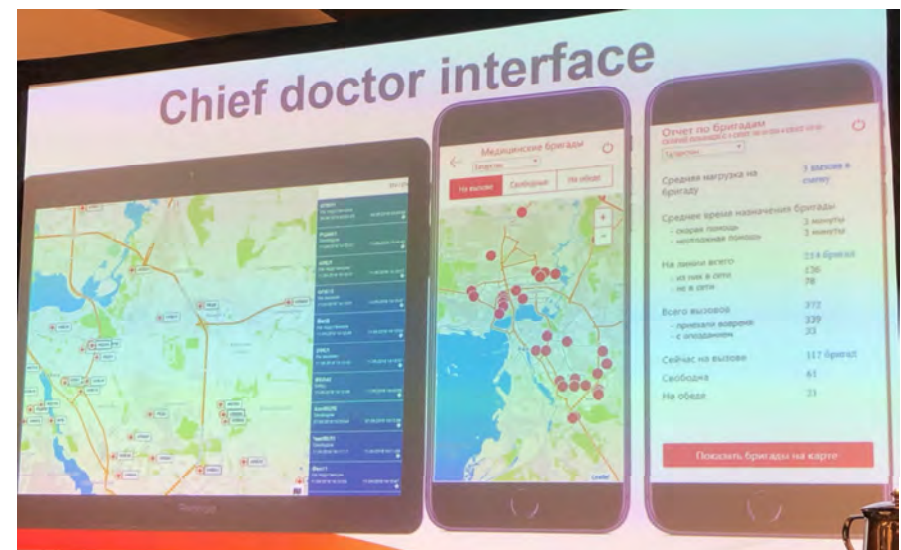
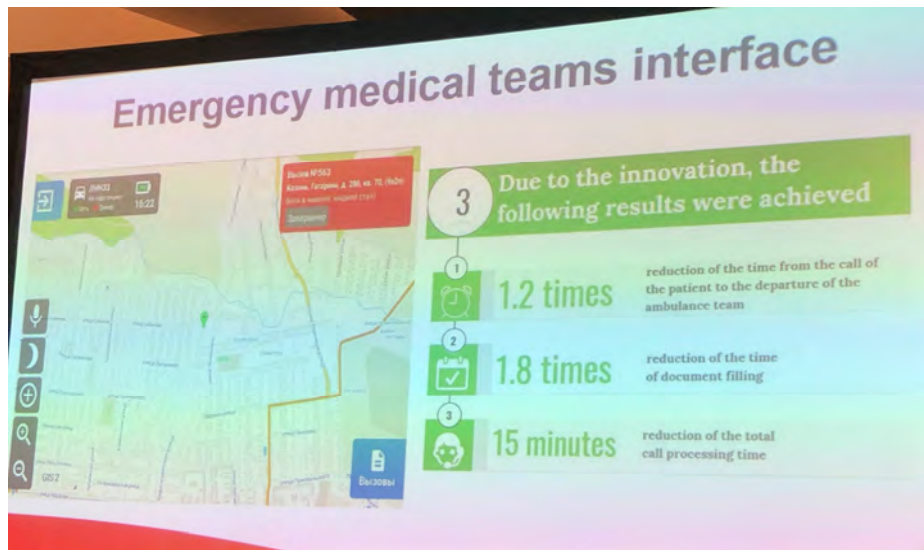
# Sustaining Smart City Safety and Mobility Through Traffic Incident Management (SIS 24)

## North Texas Tollway Authority – Swivel DMS



# ITS for Emergencies (TS 68)

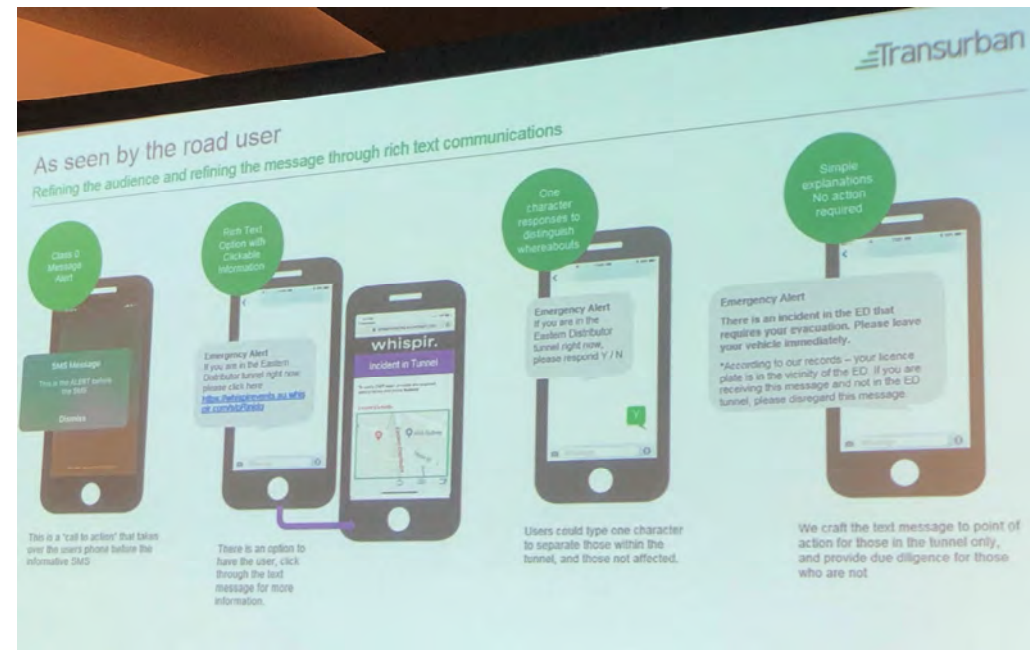
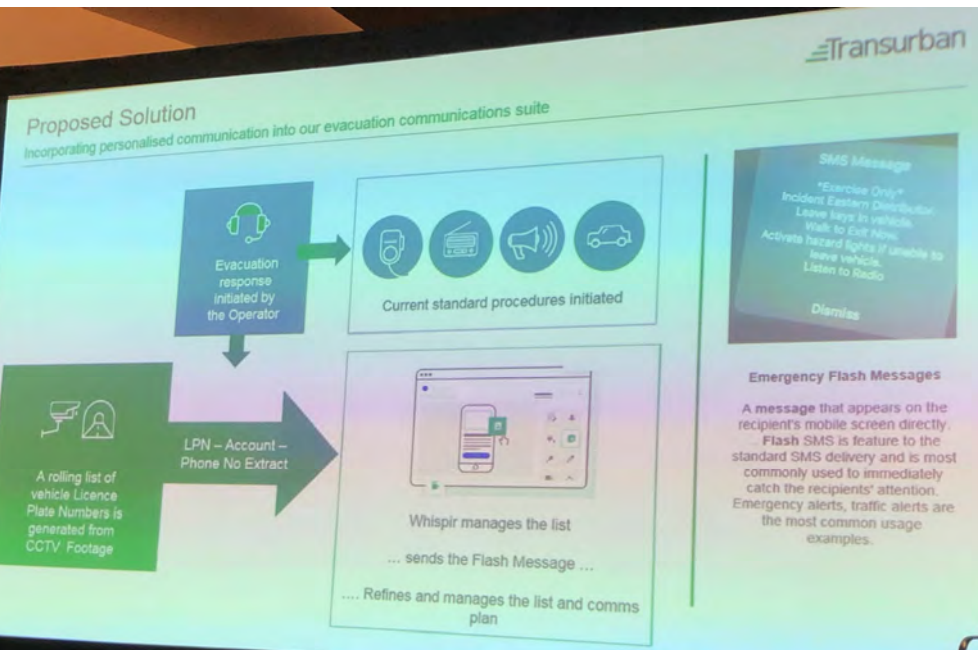
Republic of Tatarstan, Russia: Integration of GLONASS data with “112” (Russia’s 911) for enhanced medical response





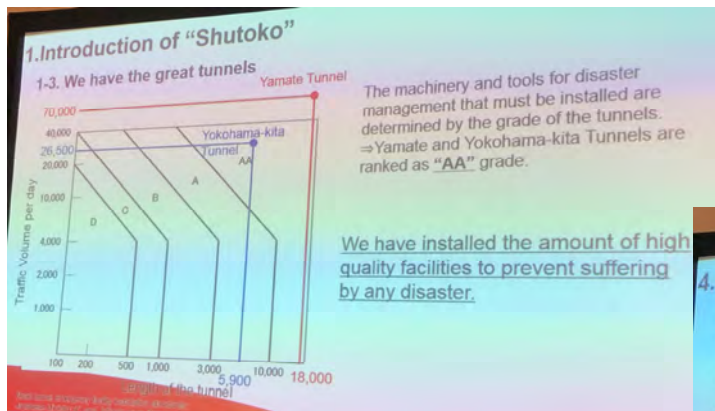
# ITS for Emergencies (TS 68)

Australia: Improving tunnel evacuation outcomes with targeted flash (text) messages



# ITS for Emergencies (TS 68)

Shutoko Expressway, Tokyo, Japan: An incident every 11 minutes!  
 Managing tunnel disasters. Tunnel “grades”



4. Our efforts

2. Handling

e) Secure the traffic  
 Air jacks (for where crane are unavailable.)  
 These can quickly recover the position of a rollover vehicle

4. Our efforts

2. Handling

b) Stop entering  
 Patrol member riding motorcycles

Reaches the incident point ASAP  
 → motorcycles can slip through in the traffic jams

# ITS for Emergencies (TS 68)

Singapore LTA: Synergizing Project Safety Review (similar to independent audit) and use of ITS for Managing Road Tunnel Fires

## Standard Operating Procedures for Handling a Vehicular Fire

### Tunnel Closure and Emergency Evacuation

- Variable Message Signs will advise motorists on the recommended course of actions
- Drive out of tunnel via the nearest exit
- If unable, stop engine and leave on foot via emergency exit (marked with strobe light)
- Refrain from passing Lane Use Signs marked with red crosses
- Refrain from entering tunnel

Traffic Plan for a Fire Scenario at Northbound KPE

## Standard Operating Procedures for Handling a Vehicular Fire

### Roles of Ground Responders

- Comprises the Vehicle Recovery Service (VRS) and Land Transport Marshals (LTM) fleet
- Arrive on site within 8 mins of dispatch
- Establish safety cordon
- Direct traffic at strategic points of ingress/egress
- Provide critical information to OCC
- Liaise with partner agencies
- Facilitate SCDF arrival from the non-incident bound
- Remove burnt vehicle

The Land Transport Authority's VRS and LTM Fleet

# ITS for Emergencies (TS 68)

Singapore LTA: Traffic Priority System (using DSRC) for Emergency Vehicles at Traffic Junctions.

## How TPS Works



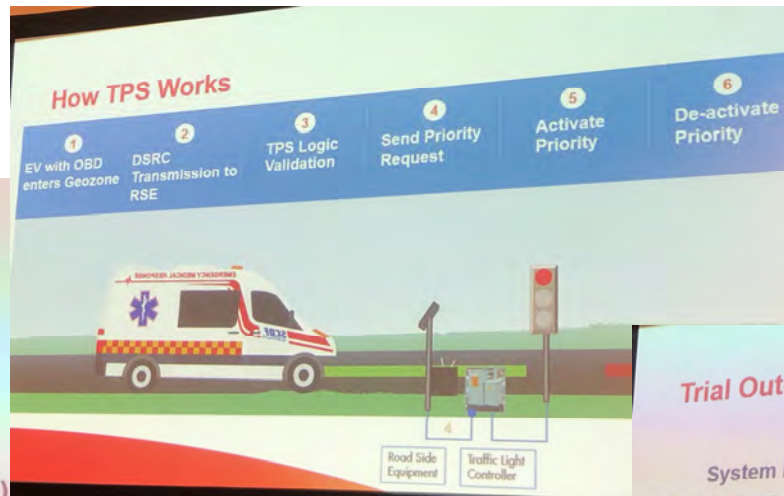
### On-Board Device (OBD)

OBD transmits info such as OBD ID, speed, position, heading and request for priority



### Road-side Equipment (RSE)

- Logic Controller and 5.9GHz DSRC radio & antenna (Omni-directional)
- Hardwire interfaced to Traffic Light Controller (TLC)



## Trial Outcome

### System Performance

99% Junction Priority Receive Rate

95% Traffic Light Activation Rate

### Benefit to EV

30% Approximate travel time savings

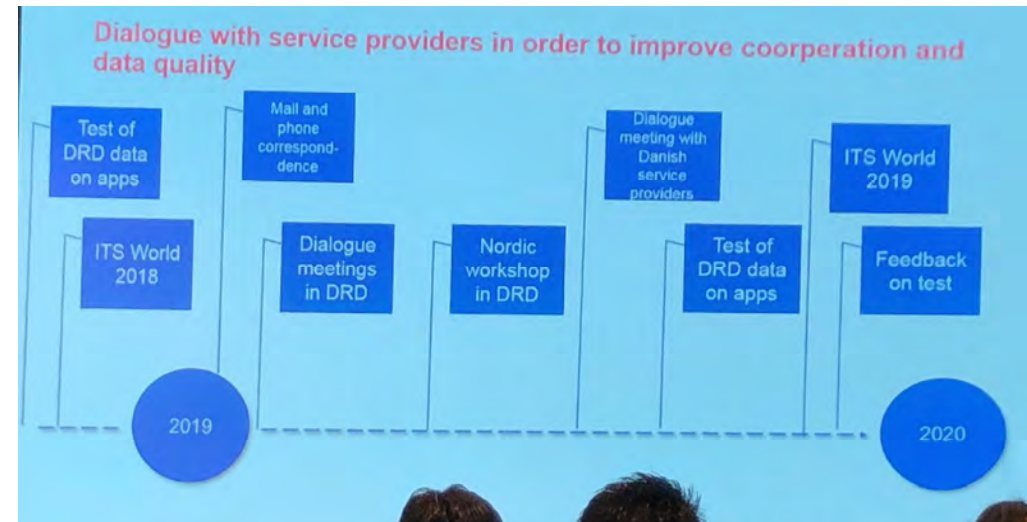
### Impact to Traffic

1 additional traffic light cycle Motorist to clear junction

15mins Approximate traffic recovery time

# Other Interesting Observations

Danish Road Directorate: Abandoned traffic information apps. Instead focusing on generating and providing extremely high-quality data to private-sector service providers (“who do it better”).



## Other Interesting Observations (and things heard/read) – 5G

- Jovan Zagajac, Technology Manager, Ford: “5G is like a mythical creature that does not exist”
- John Hibbard, GDOT: “Density of 5G infrastructure is unlike anything we have ever seen. Not likely to show up in a small 1000 population city.”
- Tami Erwin, Verizon: “5G isn’t just another G or a sequel to 4G...5G is so powerful that the best way to think about it is as a wholly new technology” (Mobile World Congress Los Angeles 2019)

# Conclusion

- Developed nations face very similar challenges as we do here in the US
- There is lots we can learn from our international peers – The ITS WC is an excellent venue for this
- Rapidly advancing technology has and will continue to provide tools to maximize transportation safety and efficiency, but beware of “hype”
- GO VISIT SINGAPORE!

Steven J. Cyra



# Thank You!

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