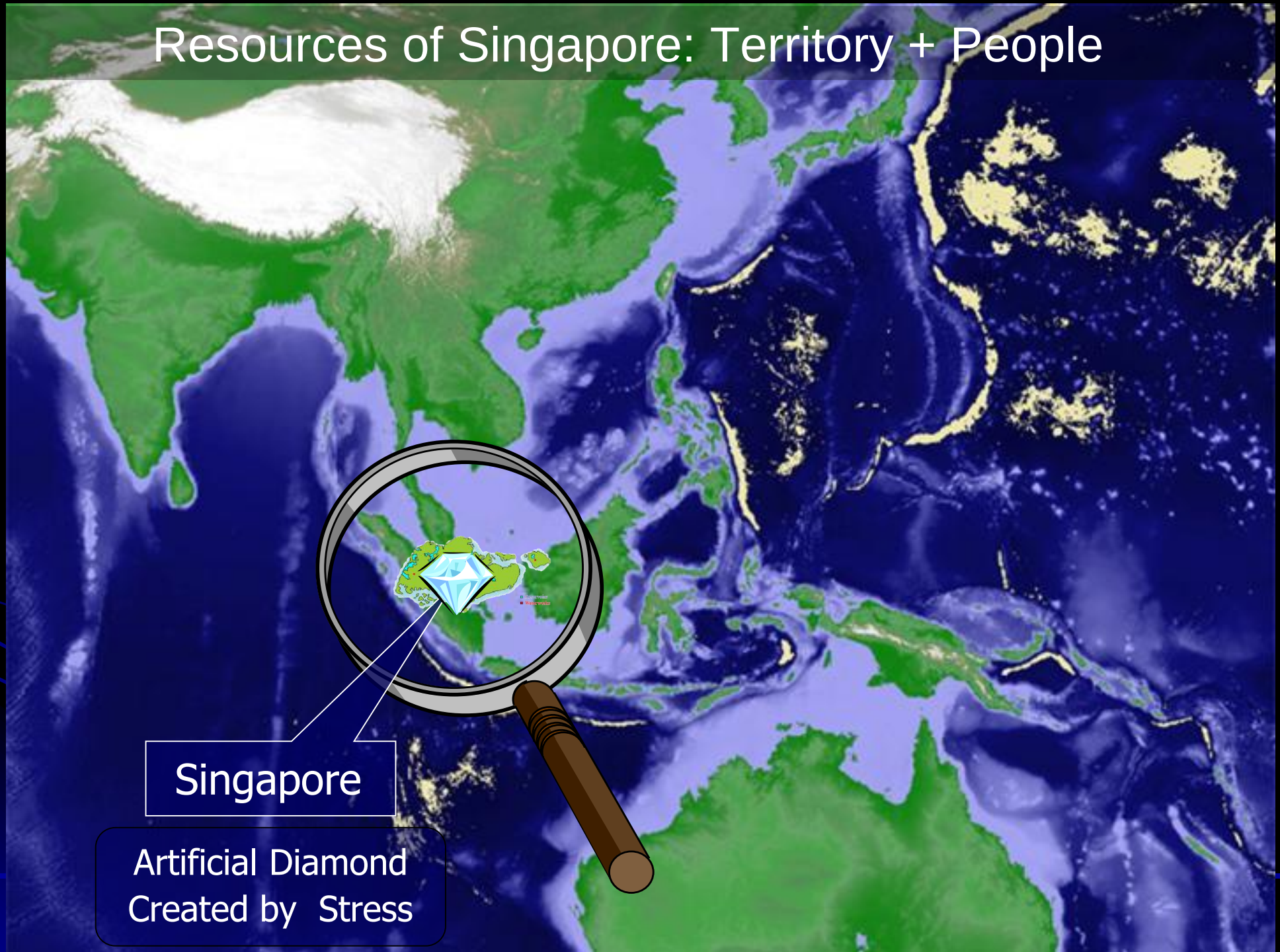
System Engineering of Mega Projects in Singapore

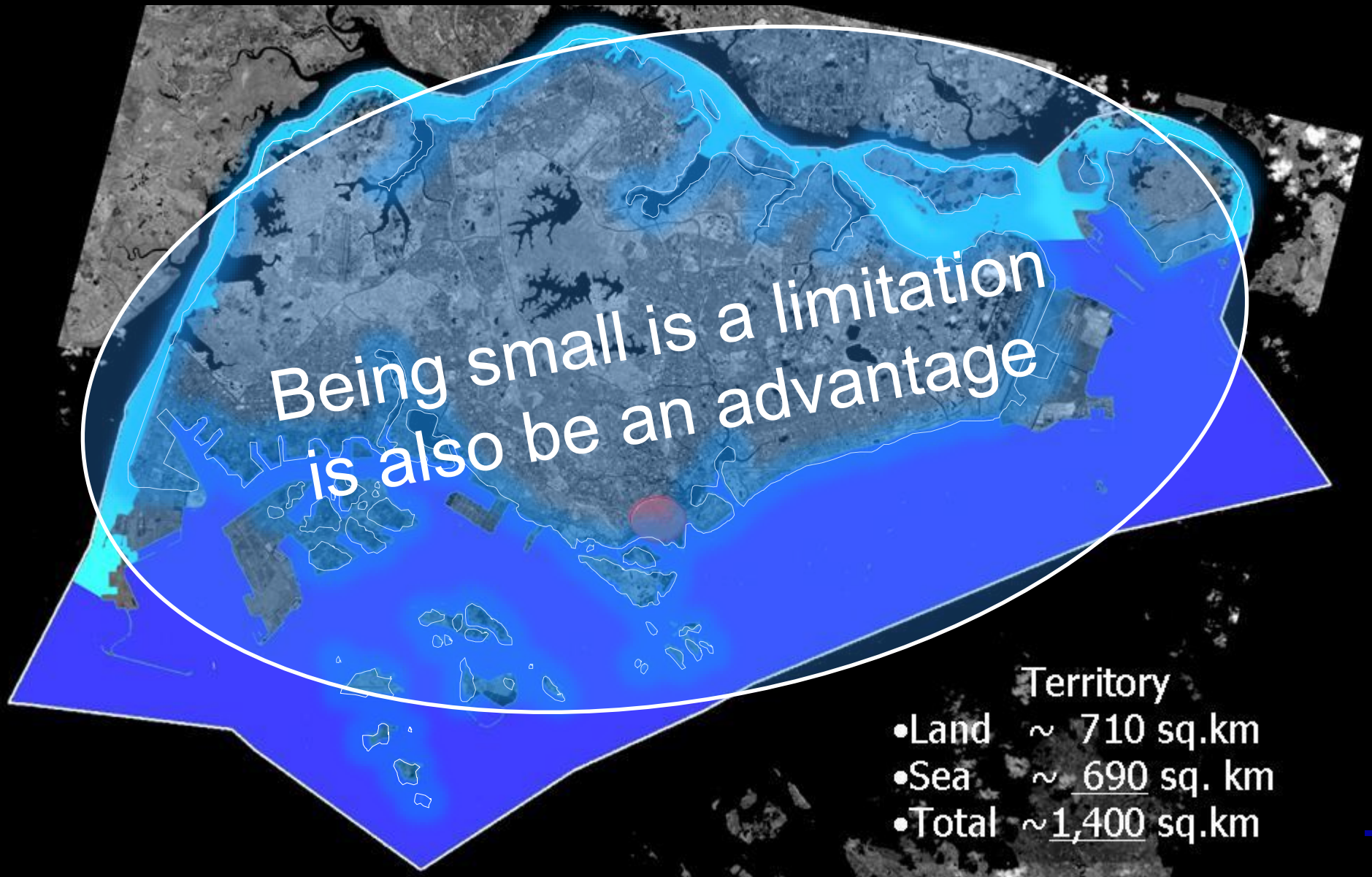
Dream & Do

- Territory
- Sea Transportation
- Air Transportation
- Land Transportation
- Concluding Remarks

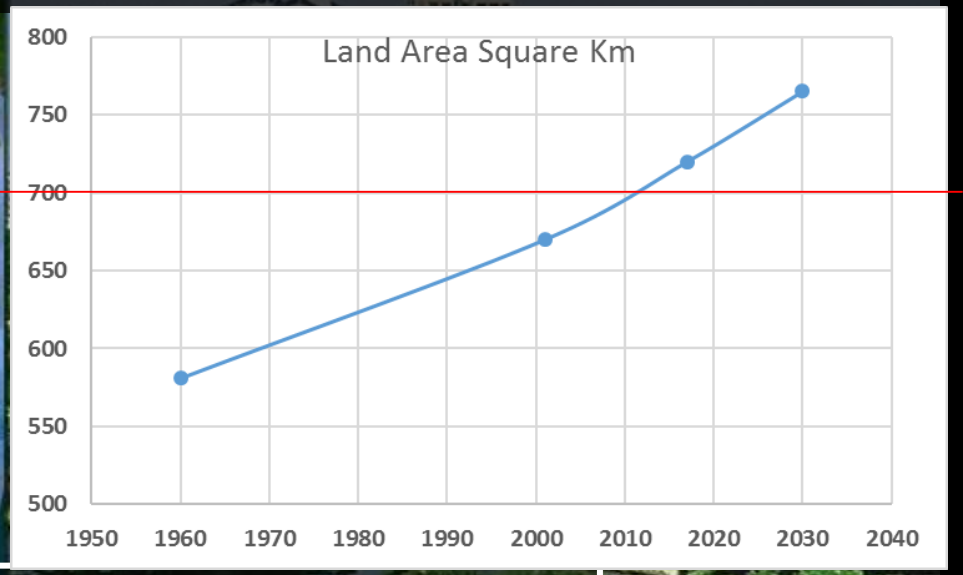
Resources of Singapore: Territory + People



We Have a Territory of 1,400 Square Kilometers



Scarcity of Land is a National Challenge

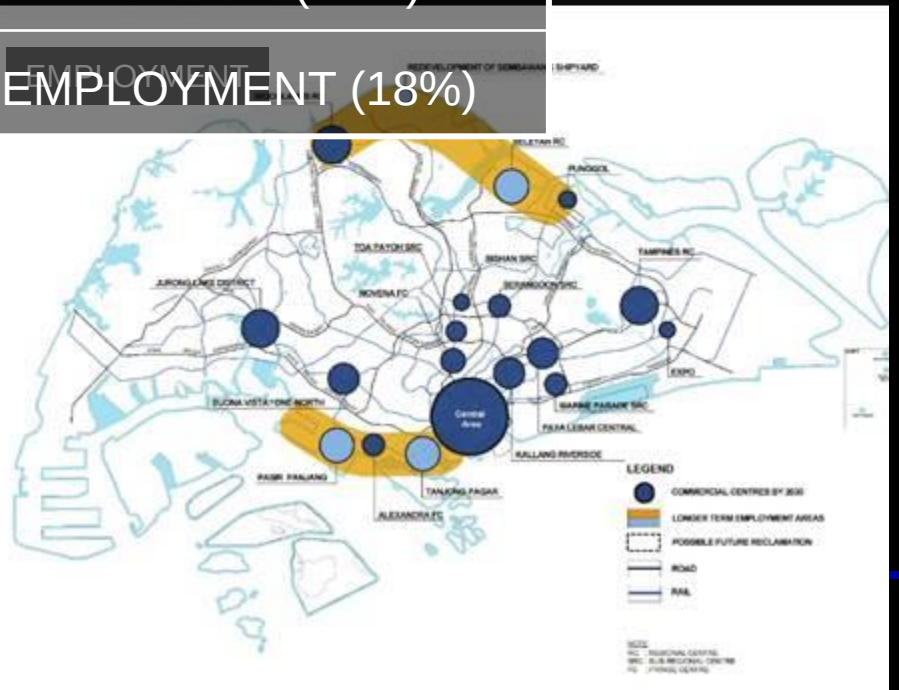


DEFENCE (19%)

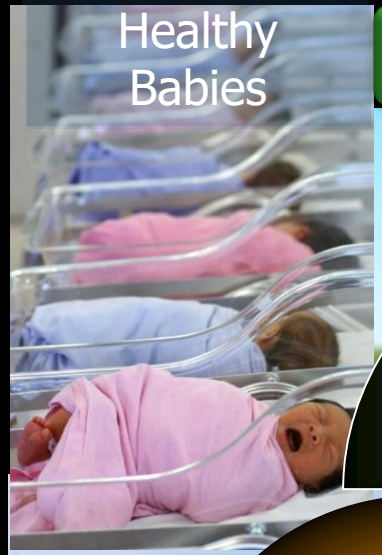
HOUSING (18%)

TRANSPORTATION (12%)

EMPLOYMENT (18%)



Aspirations for Our Green, Healthy and Smart Nation

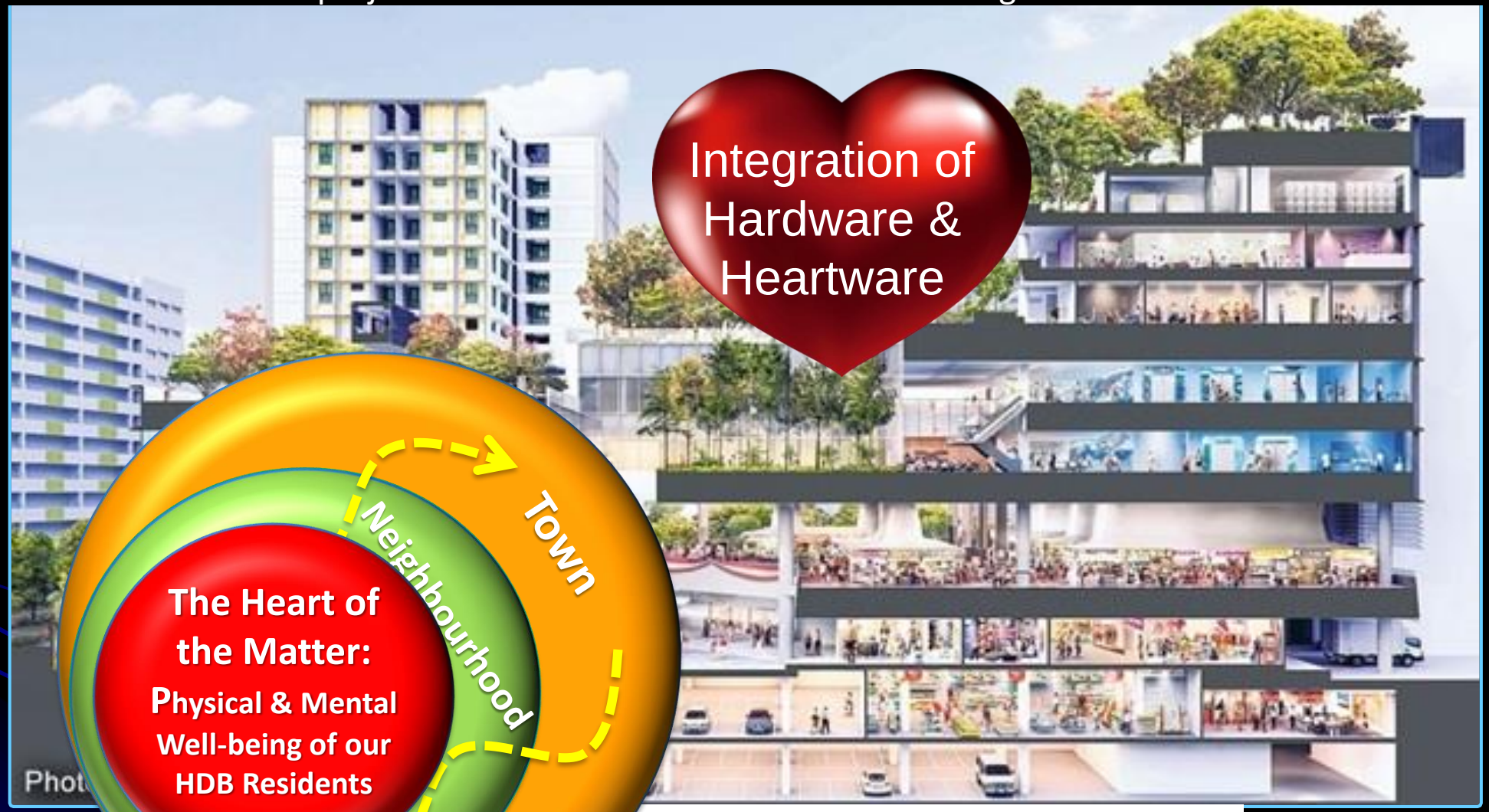


WEALTH

HEALTH

Kampung Admirality: A Vertical Urban Village for All Ages! Integration of the Community, Health-care & the Environment

Beat 535 projects from 57 countries to win the “Building of the Year” 2018



HOUSING & DEVELOPMENT BOARD

Singapore is a Maritime Nation
Maritime industry contributes 7% of GDP & employs > 170,000 people

- 130,000 ships call at Port of Singapore each year
- 600 ships anchored in our harbour at anyone time
- 1 ship arrives or departs the port every 3 minutes
- 1,000 ships moving in through our waterways each day

Relocation to Tuas Mega Port

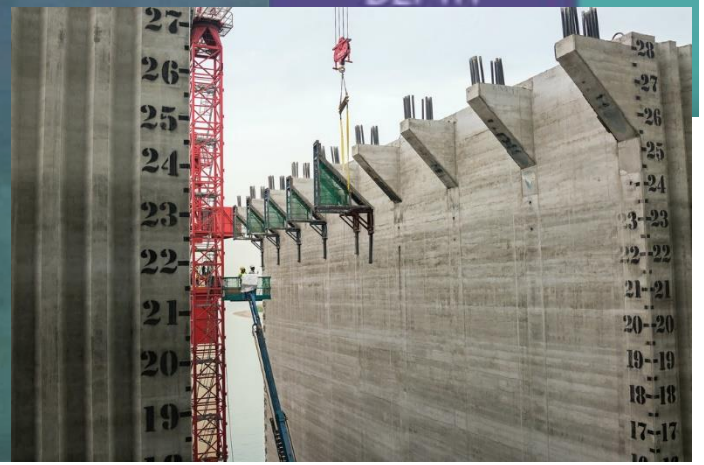
Although City Terminals' lease expire in 2027, plans have started to transfer activities to Pasir Panjang Terminals since last year. Meanwhile further consolidation will be made to Tuas Port when the mega Port begins operations in 2027

Phase 1 Tuas Mega Port Development

222 CAISSONS

8.6KM LONG WHARF STRUCTURE

−23m CD DREDGING DEPTH



7th Dec 2018

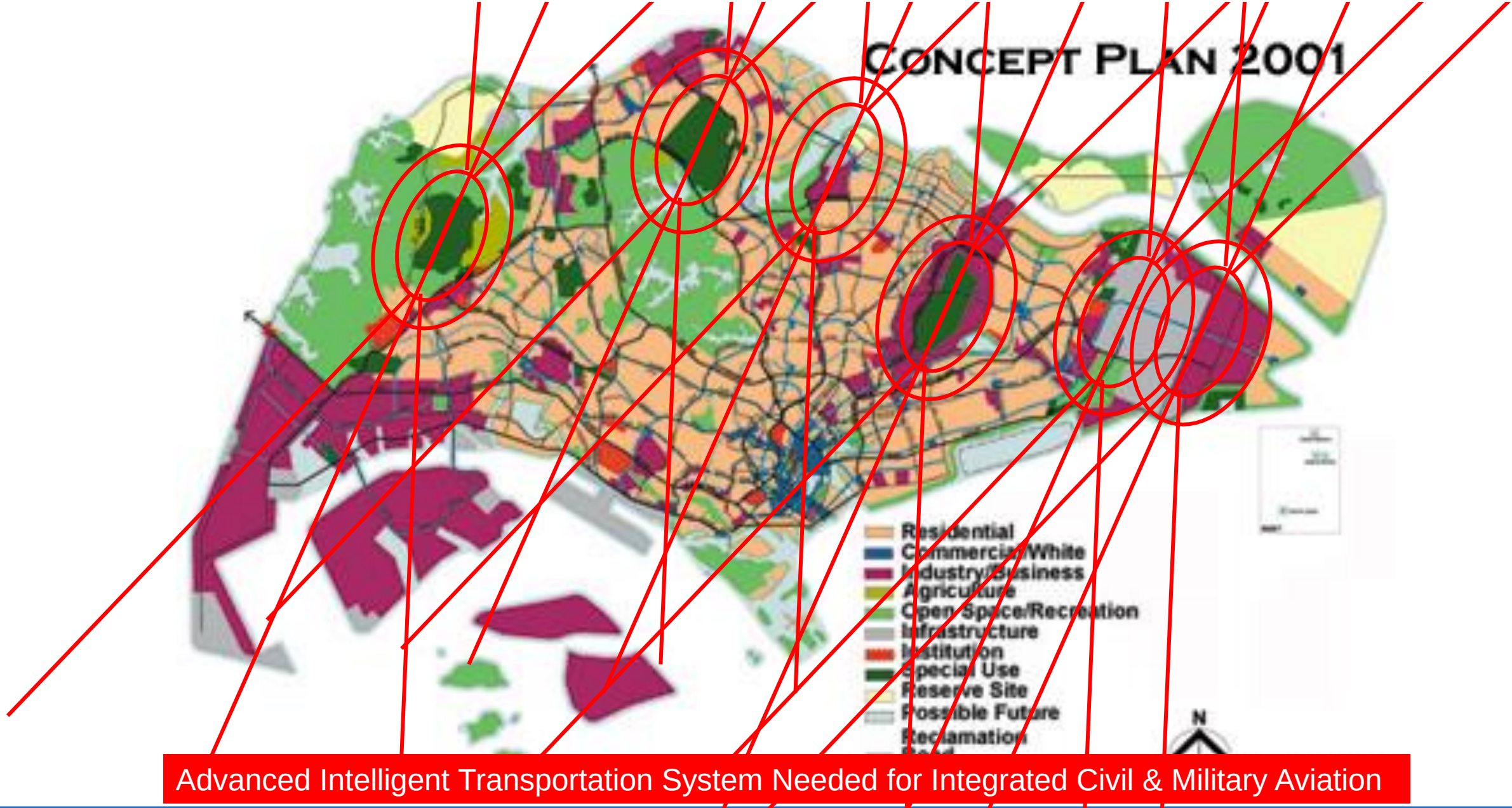
Singapore Industry in Aerospace began in 1972 with SIA operating10 aircraft. SIA now operates 100

There Will be No SIA without an International Airport in Singapore

- Better food
- Free alcoholic drinks
- Free headsets for movies
- Very high standards for operations and maintenance
- SIA Girl

JYM Pillay
Former 2PS MINDEF
Founding Chairman
SIA

Recover Land Development Potential Downtown and East with Relocation of Paya Lebar Air Base to Changi



Advanced Intelligent Transportation System Needed for Integrated Civil & Military Aviation

Changi Airport Passenger Capacity

- T1: 24 m passengers/year
- T2: 23 m passengers/year
- T3: 22 m passengers/year
- T4: 16 m passengers/year
- Total: 85 m passengers/year

2017 Passengers = 62.2 million

- T5: 50 million passengers per year by 2030

Intensify Use of Changi Airport Land With Jewel Mixed-use Development

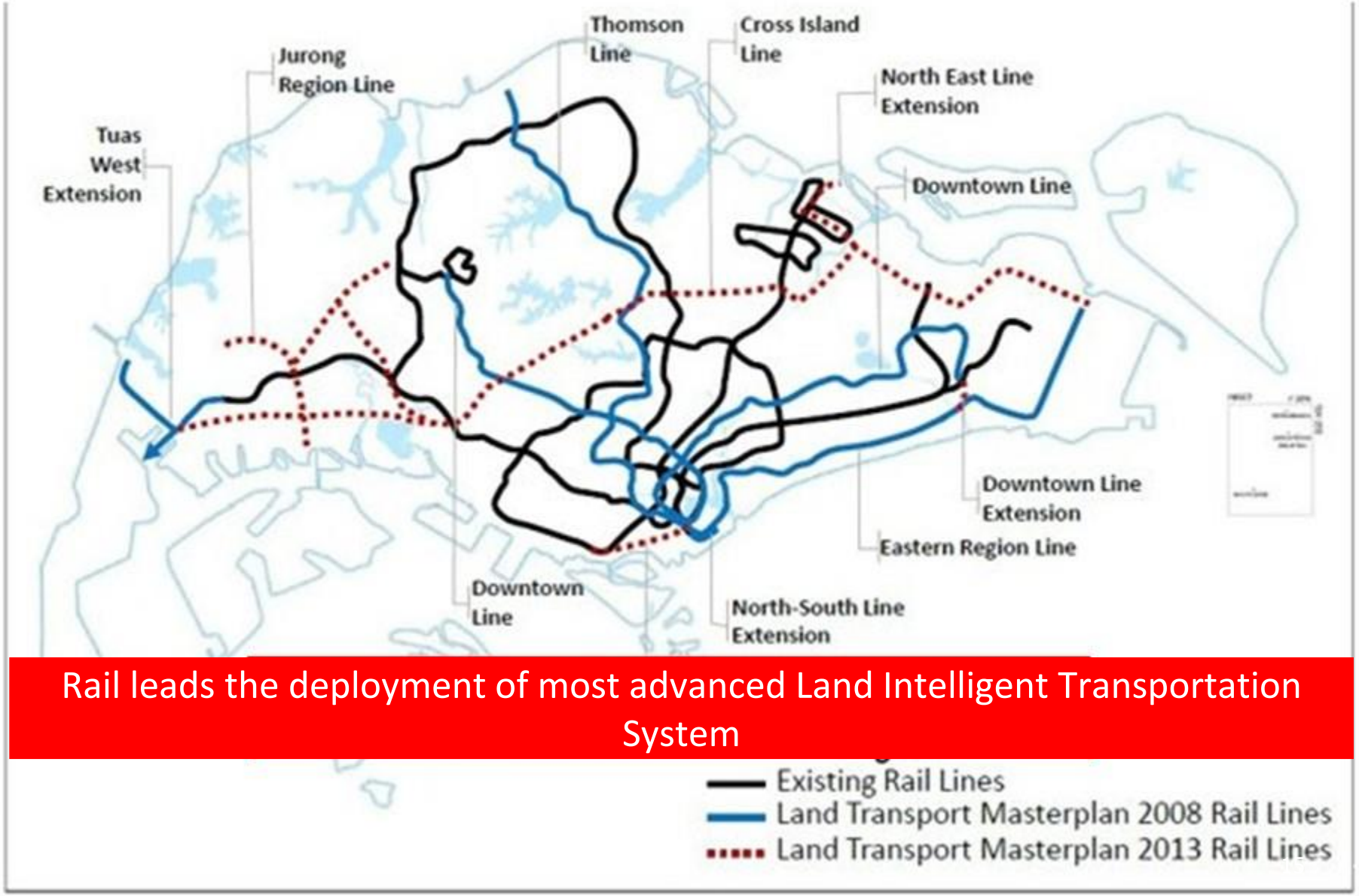
Work underway to operationalize Runway 3 for civilian co-use by 2020

T5 for 50 Million Passengers Per Year Under Planning

7th Dec 2018

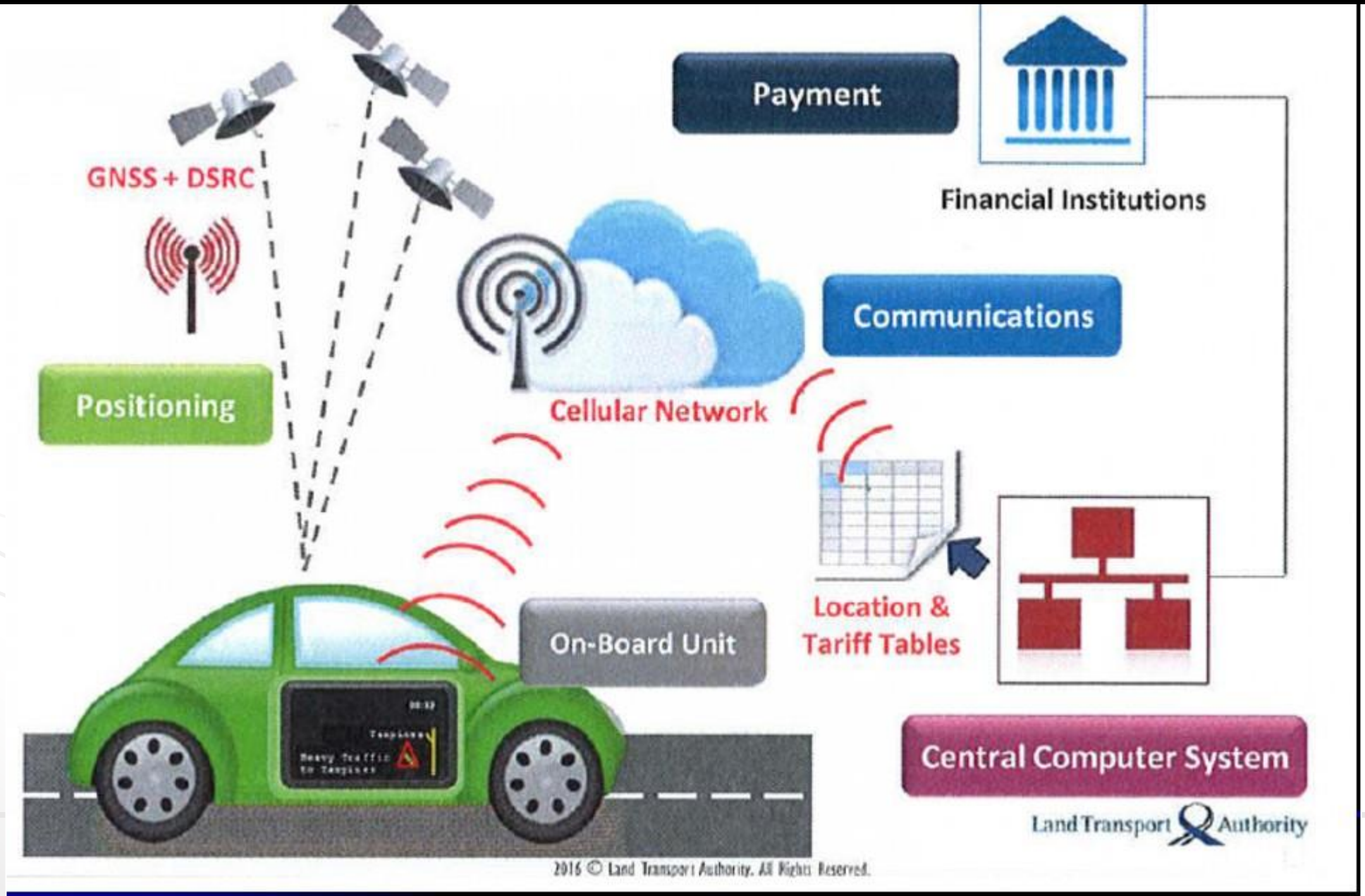
An Example of Whole of Government Approach to Plan and Implement Major Projects

The Backbone of Our People Moving System is Rail
Rail Will Double from 180km to 360km by 2030



Rail leads the deployment of most advanced Land Intelligent Transportation System

ERP 2 Affordable With Technological Progress Technological Progress



ERP2 LTA C3 (Communications, Cybernetics & Control) System

Ngien Hoon Ping
CE LTA

"ERP 2 Will Help to Maximize Utilization of Roads Solution Must be Trains and Integrated Cities"

Making **Sense** of our Roads

Networks are the Corner stone of the LTA C3 System

Integrating the Real-Time Transportation Needs of Individuals and Supply Will Provide Unprecedented Level of Service

Intelligent Transport Systems Enables DARS
(Dynamic Allocation of Resources & Services)
Matching Demand for and Supply of Public Transport

Comprehensive

Real-Time Situation

Picture of Demand &

Supply

Operation Centre

o Assessment

o Projection

o Planning

Action

Decision

Integrating the Real-Time Transportation Needs of Individuals and Supply Will Provide Unprecedented Level of Service

Global Challenge: Climate Change
Must Be Prepared for Extreme Weather & Sea Level rising

Global Warming

Challenges:

- Rising Temperature
- Extreme Weather
  - Drought
  - Flood
- Sea Level Rising

22nd Nov 2010 | Introduction | Nuclear Accidents | German Response | French Response

MSS reported that Singapore's continuous temperature records since 1948 show that the island has warmed. Surface air temperature has risen by an average of 0.25°C per decade between 1948 and today.

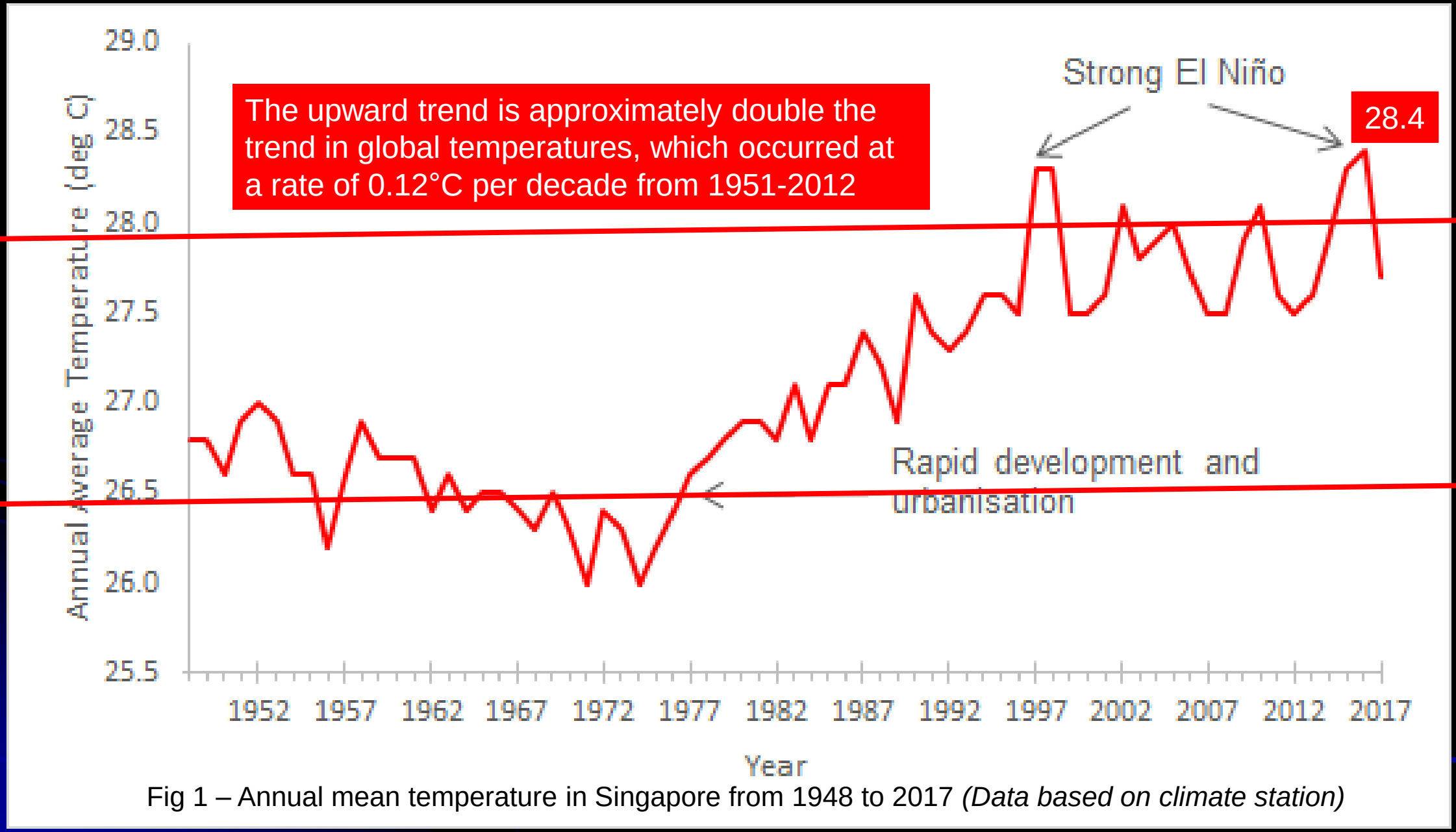
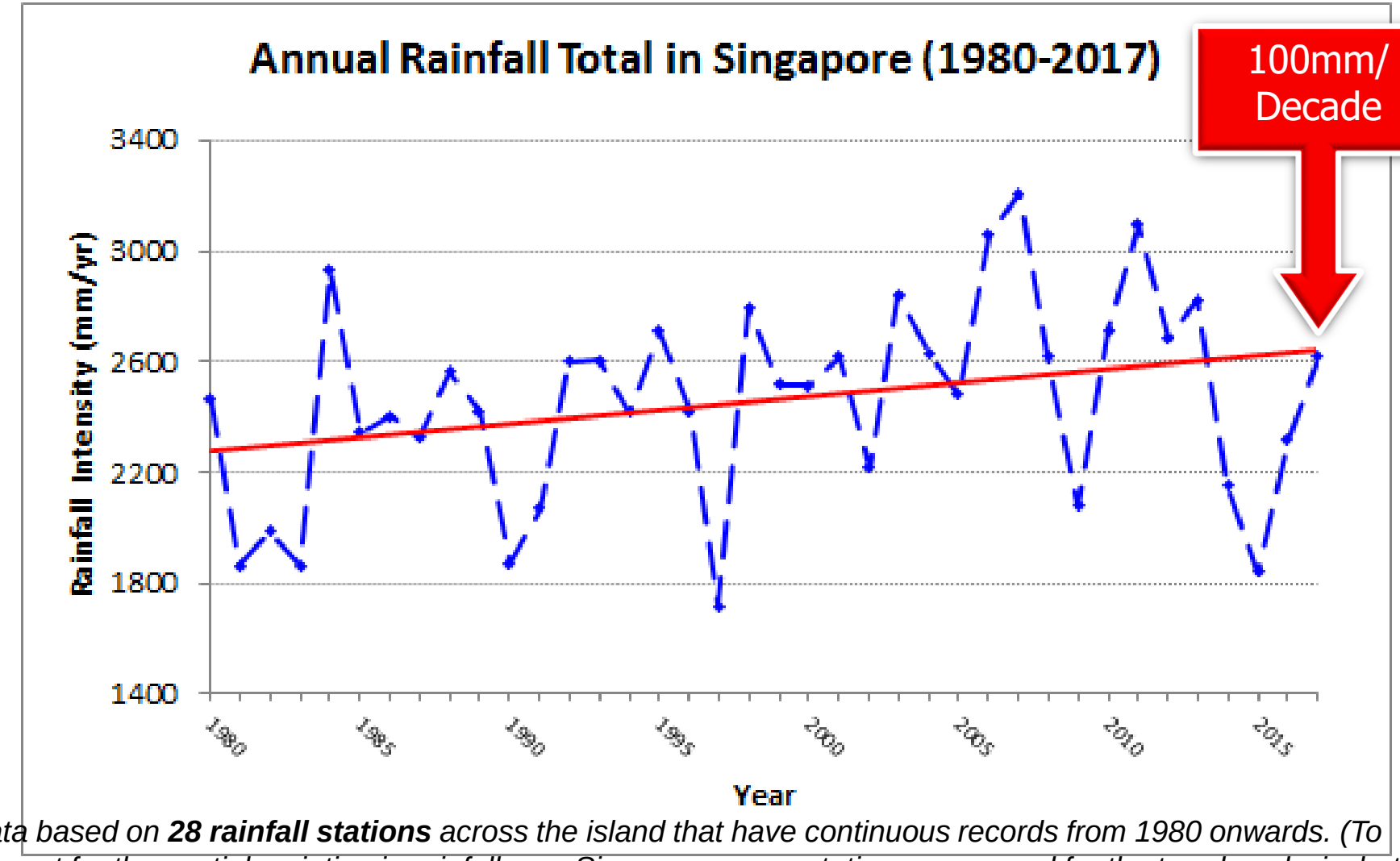


Fig 1 – Annual mean temperature in Singapore from 1948 to 2017 *(Data based on climate station)*

Meteorological Service Singapore

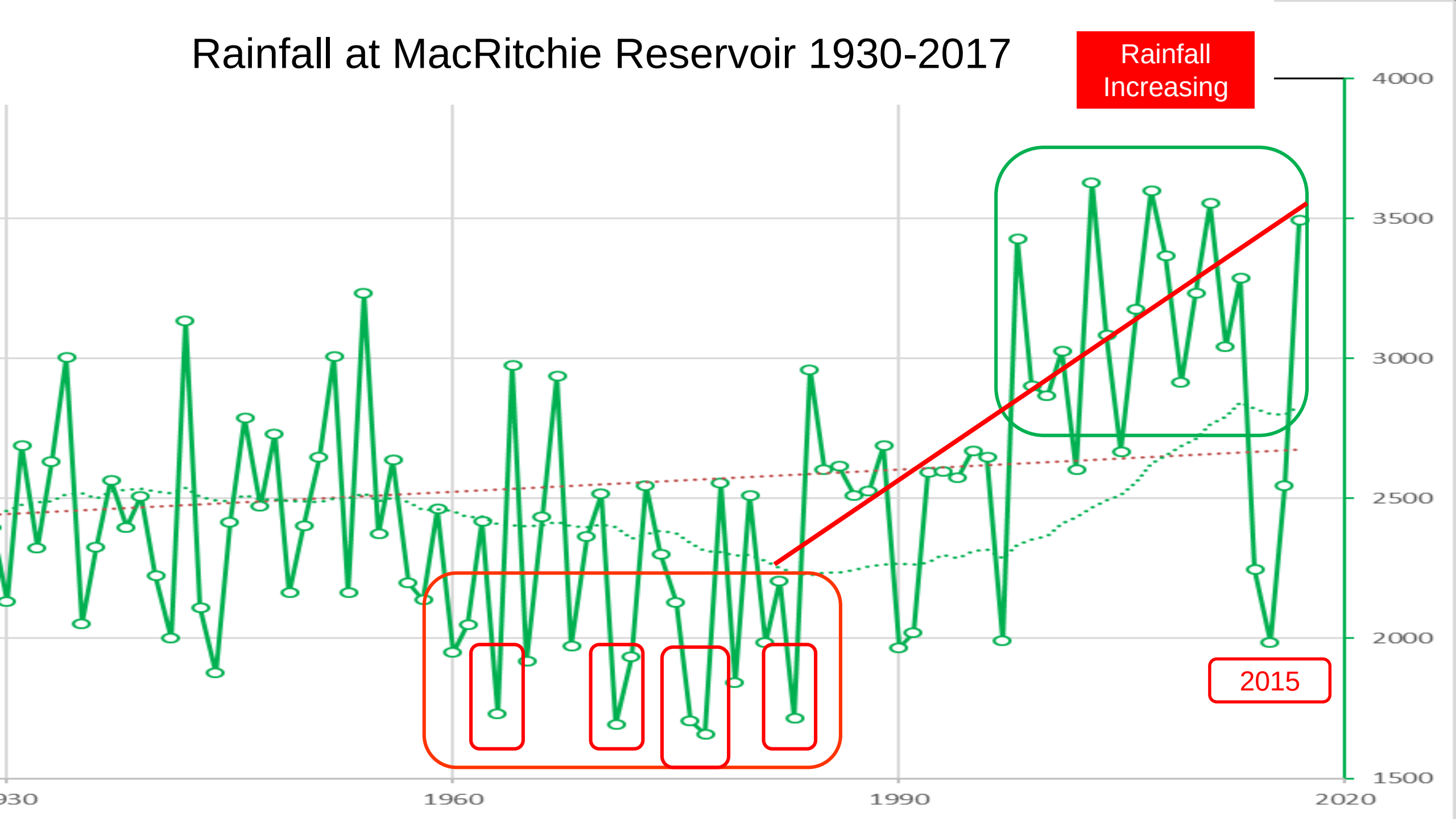
http://www.weather.gov.sg/climate-past-climate-trends/

Singapore's year-to-year rainfall is highly variable; however, on a longer term basis, average annual rainfall total for Singapore since 1980 has increased at an average rate of 100 mm per decade.

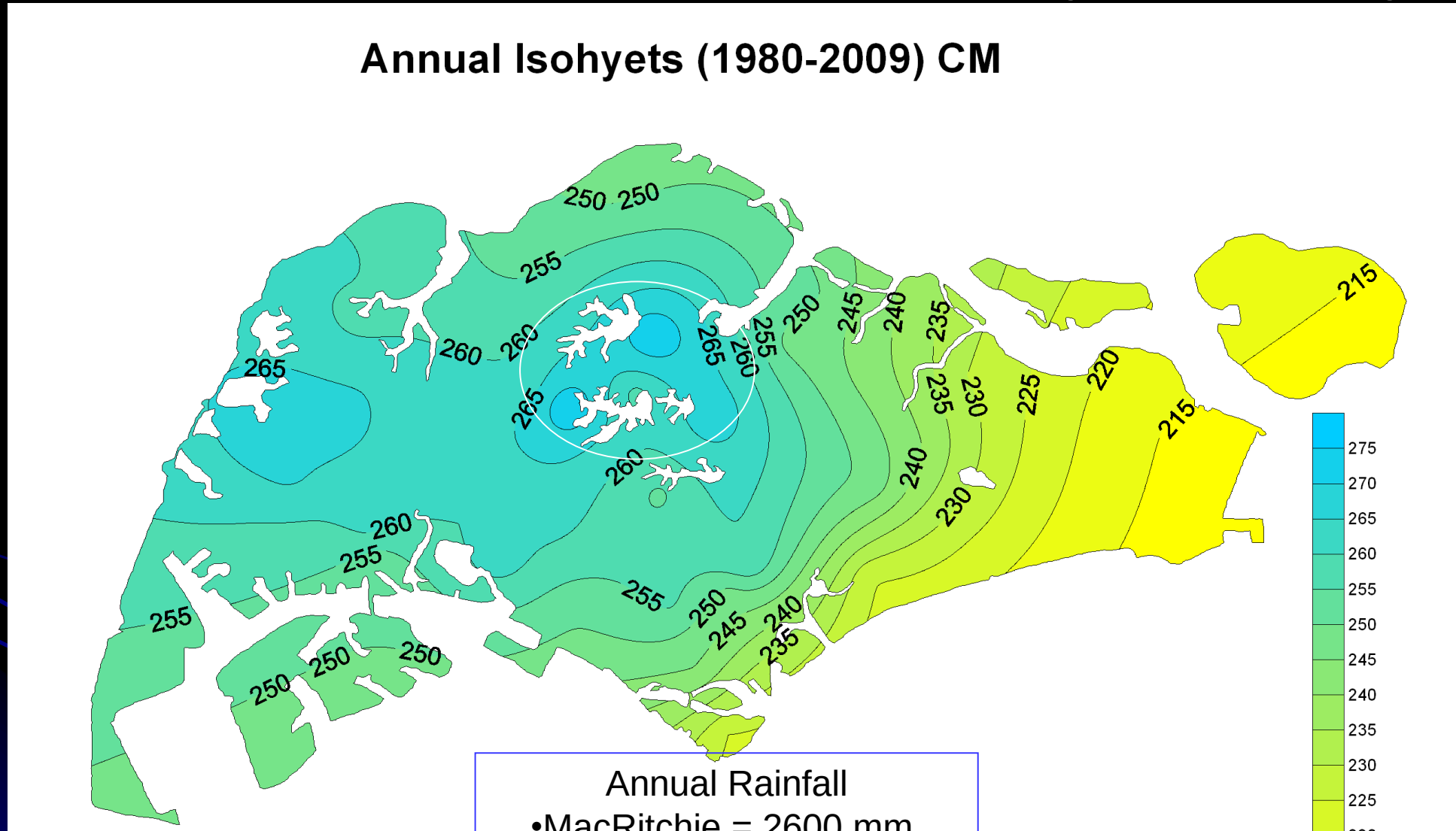


*Data based on **28 rainfall stations** across the island that have continuous records from 1980 onwards. (To account for the spatial variation in rainfall over Singapore, more stations were used for the trend analysis, but not all selected stations have records before 1980, resulting in the shorter period of available data.)*.

Rainfall at MacRitchie Reservoir 1930-2017



1980 -2009 Spatial Variation of Singapore Annual Rainfall
Annual Rainfall Over Central Catchment is 50 cm Higher Than Changi



Annual Rainfall
- MacRitchie = 2600 mm
- Changi = 2000 mm
- Difference = 600 mm ~ 30%

National Environment Agency
Our Environment - Sustain and Enjoy

integration of policy, science and technology in Large Scale Systems

Policy

Technology & Systems

Universities, Government Agencies & Industries

dt

3 Lessons from Dr Goh Keng Swee Minister of Interior & Defence 1965

"The only way to avoid failing is not to do anything. That will be the ultimate failure."

1. Dream & Do
2. Self Belief
   Beyond World Class
3. Determination

Thank you