

# HEALTHY CITY DESIGN 2019

## A FRAMEWORK FOR A HEALTHY NEIGHBOURHOOD/ PRECINCT



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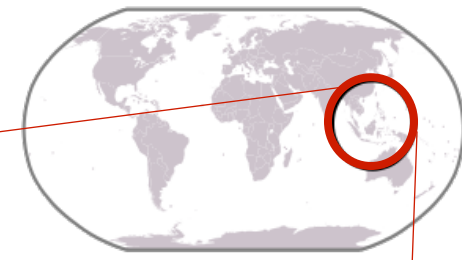
**MINISTRY OF HEALTH**  
SINGAPORE

Office for Healthcare Transformation

# Outline

- 1. Background of Singapore**
- 2. Introduction to the Healthy Precinct Project**
- 3. Healthy Precinct Framework**
- 4. Applying the Healthy Precinct Framework**

# About Singapore



**Size:** 721.5km<sup>2</sup>

**Total Population:** 5.703mil

**Population Density:** 7,866 per Km<sup>2</sup>

## Demography:

- Multi racial mix of Chinese, Malay, Indian, Others
- Rapidly ageing population

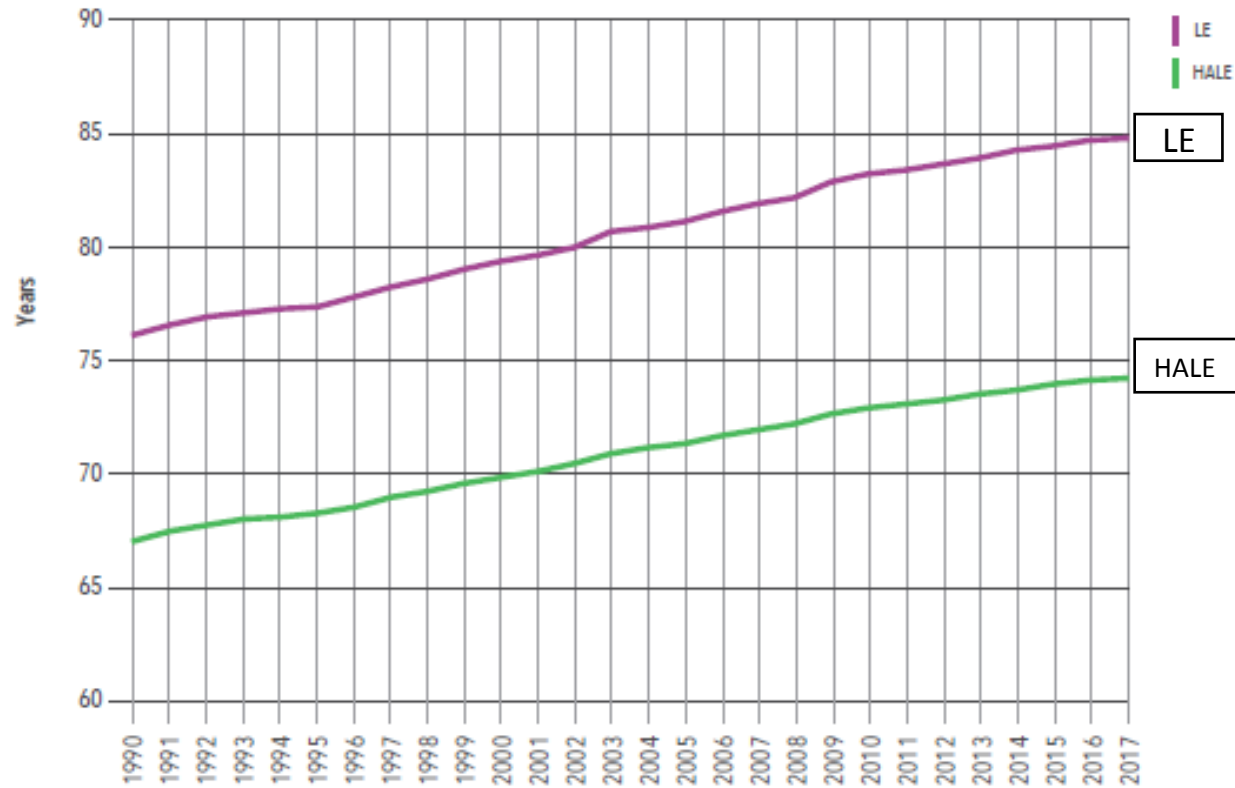
**Housing distribution:** 80% live in public housing



# Longer but not necessarily Healthier lives

FIGURE 1

Life expectancy and healthy life expectancy at birth in Singapore, both sexes, 1990–2017



*The Burden of Disease in Singapore, 1990-2017 (BOD Report, 2017)*

❑ Singaporeans are living longer

❑ Between 1990 and 2017, life expectancy at birth in Singapore rose 8.7 years, to **84.8 years**. Healthy life expectancy at birth, however, rose only 7.2 years, to **74.2 years**.

❑ More years spent in poor health

# The Healthy Precinct Project

## Why Precincts?

1. A precinct-based approach can help **focus the collective efforts** of government agencies and the community on a smaller area with a targeted population
2. Engender a sufficiently **high level of community engagement and partnership** that would make interventions more sustainable
3. Testing evidence-informed health promotion priorities with the aim to **scale** efforts



*Public Housing Blocks in Singapore*

# PILOT SITE

**Area:** ~9.5km<sup>2</sup>

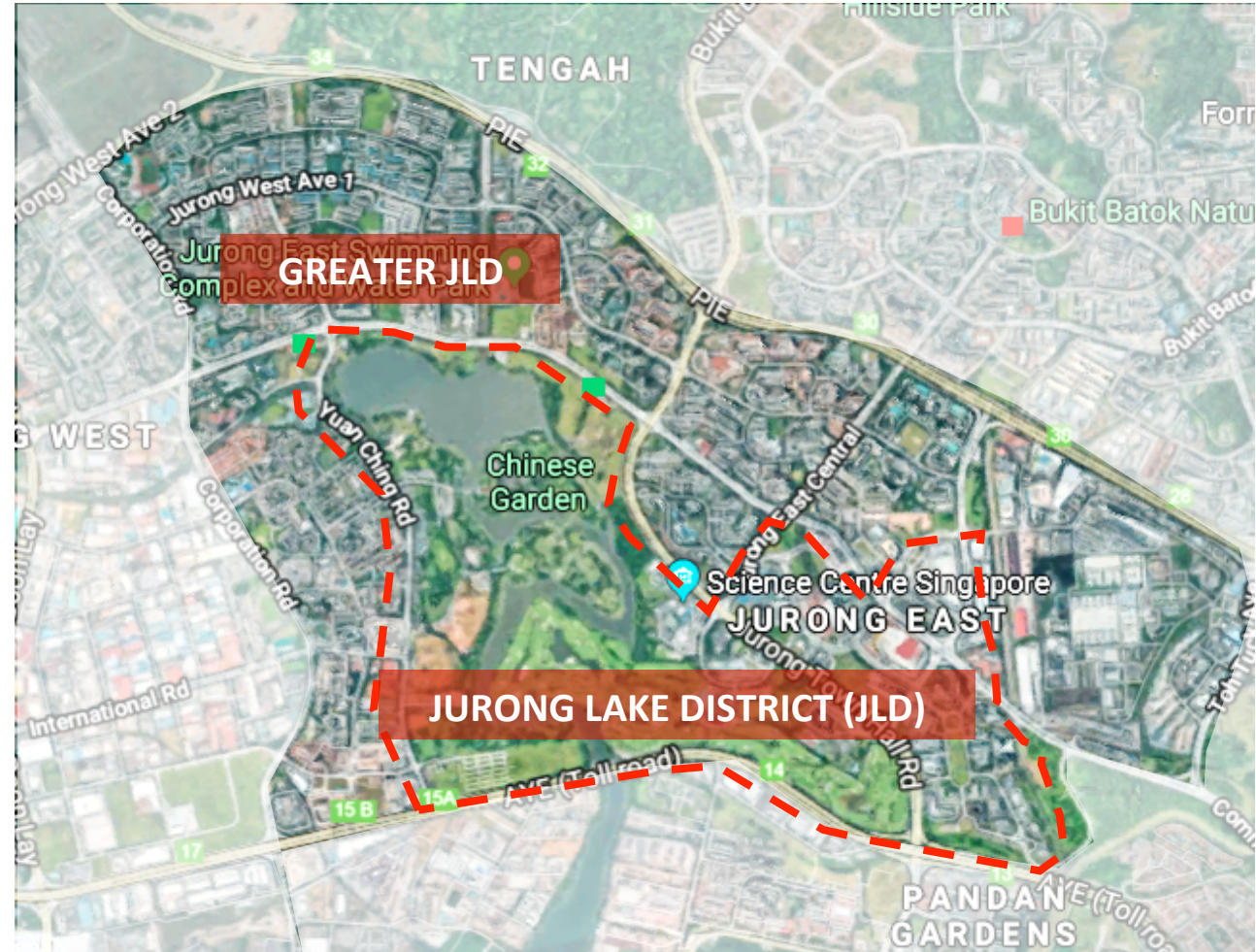
**Total Population:** ~250,000

## Demography:

- Mature estate with higher proportion of elderly
- Large working population

## Landuse description:

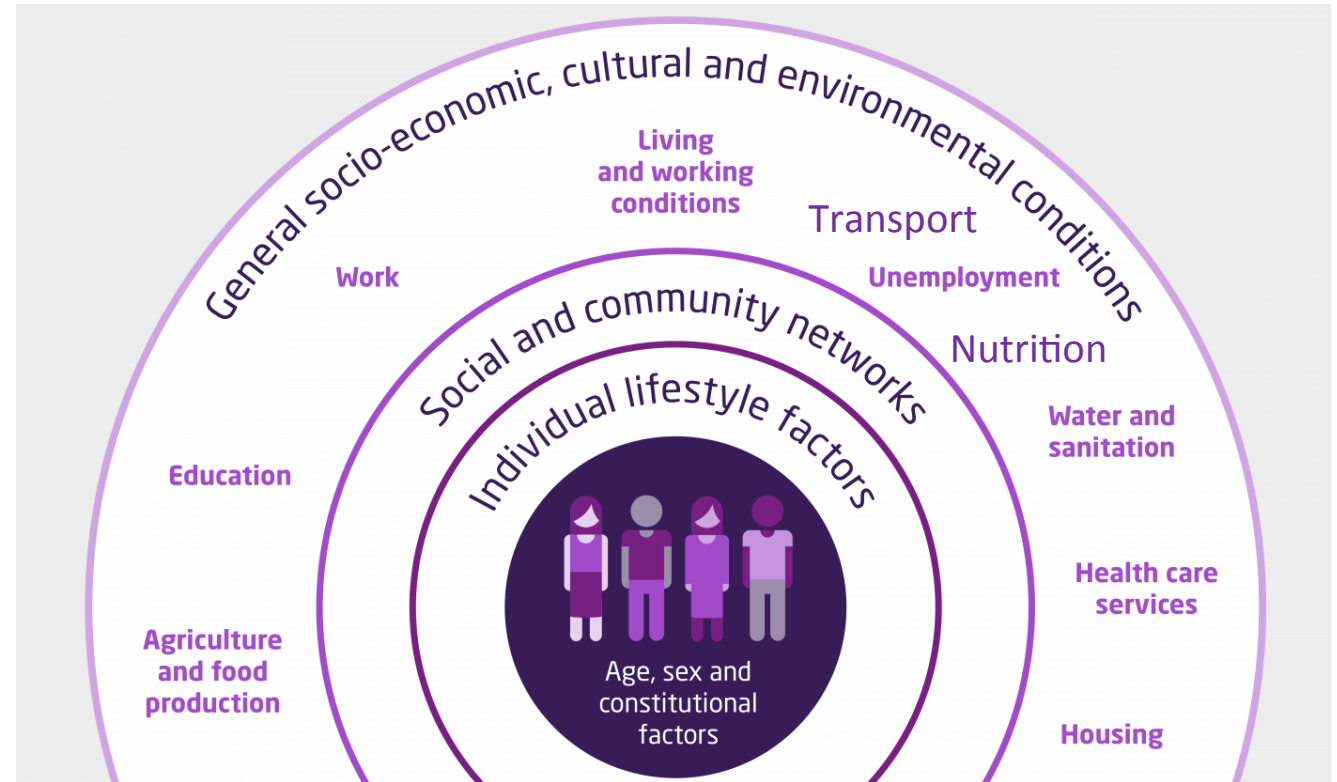
- **Jurong Lake District (JLD):** To be redeveloped into offices, retail, residential and recreation (completed after 2040)
- **Greater JLD Region :** High-rise, high-density residential area



# Using A Health Determinant Lens

*‘The range of behavioural, biological, socio-economic and environmental **factors** that **influence** the **health status** of individuals or populations.’*

–Adapted from the World Health Organization 1998.



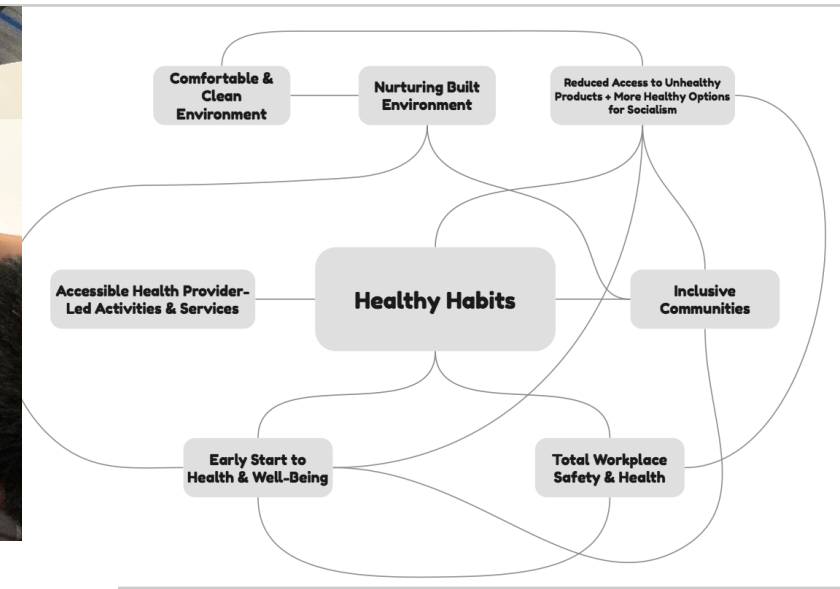
*Adapted from Dahlgren and Whitehead's (1993) model of determinants of health, cited in the King's Fund (2013).*

# DERIVING A FRAMEWORK

- **Process:**
  - Curated and prioritized key influences from a list of 30 Socio-environmental Determinants with an initial group of agencies through a workshop
- **Outcome:**
  - Prioritised Determinants & First cut of the Healthy Precinct Framework



Q5. What do you think are the key health pain points at a neighbourhood scale?

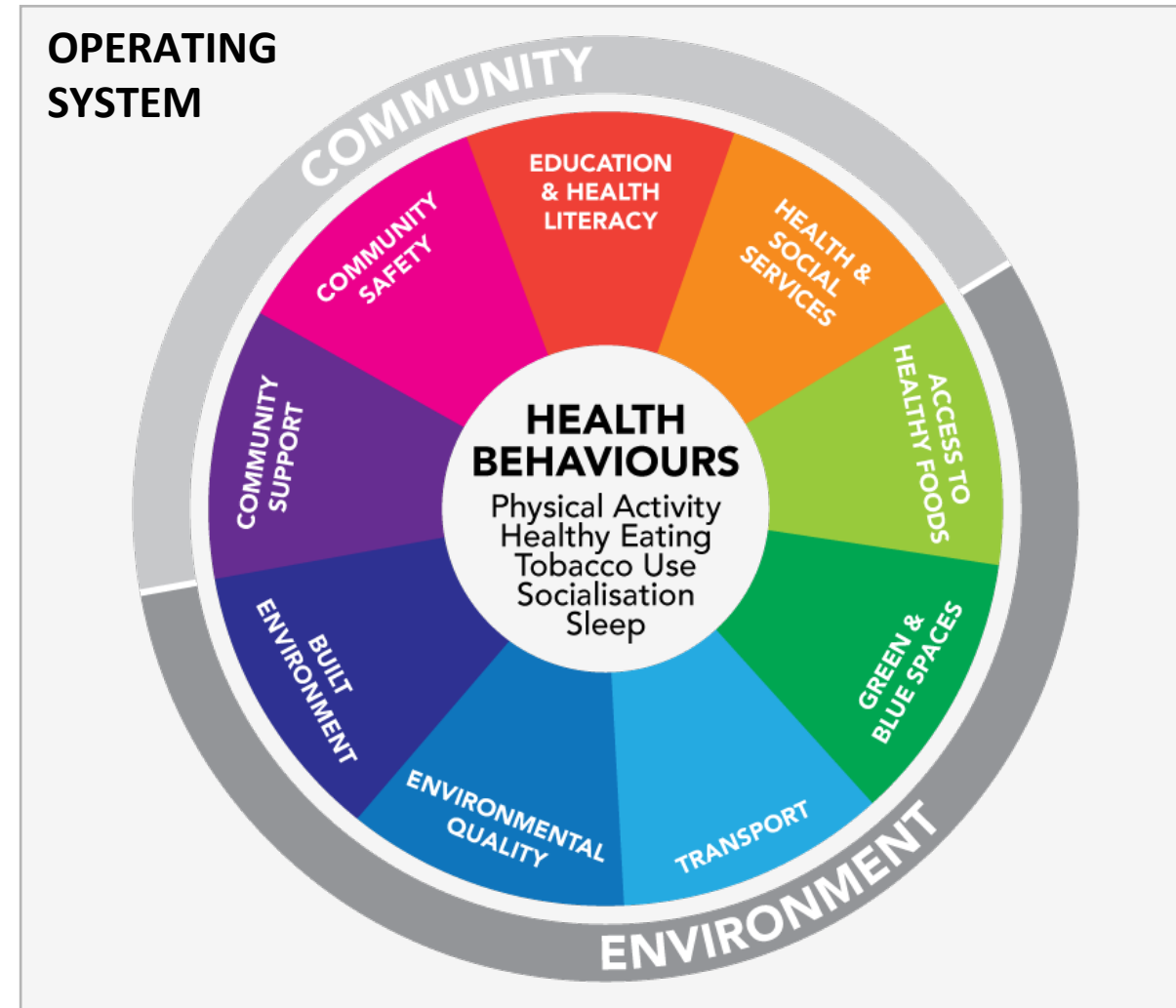


Discussions and photos from 'Defining a Healthy Precinct' Workshop, April 2019



# HEALTHY PRECINCT FRAMEWORK

- **Description:**
  - Behaviour-driven framework that hypothesizes relationships between 9 **socio-environmental determinants** of health behaviours and 5 key **health behaviours**
- **Purpose:**
  - Provides structure for synergistic participation between multiple agencies that impact health promotion at precinct level (*Health in All Policies*)



**MOHT HEALTHY PRECINCT FRAMEWORK**  
(to be refined further)

# DERIVING THE 5 BEHAVIOURS

- Physical Activity
- Healthy Eating
- Socialisation
- Sleep
- Tobacco Use

Leading risk factors contributing to DALYS, Singapore, both sexes, 1990-2017

2017 rank		% of total risk-attributable DALYs	total % change in risk-attributable DALYs 1990-2017
1	Dietary risks	10.1%	2.9%
2	Tobacco	7.9%	3.8%
3	High blood pressure	7.6%	6.5%
4	High blood sugar	7.0%	14.1%
5	Obesity and overweight	6.4%	141.0%
6	High cholesterol	4.2%	-4.1%
7	Occupational risks	4.0%	17.7%
8	Air pollution	3.4%	17.2%
9	Impaired kidney function	2.7%	32.3%
10	Child and maternal malnutrition	1.7%	-35.4%
11	Drug use	1.6%	88.6%
12	Alcohol use	1.2%	91.4%
13	Low physical activity	1.1%	9.1%

Leading causes of DALYS, Singapore, both sexes, 1990-2017

2017 rank		% of total DALYs	total % change in DALYs 1990-2017
1	Cardiovascular diseases	14.2%	11.7%
2	Cancers	13.3%	48.2%
3	Musculoskeletal disorders	12.6%	99.8%
4	Mental disorders	10.2%	70.9%
5	Neurological disorders	6.6%	104.6%

*The Burden of Disease in Singapore, 1990-2017 (BOD Report, 2017)*

Imperative to act on modifiable risk factors to reduce disease burden in the population

# PRELIMINARY BEHAVIOUR GOALS\*

*\*Goals are broad  
enough to be  
achievable for different  
socio-economic groups*



## PHYSICAL ACTIVITY

Increase no. of Singaporeans who:

- Achieve recommended steps/day
- Achieve recommended time spent performing moderate PA/week
- Reduce no. of hours spent sedentary



## HEALTHY EATING

Increase no. of Singaporeans who:

- Achieve recommended daily caloric intake
- Achieve recommended servings/food group
- Reduce unhealthy snacking



## SOCIALISATION

- Improved the quality and quantity of social relationships  
*(To be defined further)*



## SLEEP

- Achieving recommended no. of hours of sleep *(to be defined further)*



## TOBACCO USE

- Reduce the no. of Singaporeans who smoke
- Reduce the no. of cigarettes smoked/day per individual

# WHY THE 9 DETERMINANTS?

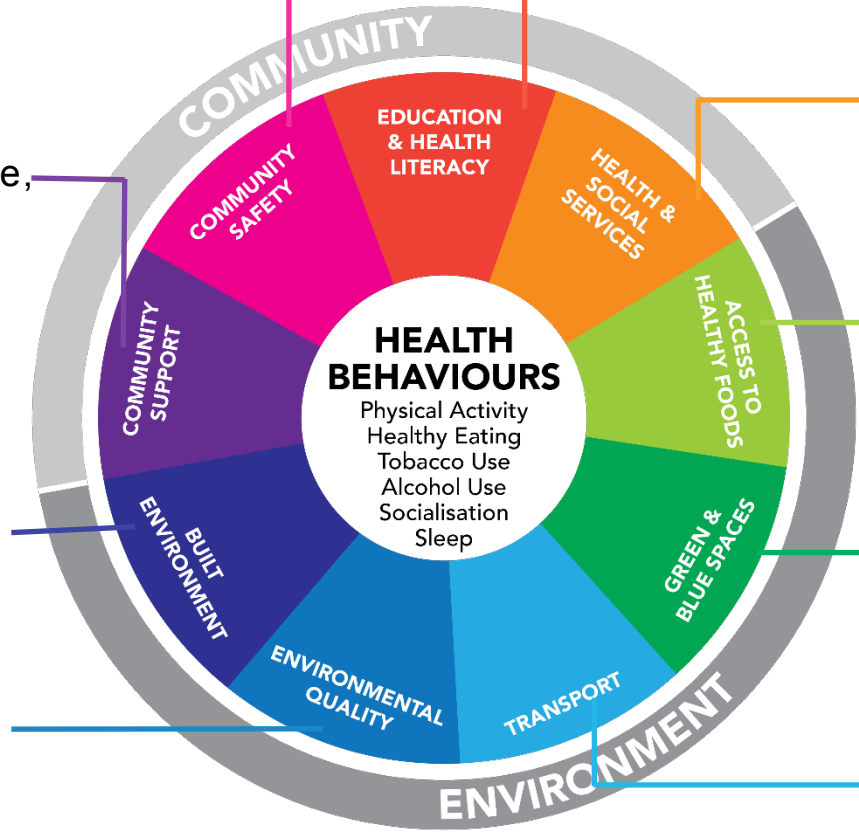
- Health is influenced by factors beyond the domain of healthcare provision
- The determinants are key social and environmental influences that have been identified to impact the 5 health behaviours at a precinct level in Singapore

**Community Safety**  
Low crime and a safe environment for all to live healthily

**Community Support**  
Forming inclusive, engaged and vibrant communities

**Built Environment**  
Built environment, including public spaces, that promote healthy living

**Environmental Quality**  
Minimise and control air & noise pollution



**Education & Health Literacy**  
Being able to make informed choices for healthy living

**Health & Social Services**  
Access to affordable, good quality services & programmes for all

**Access to Healthy Foods**  
Healthy food options that are readily convenient & affordable

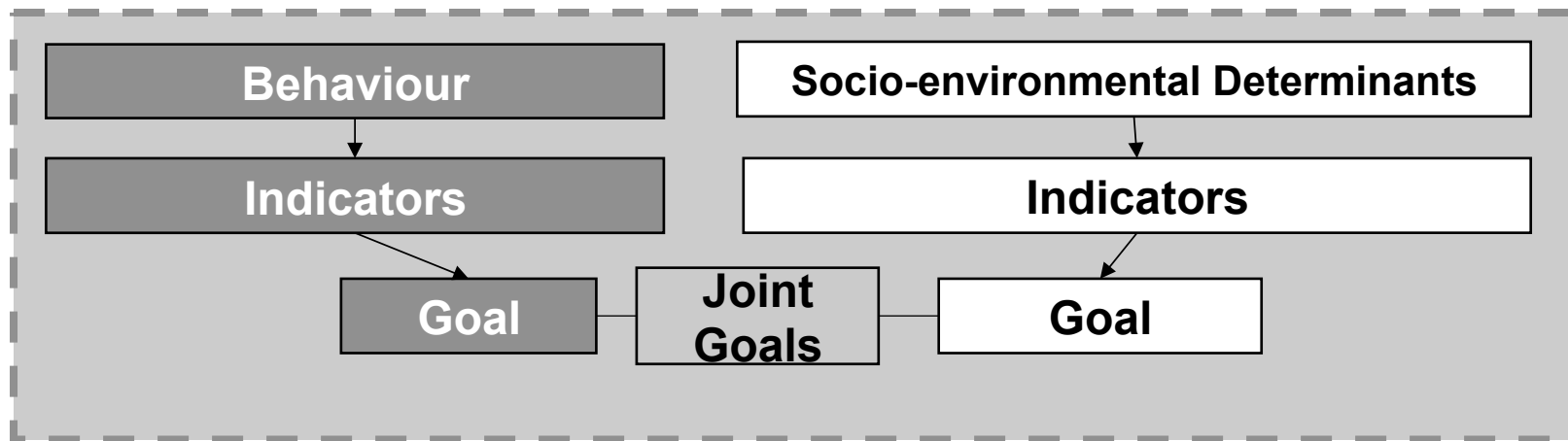
**Green & Blue Spaces**  
Access to attractive green/blue spaces to relax, exercise and spend time

**Transport**  
Efficient, comfortable, & convenient modes of transport for end-to-end transport within a precinct

# **APPLYING THE FRAMEWORK**

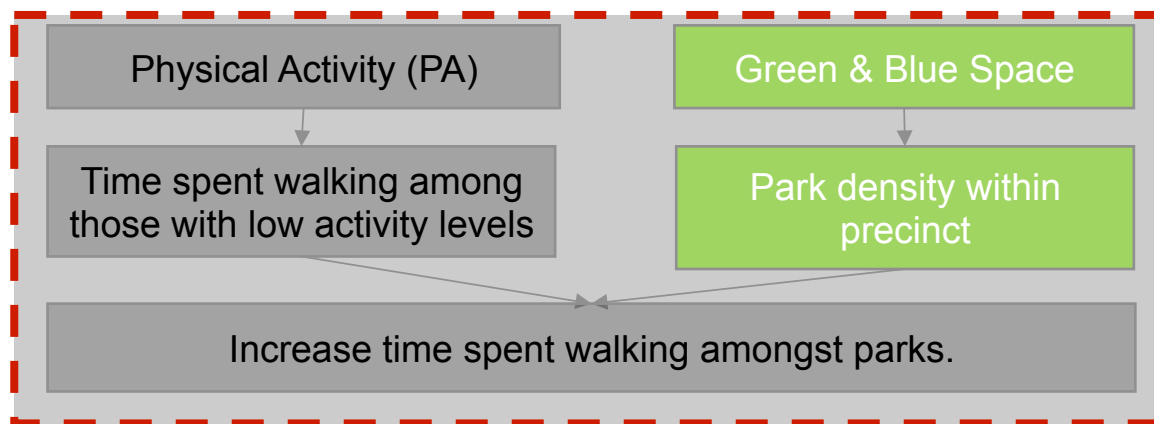
# Fleshing out the Framework into an Index

- Behaviour indicators worked out with health agencies



- Socio-environmental determinant indicators worked out with non-health agencies

## Illustrative Example



# Examples of Evidence-based Behaviour-Determinant Relationships

\* Denotes evidence from local literature in Singapore

Behaviour	Access to Healthy Foods	Built Environment	Health/social services
Physical Activity		<ul style="list-style-type: none"> <li>• Access to health-promoting facilities*</li> <li>• Neighbourhood walkability</li> <li>• Land-use diversity*</li> </ul>	<ul style="list-style-type: none"> <li>• Availability</li> <li>• Accessibility</li> <li>• Quality (targeted)</li> <li>• Affordability (cost, incentives)</li> </ul>
Healthy Eating	<ul style="list-style-type: none"> <li>• Affordability*</li> <li>• Availability*</li> <li>• Accessibility*</li> </ul>	<ul style="list-style-type: none"> <li>• Accessibility* of fast-food outlets</li> <li>• Density of fast-food outlets</li> <li>• Density of F&amp;B advertisements</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of nutrition programmes*</li> <li>• Access to healthcare professional advice*</li> </ul>
Socialisation		<ul style="list-style-type: none"> <li>• Destinations (e.g. public spaces)</li> <li>• Population Density</li> <li>• Distance from home to street/public space</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of educational programmes</li> <li>• Affordability</li> </ul>
Sleep		<ul style="list-style-type: none"> <li>• Road intersection</li> <li>• Population density</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of healthcare professional advice*</li> </ul>

# Examples of Evidence-based Behaviour-Determinant Relationships

\* Denotes evidence from local literature in Singapore

Behaviour	Transport	Environmental Quality	Green/Blue Space
<b>Physical Activity</b>	<ul style="list-style-type: none"> <li>• Accessibility of active transport (e.g. walking, cycling)</li> <li>• Availability of infrastructure for active transport</li> <li>• Availability of facilities for active transport</li> <li>• Accessibility of public transport</li> <li>• Variety of public transport</li> <li>• Frequency of public transport</li> </ul>	<ul style="list-style-type: none"> <li>• Air quality</li> <li>• Ambient temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Availability (park density) *</li> <li>• Accessibility (traveling distance/public transport access) *</li> <li>• Design of green space*</li> </ul>
<b>Healthy Eating</b>	<ul style="list-style-type: none"> <li>• Accessibility to healthy food sources</li> </ul>		
<b>Socialisation</b>	<ul style="list-style-type: none"> <li>• Travel distance (barrier to visiting other facilities and participating in community programmes)</li> </ul>	<ul style="list-style-type: none"> <li>• Air quality</li> <li>• Ambient temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of community programmes in green spaces</li> </ul>
<b>Sleep</b>		<ul style="list-style-type: none"> <li>• Traffic noise levels</li> </ul>	<ul style="list-style-type: none"> <li>• Greener neighbourhoods</li> </ul>

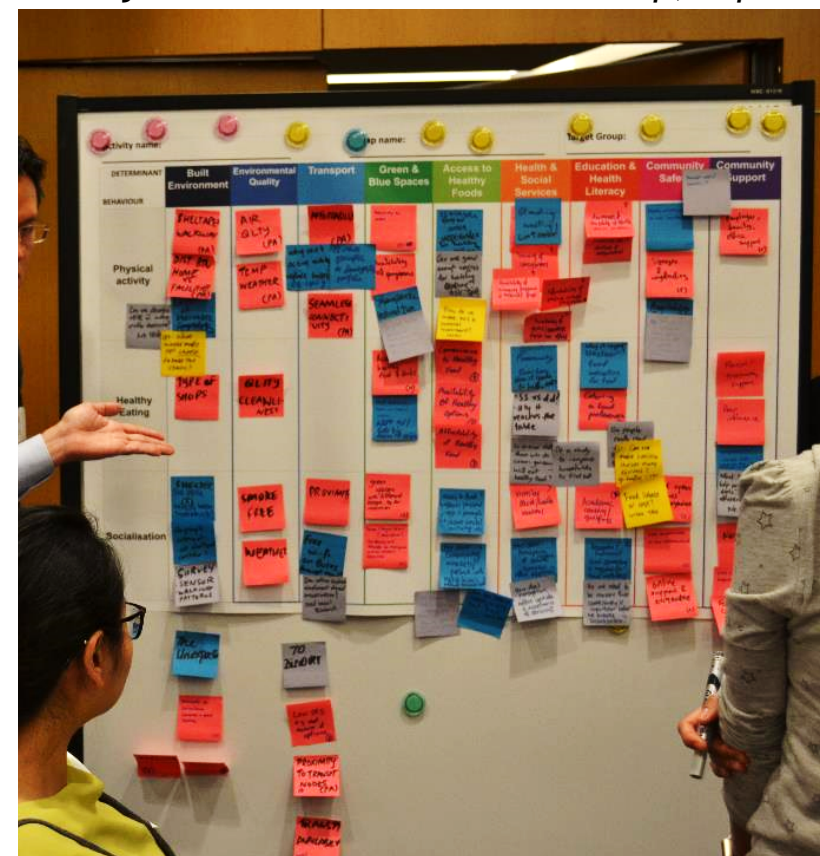


# Examples of Evidence-based Behaviour-Determinant Relationships

\* Denotes evidence from local literature in Singapore

Behaviour	Education & Health Literacy	Community Safety	Community Support
<b>Physical Activity</b>	<ul style="list-style-type: none"> <li>Education levels</li> </ul>	<ul style="list-style-type: none"> <li>Perceived neighbourhood safety *</li> <li>Crime rate</li> </ul>	<ul style="list-style-type: none"> <li>Perceived social support (older adults)*</li> <li>Programmes with social elements*</li> </ul>
<b>Healthy Eating</b>	<ul style="list-style-type: none"> <li>Parental influence*</li> </ul>	<ul style="list-style-type: none"> <li>Perceived neighbourhood safety</li> </ul>	<ul style="list-style-type: none"> <li>Family/household norms *</li> <li>Workplace norms*</li> </ul>
<b>Socialisation</b>	<ul style="list-style-type: none"> <li>Education levels (isolation)</li> </ul>	<ul style="list-style-type: none"> <li>Perceived neighbourhood safety*</li> <li>Crime rate</li> </ul>	<ul style="list-style-type: none"> <li>Social support *</li> </ul>
<b>Sleep</b>	<ul style="list-style-type: none"> <li>Education levels</li> </ul>	<ul style="list-style-type: none"> <li>Perceived neighbourhood safety*</li> <li>Crime rate</li> </ul>	<ul style="list-style-type: none"> <li>Social norms (friends/family)</li> </ul>

'Healthy Precinct Framework' Workshop, Sep 2019



# Applying the Healthy Precinct Index in Precincts

- For the first pilot site, U-S-E will validate the Healthy Precinct Framework iteratively



Provides a comprehensive overview of the precinct based on Healthy Precinct Framework

Collaborative design and implementation of integrated interventions

Assessing the progress against the Healthy Precinct Index

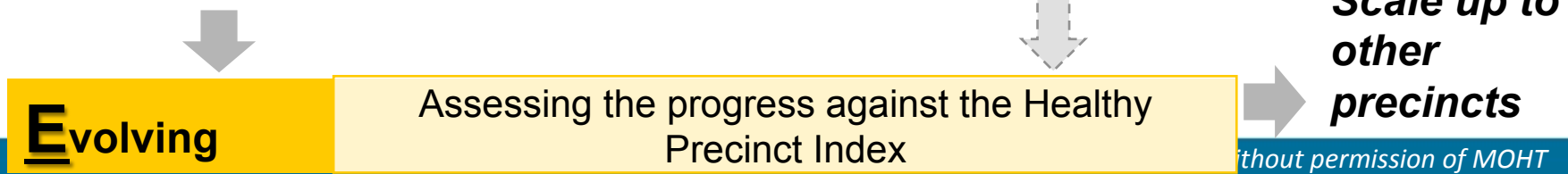
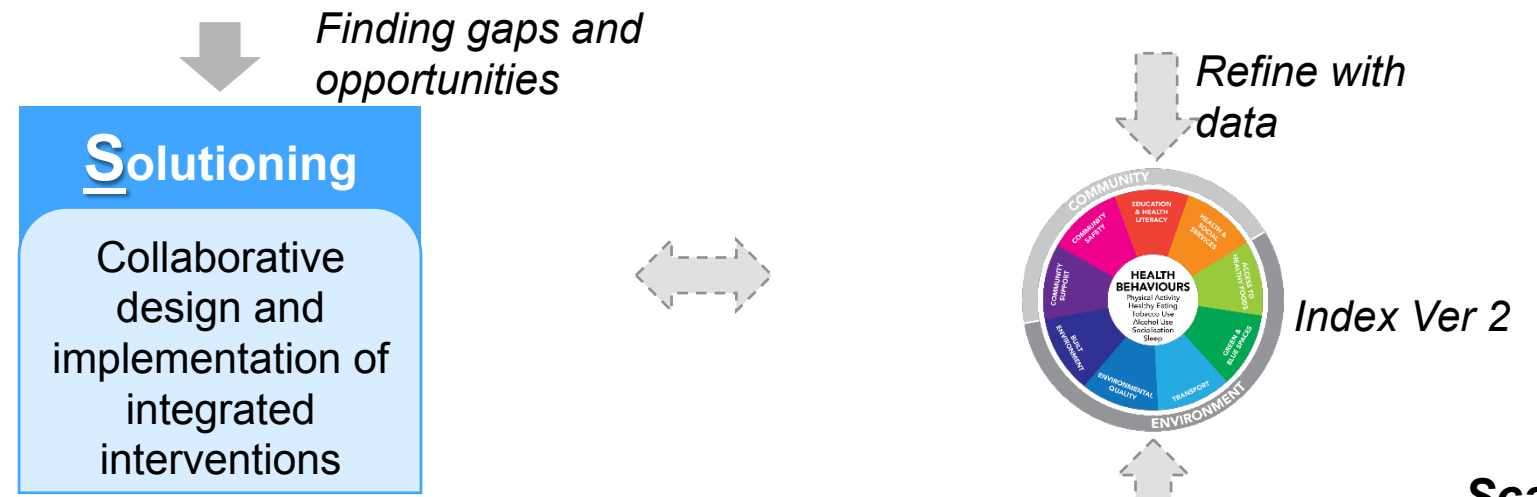
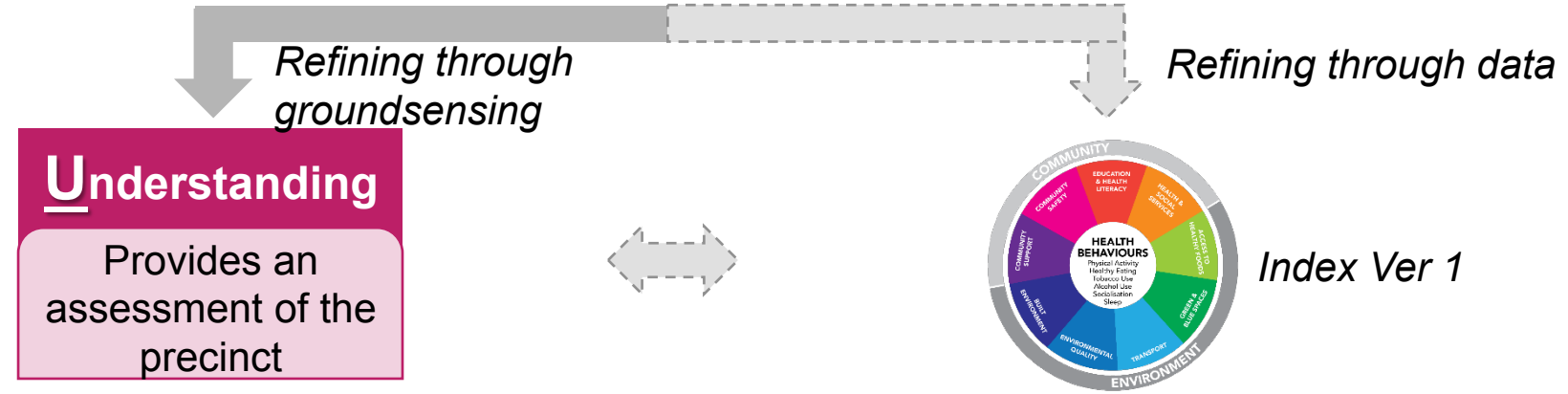
U – S – E

# Testing the Healthy Precinct Index



**Flesh out framework (workshop)**

- **Using the framework in Jurong:** Focus and provide parameters for exploration through U-S-E
- **Two-pronged approach:** Evidence-based approaches to refine the index, using big data and groundsensing findings.



without permission of MOHT

# Testing the Healthy Precinct Index

## - Understanding Phase

- **Quick Groundsensing** : Mixed methodologies to refine indicators (e.g. do people actually perform physical activities in parks, why and why not?)
- **Big data analysis** : Relevant datasets helps to find associations between behaviours and determinants. (e.g. how does city walkability affect physical activity?)

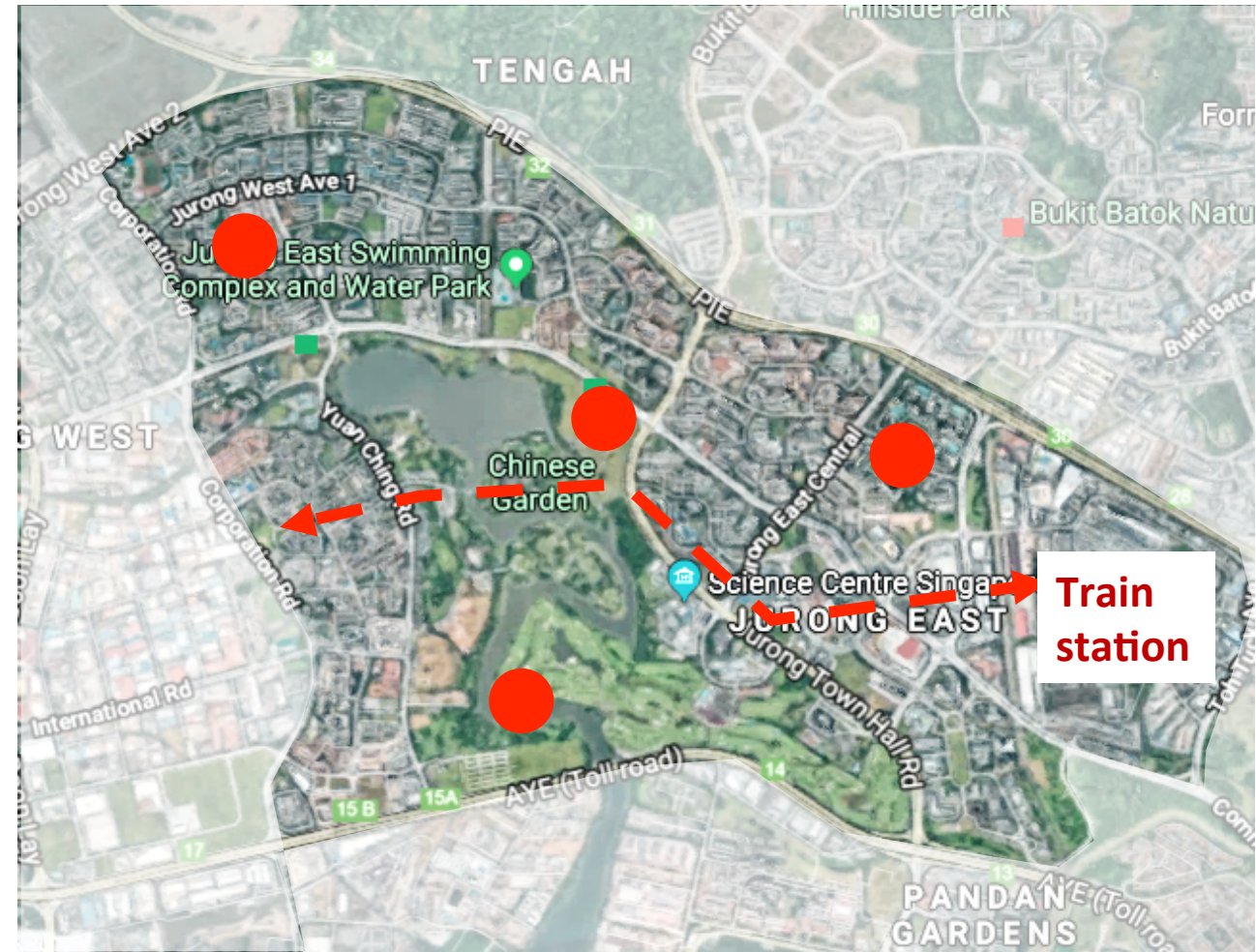


# Co-creating and implementing innovative interventions

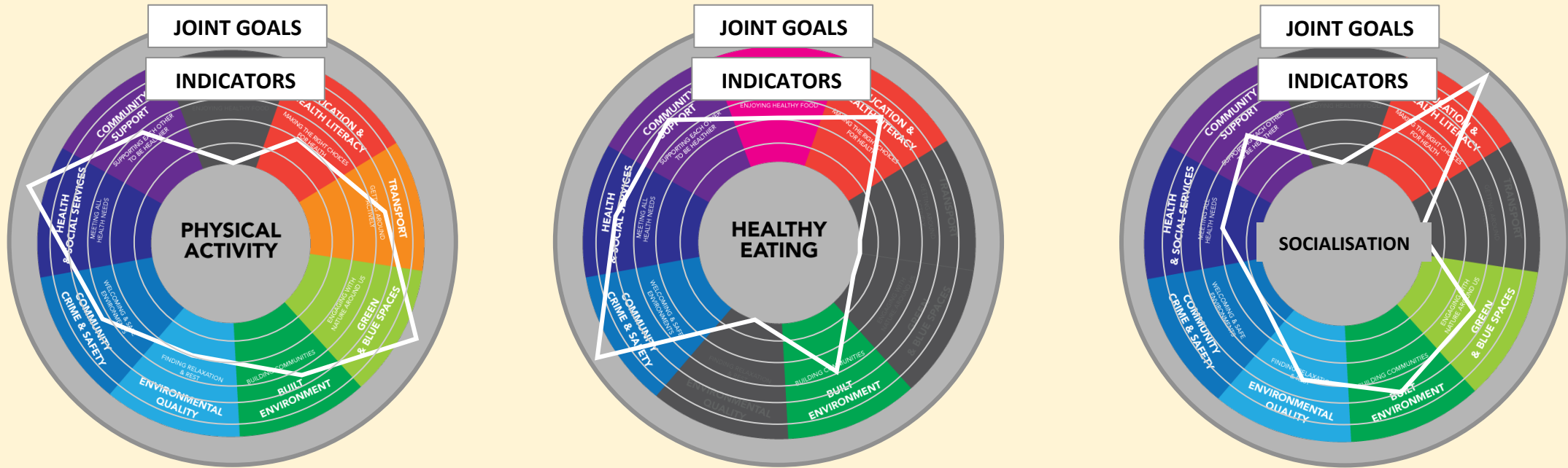
## - Solutioning Phase

- **Methodology:** Co-creating a contextual action plan and co-designing solutions with stakeholders (e.g. govt agencies and community)
- **Illustrative examples:**
  - Improving **wayfinding** and walking experience to increase prevalence for walkability in pilot site.
  - Implementing **food foraging** parks with healthy eating programmes

*Illustrative examples*



# Illustrative Healthy Precinct Dashboard for **Evolving Phase**



## Evaluating through:

- Short term (utilization, process evaluation)
  - Medium term (behaviour change)
  - Long term (health outcomes)

# Illustrative Envisioned Outcome



<b>Health Behaviour :</b>	<b>Determinant : Built Environment</b>
Physical Activity	<i>How does neighbourhood walkability influence total number of steps/day?</i>

*Applying the socio-demography lens*



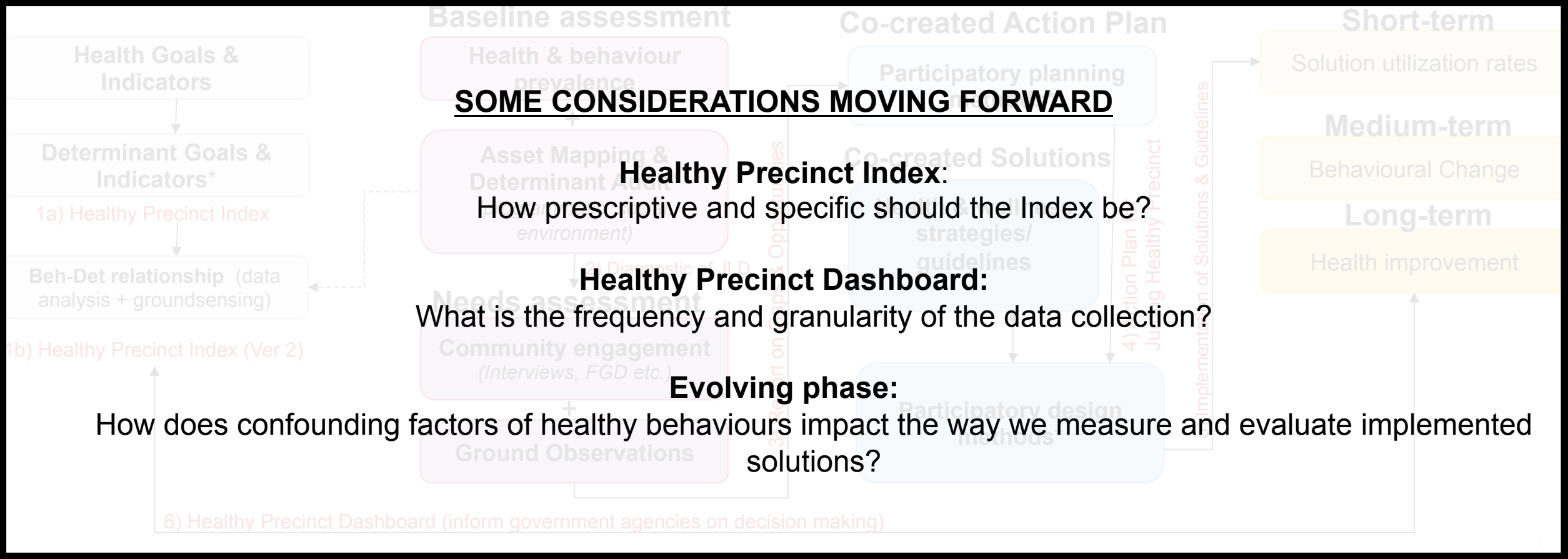
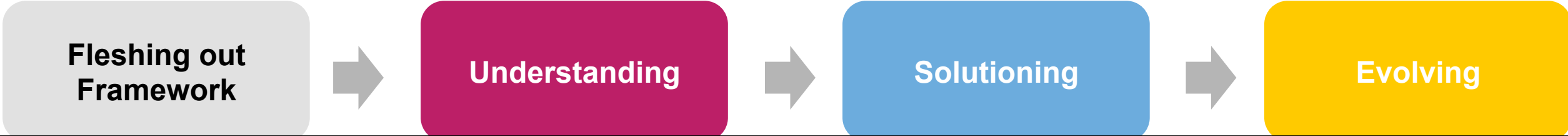
**UNDERSTANDING**  
 Groundsensing + Data analytics at Jurong  
*(e.g. Visualization from Strava app heatmap on walking in Jurong)*

**Co-SOLUTIONING**  
 Wayfinding with Jurong Lake Gardens as a shortcut destination between transport nodes



**EVOLVING**  
 Number of steps taken in Jurong Lake Gardens has increased

# Summary





# Thank You



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