MINISTRY OF HEALTH
SINGAPORE

INTEGRATING FOR EFFECTIVE PREVENTION

THE WHOLE OF GOVERNMENT APPROACH

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Current challenges

POPULATION HEALTH STATUS

- Ageing population
- Increasing prevalence of chronic disease
- Risk factors eg obesity, sedentary lifestyle – the new norm?

HEALTH SERVICES

- Concentrated on acute episodic care
- Fragmented and silo based
- Inconsistent incentives

ROLE OF PATIENT

- Uninformed and/or non compliant
- Willing but lack capability

Desired Destination

Strategic considerations

- Prevention and early detection and intervention is key
- Move away from episodic care to integrated and longitudinal care
- Increase patient participation in their own care

GOVERNMENT AS

SYSTEM DESIGNER

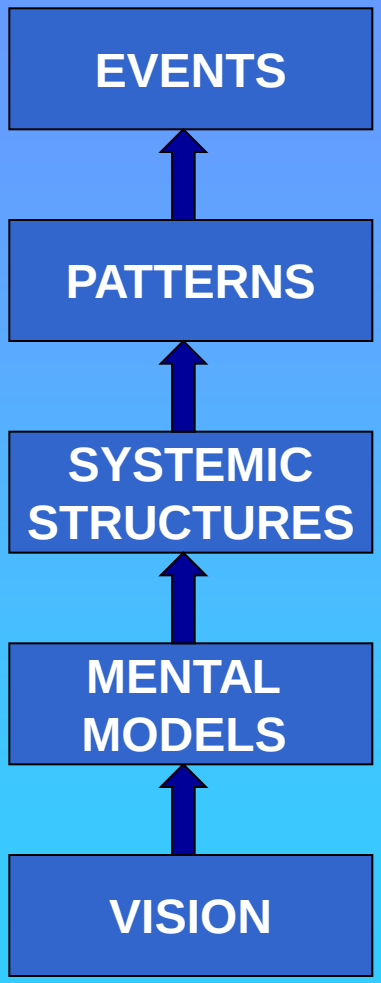
GOVERNMENT AS **SYSTEM DESIGNER**

1. Set DIRECTION
2. Create LEVERAGE
3. Align for SYNERGY
4. Enable INNOVATION

SET DIRECTION

Leadership and Framing

Framing



DESCRIPTION

Events happening at a point in time
Wrt key variables, what are key events taking place at a particular point in time?

Pattern of events happening over time graph
What is the graphical pattern of behaviour over time of these variables?

Causal diagrams
What systemic structure (causal relationships) is driving the behaviour?

Underlying beliefs or logic
What are the mental models sustaining these systemic structures?

Mother of all Mental Models
What is the chief underlying mental model in use?

Redefining Healthcare

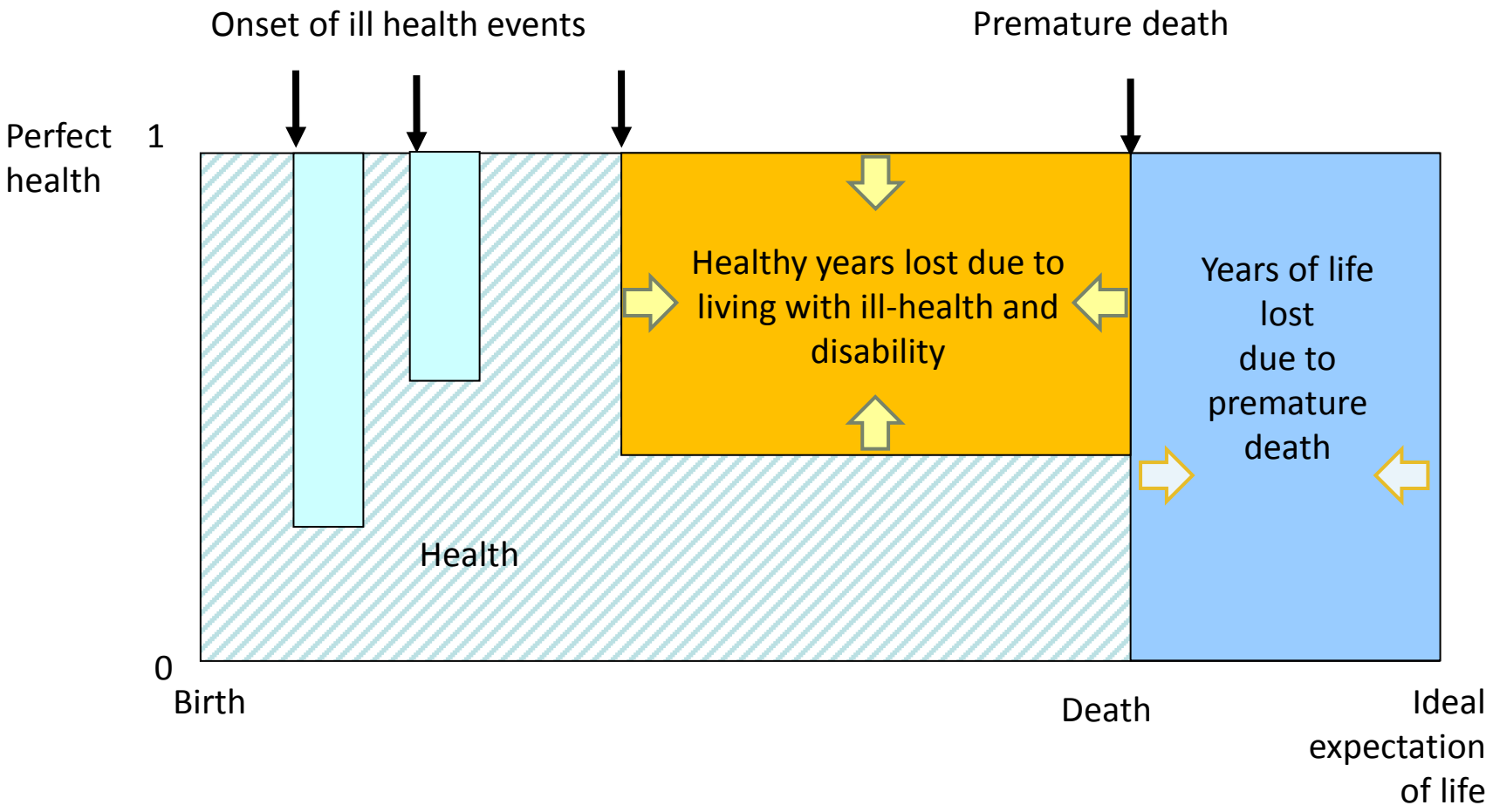
Wellness Centric
Aim is health not healthcare

From Episodic ('snapshot') to Longitudinal
"Whole System" approach to measuring and managing quality

From Cost to Cost-effectiveness

1 Better Health

Disability Adjusted Life Years (DALYs)



2 Better Care

Life Cycle Approach

Stroke

Asymptomatic Stage
- General health promotion
- Educational interventions
- Health Screening

Symptomatic Stage
- Screening for Hypertension and cardiovascular disease
- Treatment
- Other prevention of Stroke

Functional Decline
- Acute care
- Treat co-morbidities

Functional Recovery
- Multidisciplinary rehab

Adjustment Phase
- Stabilising functional condition
- Intervention to mitigate further disability
- Prevention of recurrent stroke
- Improve quality of life

Prevention	Disease Stage	Recovery

CORONARY HEART DISEASE PATHWAY

Primary prevention

Active life style management

1. Reducing salt intake (target: <6g/day)
2. Reducing saturated and trans fats in diets
3. Reducing prevalence of binge drinking
4. Reducing prevalence of smoking
5. Regularly maintained physical exercise

Management of risk factors

6. Reducing prevalence of obesity (target BMI <25)
7. Preventing and treating hypertension (target BP: ≤140/90 mmHg)
8. Preventing and treating diabetes (target: HbA1c ≤7.0%)
9. Preventing and treating hypercholesterolemia (target CHO: ≤200 mg/dL), e.g., with Statins

Early management of CHD

Regular medication and monitoring from primary care

10. Treating SA patients who have hypertension (target BP: ≤130/80 mmHg)
11. Treating SA patients who have diabetes (target: HbA1c ≤6.5%)
12. Treating SA patients with Statins on a long term basis
13. Using sublingual nitroglycerin for immediate relief of angina
14. Treating SA patients with beta-blockers on a long term basis
15. Treating SA patients with low-dose aspirin (75–325 mg) on a long-term basis
16. Immunizing all CHD patients with flu vaccine
17. Annual GP review for SA patients

Further assessment and treatment from specialist care

18. Referring newly diagnosed angina patients to specialist for further assessment within 2 wks
19. Exercise Tolerance Testing (i.e., stress ECG) for patients with suspected CHD
20. Angiography (± PCI) for high-risk patients identified by non-invasive diagnostics
21. CABG for angina patients with LM (left main stem) or 3VD (triple-vessel disease)

Management of AMI

Rapid and proper ambulance support

22. Rapid ambulance transfer of suspected AMI to A&E (including ECG review)

Immediate diagnosis by cardiologists at A&E

23. Cardiac specialist care starting upon presentation to A&E
24. Immediate 12-lead ECG at A&E
25. Troponin tests at presentation and at 12 hrs from symptom onset

Proper medical therapy at A&E

26. Aspirin 300 mg for AMI patients immediately, if not given on ambulance
27. Clopidogrel 300 mg in combination with aspirin immediately
28. Nitrates (nitroglycerin or isosorbide mononitrate) titrated to chest pain and blood pressure
29. Opiate analgesia, esp. morphine, administered with antiemetics

STEMI

Proper setting of care: CCU

30. Transfer STEMI to CCU

Optimal revascularization

31. Increasing proportion of STEMI patients who receive PPCI for revascularization
32. Reducing DtB time for patients eligible for PPCI (target: 90 mins)
33. Intracoronary stenting for STEMI patients undergoing PPCI
34. Immediate thrombolysis for patients ineligible for PPCI
35. Reducing CtN time for patients eligible for thrombolysis (target: 30~60 mins)
36. Rescue PCI within 6 hrs of symptom onset after failed thrombolysis
37. Coronary angiography (± angioplasty) for patients treated with thrombolysis

Medical therapy and others

38. Beta-blockers for STEMI
39. LMWH for STEMI
40. GpIIb/IIIa inhibitor for STEMI w/ PCI
41. Emergency CABG for patients with mech. complications or coronary rupture
42. Leaving CCU when hemodynamically stable & 12–24 hrs after symptom onset

NSTEMI/UA

Medical therapy and others

43. Beta-blockers for NSTEMI/UA
44. LMWH for NSTEMI/UA
45. Glycoprotein IIb/IIIa inhibitor for NSTEMI/UA patients undergoing PCI

Further assessment to identify high-risk patients

46. Coronary angiography (± angioplasty) for NSTEMI/UA patients at medium to high risk of recurrent coronary events
47. Measure LV function with echo-cardiogram if not done in angiography

Rehab & secondary prevention

Rehab program

48. Comprehensive rehab program comprising supervised exercise, lifestyle education, psychosocial counseling, etc.

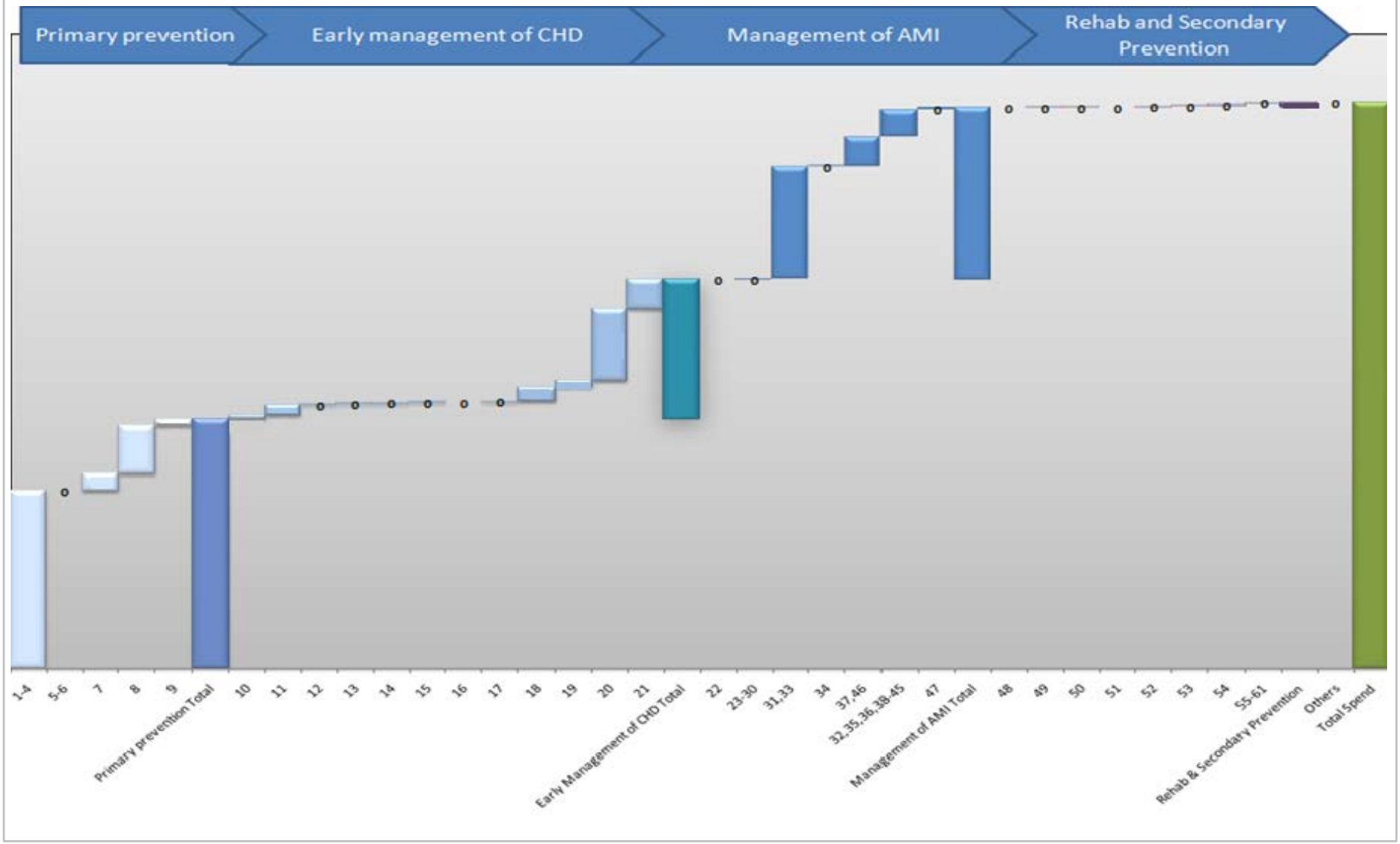
Regular medical therapy

49. Starting long term statin therapy prior to hospital discharge
50. Starting long term aspirin (75 mg daily) therapy prior to discharge
51. Using clopidogrel (75 mg daily) in combination with aspirin
52. Starting long-term beta-blocker therapy prior to hospital discharge
53. Oral/transdermal nitrates after AMI
54. Starting ACEI or ARB treatment within 14 days of AMI

Continued management of life style and other risk factors

55. Reducing salt intake (target: <6g/day) after AMI
56. Reducing saturated and trans fats in diets after AMI
57. Reducing prevalence of smoking after AMI
58. Regularly maintained physical exercise planned with GP after AMI
59. Obesity management with lifestyle advice (target BMI < 25) after AMI
60. Treating hypertension (target BP: ≤130/80 mmHg) after AMI
61. Treating diabetes (target: HbA1c ≤6.5%) after AMI

INTERVENTION COST WATERFALL - CHD



Value Based Service Planning

Prevention and Early Diagnosis → Primary Care → Secondary/ Tertiary Care (Outpatient) → Secondary/ Tertiary Care (Inpatient) → Step Down Care → End-of-Life Care

EVIDENCE MATRIX OF INTERVENTIONS FOR MANAGEMENT OF STROKE (Focus on Acute Care)

Intervention	Decreased Mortality at 1 yr / end of follow-up	Improved Functional Outcome	Decreased Recurrent stroke	Decreased Complications	Decreased Length of Stay	Decreased Stroke Misdiagnosis	Decreased Depression	Cost Effectivness
Acute Stroke Service								
Stroke Unit[a] vs Alternative Service[b]	1 	2 	N/A	N/A	1 	N/A	N/A	3, 4 **28 weeks:** $$ **5 years:** $
Early Specialist Assesment for TIA								
Within 24hrs vs Standard protocol[c]	N/A	N/A	5 	N/A	N/A	N/A	N/A	6 $

Abbreviations

ADL - Activities of Daily Living
BI - Barthel Index
HR - Hazard Ratio
LOS - Length of Stay
mRS - Modified Rankin Scale
NIHSS - National Institute of Health Stroke Scale
OR - Odds Ratio
RR - Relative Risk
TIA - Transitent Ischaemic Attack

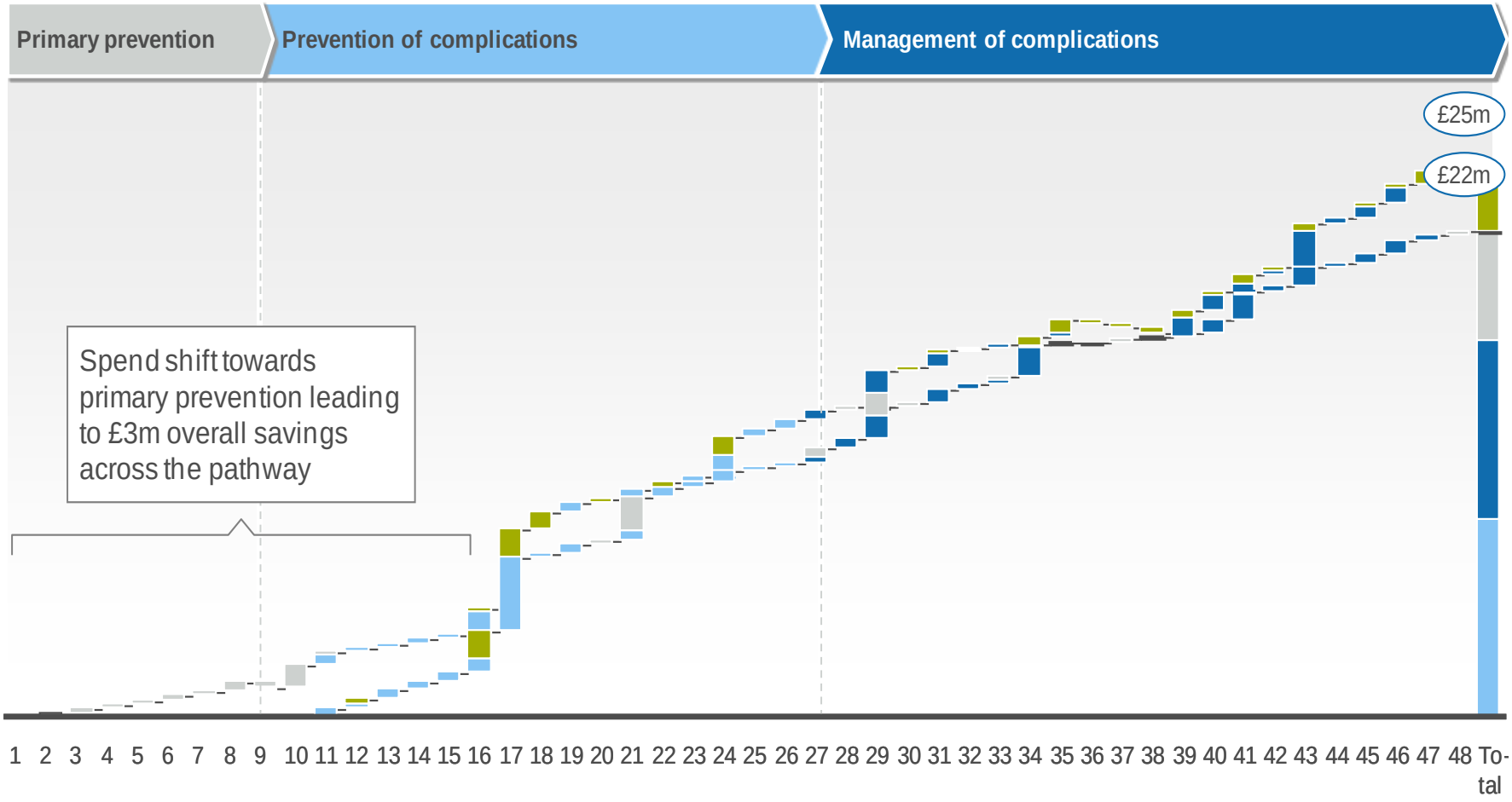
LEGEND

	OR ≥ 3.0		Difference ≤ 1.0	$	Cost Saving
	OR 2.0 - 2.9		Difference 1.1 - 2.0	$$	Cost Effective
	OR 1.0 - 1.9		Difference 2.1 - 3.0	$$$	Not Cost Effective
	OR < 1.0		Difference > 3.0		

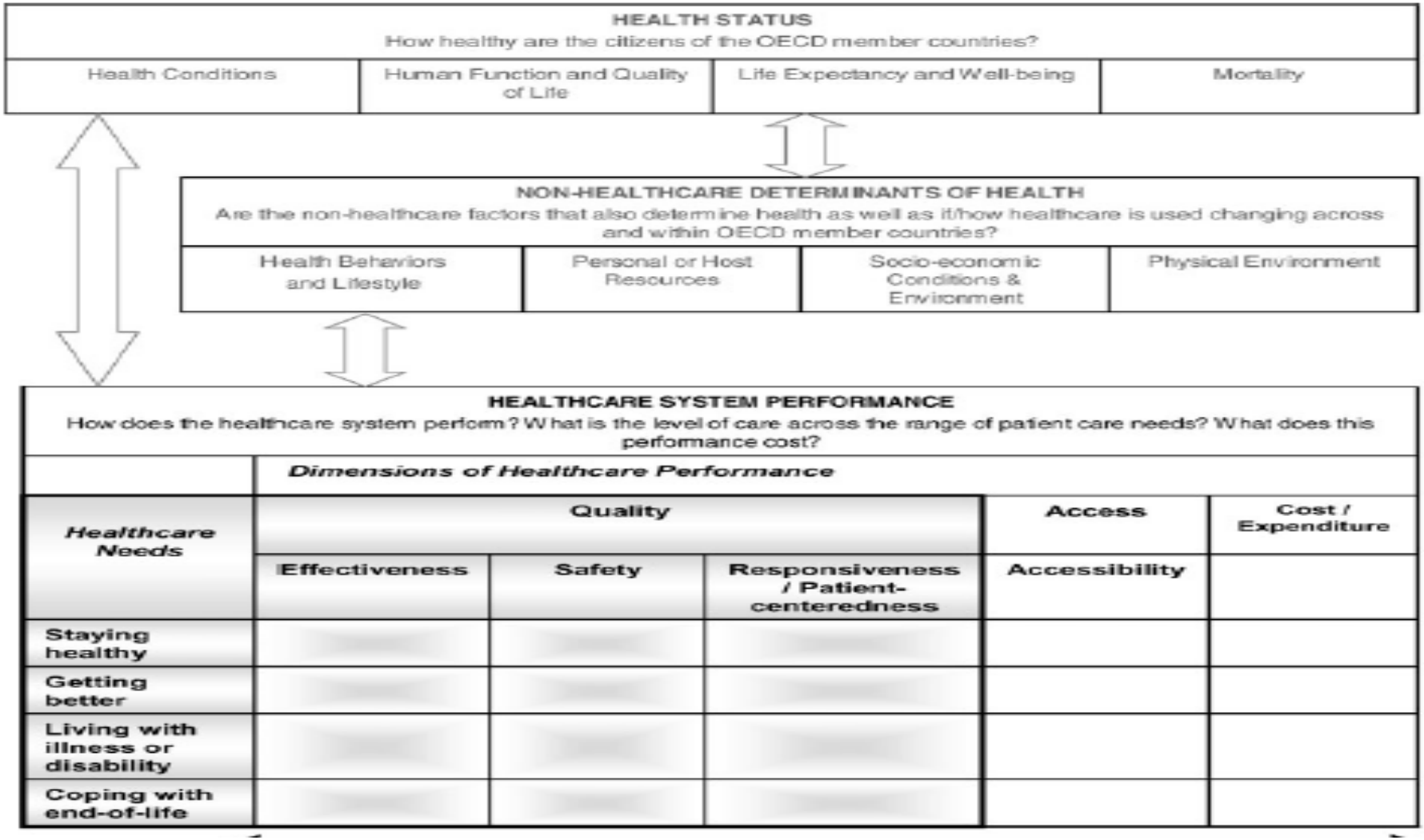
↔ No Difference

Value Based Service Planning

INTERVENTION COST WATERFALL - DIABETES



Bringing it all together
National Scorecard

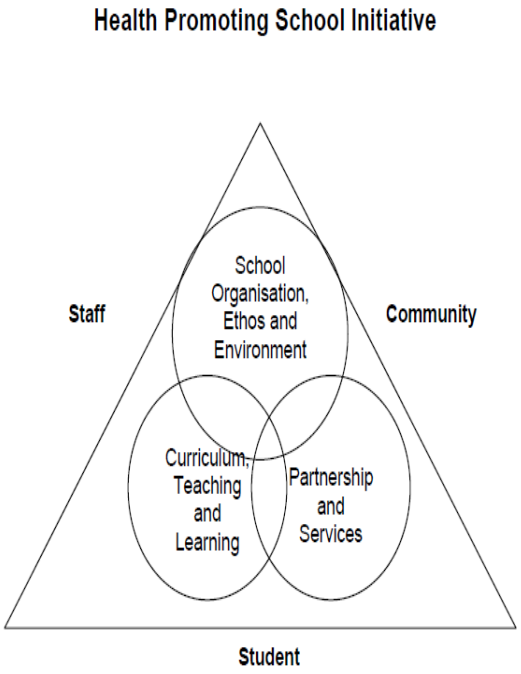


Source: A conceptual framework for the OECD Health Care Quality Indicators Project; Arah et al; International Journal for Quality in Health Care; September 2006: pp. 5–13

CREATE LEVERAGE

putting the pieces together

BUILDING GOOD FOUNDATIONS



- CHERISH (Championing Efforts Resulting in Improved School Health) Award.
  - recognises schools that constantly strive to improve themselves as healthy settings for students, staff and community by fostering good physical, social and mental health for optimal learning.

School based intervention has reduced obesity in Singapore

CM Toh, J Cutter, SK Chew

BMJ. 2002 February 16; 324(7334): 427.

Criterion 1

SCHOOL ORGANISATION, ETHOS AND ENVT

1.1 SCHOOL STRUCTURE AND ORG

- 🕓③ School vision, mission and core values
- 🕓③ School policies on health
- 🕓③ Engagement of students, staff and Stakeholders
- 🕓③ Capacity building and resources

1.2 SCHOOL ENVIRONMENT

- 🕓③ Physical environment
- 🕓③ Model school tuckshop
- 🕓③ Psychosocial environment

1.3 HEALTH NEEDS ASSESSMENT

- 🕓③ Demographics
- 🕓③ Health and fitness status
- 🕓③ Lifestyle and health practices
- 🕓③ Satisfaction levels

1.4 PLANNING

- 🕓③ Data management and use
- 🕓③ Identification of health priorities
- 🕓③ Consideration for those with special needs
- 🕓③ School health promotion plan

1.5 HEALTH PROMOTION INITIATIVES FOR STAFF

Criterion 2 CURRICULUM, TEACHING AND LEARNING

2.1 FORMAL AND NON-FORMAL CURRICULA

- 🕓③ Integration of health

2.2 TOPIC-BASED HEALTH PROMOTION INITIATIVES FOR STUDENTS

- 🕓③ Physical activity
- 🕓③ Nutrition
- 🕓③ Mental health
- 🕓③ Other areas

2.3 TEACHING RESOURCES

- 🕓③ Types of resources
- 🕓③ Optimal utilisation of resources

Criterion 3 PARTNERSHIPS AND SERVICES

- 🕓③ Collaborations with national agencies
- 🕓③ Collaborations with other schools, parents and community

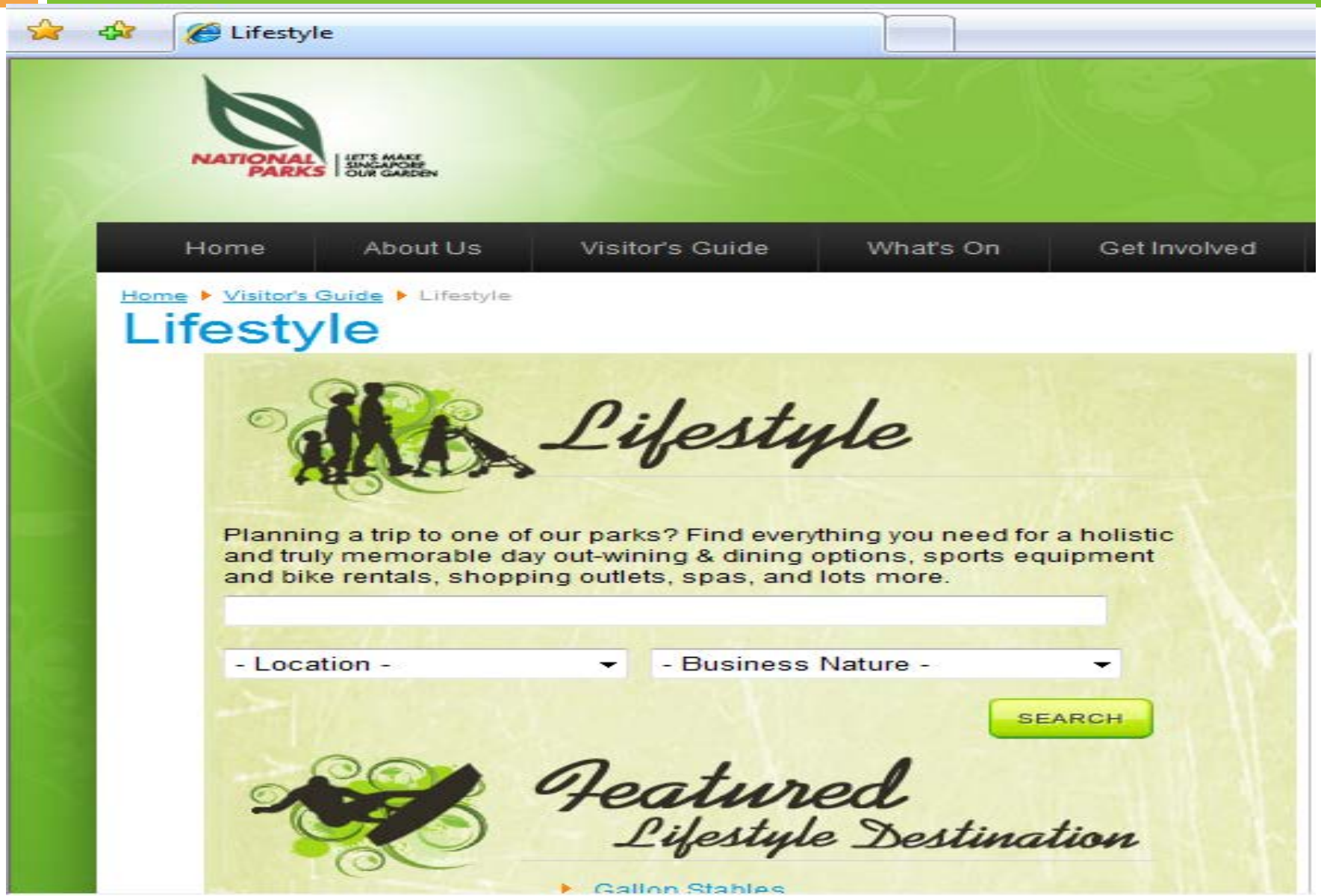
Criterion 4 EVALUATION

- 🕓③ Measures of physical, mental and social health

Criterion 5 CHALLENGES AND FUTURE PLANS

- 🕓③ Measures of commitment and sustainability

Active Lifestyle - New Norm



ACTIVE LIFESTYLE

2008

- Walking
  - more comfortable and conducive walking environment
  - covered linkways and pedestrian overhead bridges will be provided
- Cycling
  - facilitate intra-town cycling by connecting cyclists from their homes to key public transport nodes, key amenities and connect to the existing Park Connector Network
  - Provide better bicycle parking facilities around MRT stations and bus interchanges;
  - Allow foldable bicycles onto buses and trains on a trial basis;
  - Install appropriate road signs to alert motorists to the presence of cyclists along frequently used routes.

ACTIVE LIFESTYLE

Community Sports Festival

The annual Community Sports Festival (CSF) is a signature programme of the CSCs. The CSF is led by the CSC Council, in partnership with the five Community Development Councils (CDCs) and other grassroots organisations, with each of the five districts holding various activities during the Festival catering to the interest and passion of its residents. Focusing on recreation and fun so that people of all abilities can participate, the Festival features community sports that offer opportunities to bring people together, to build long-lasting friendships, foster teamwork and to cultivate stronger social networks through shared interests.

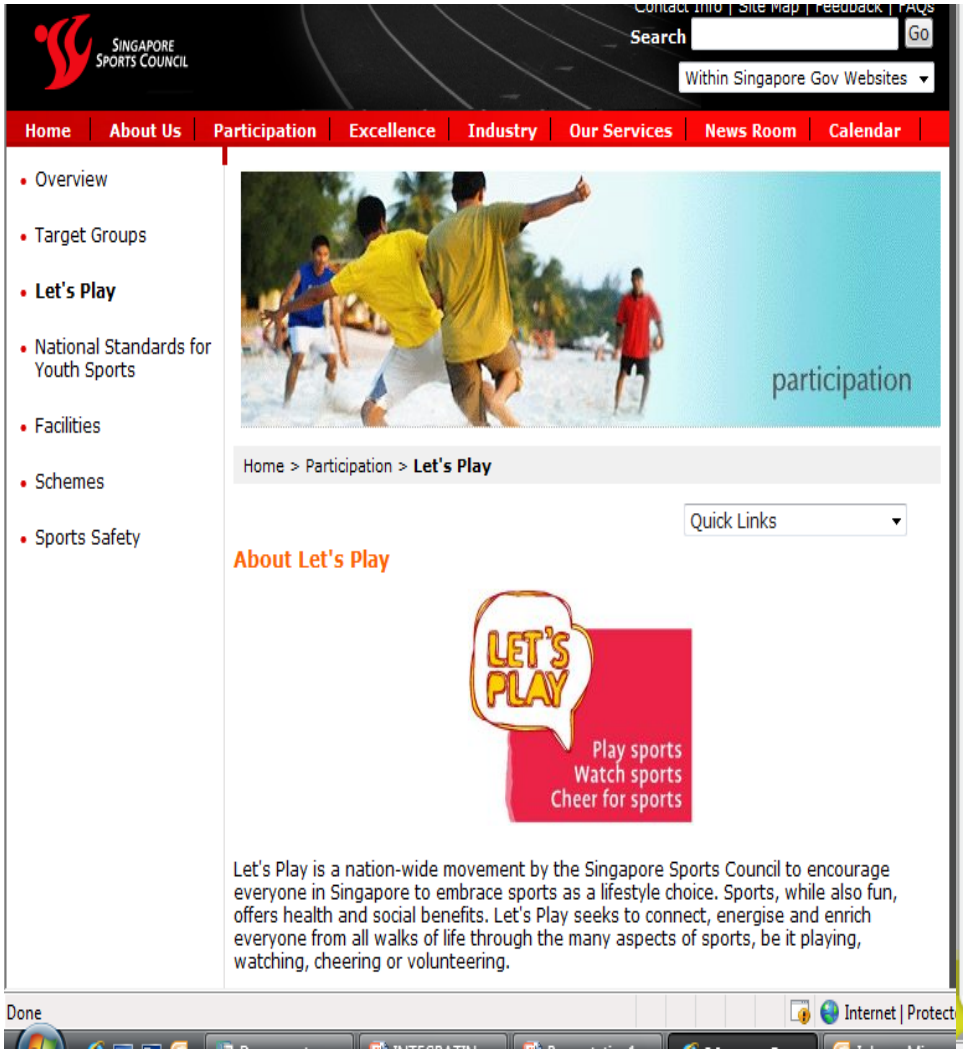
Community Games

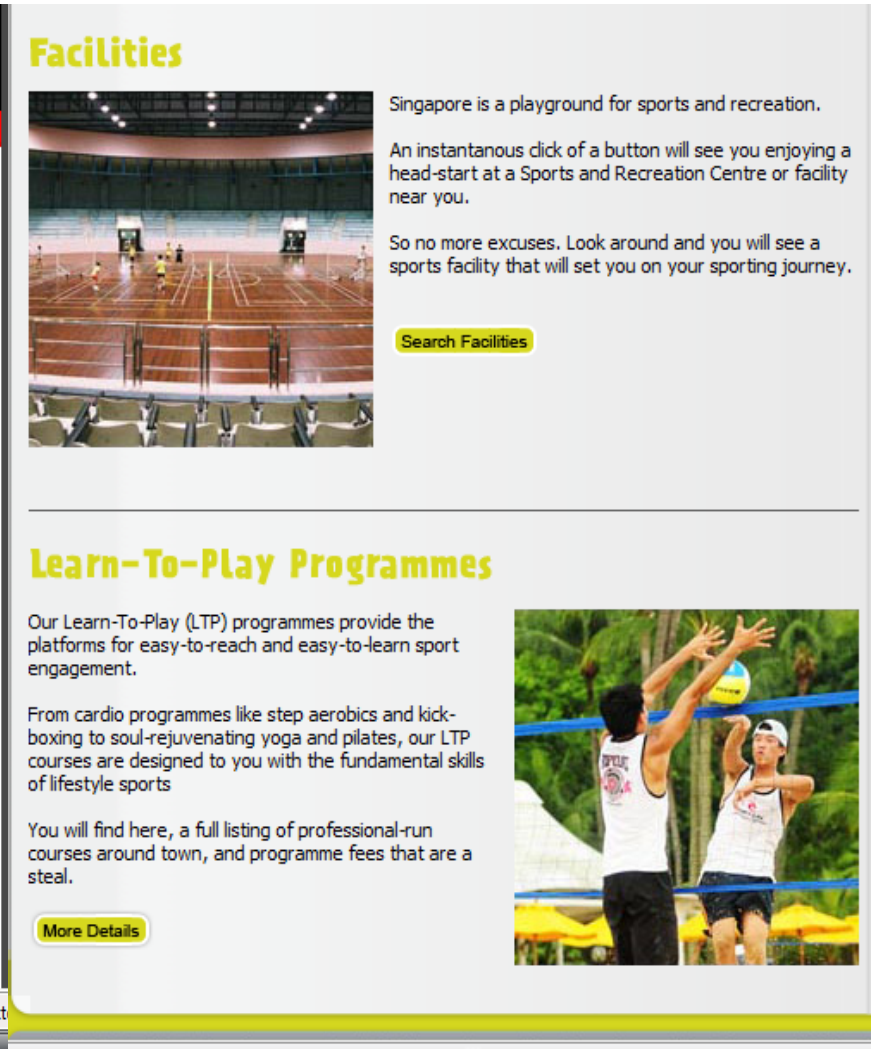
The Community Games, previously known as Inter-Constituency Games offer opportunities for residents to represent their constituencies at a competitive level, and to foster community bonding through sports. Currently the Games comprise a series of sports such as badminton, basketball, bowling, football, running, sepak takraw, swimming and table-tennis.

PA Children's Football League

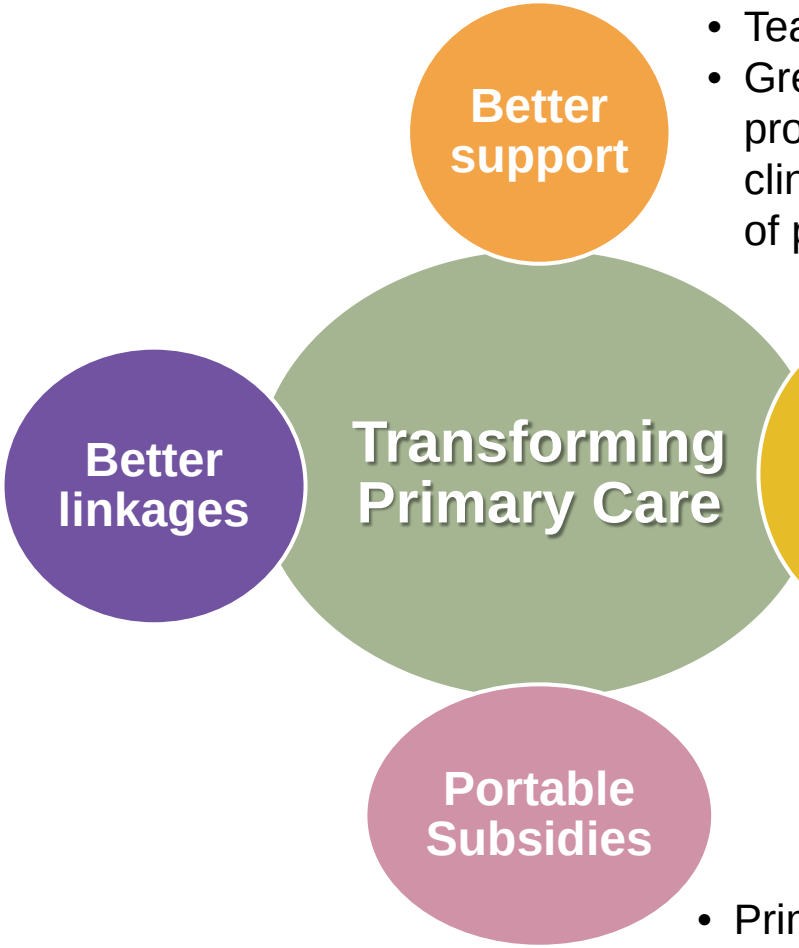
The PA Children's Football League is a fun programme involving children,

ACTIVE LIFESTYLE





Primary Care Transformation



- Team-based care for better outcomes
- Greater involvement of other healthcare professionals e.g. dieticians, nurses, clinical pharmacists etc in management of patients

- Closer collaboration between GPs and the Regional Health Systems

- Enabling infrastructure to support chronic disease management

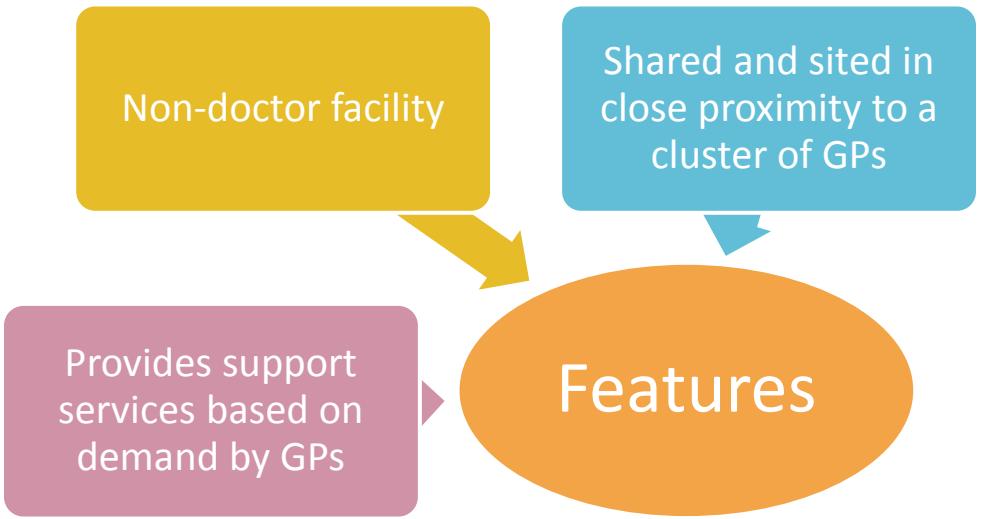
- Primary Care Partnership Scheme

New Primary Care Models

Family Medicine Clinics

- Bigger spaces, enabling the formation of multi-doctor practices and co-location of ancillary support services
  - Enable resource sharing
  - Economies of scale
  - Team-based care

Community Health Centres



Diabetic Foot Screening

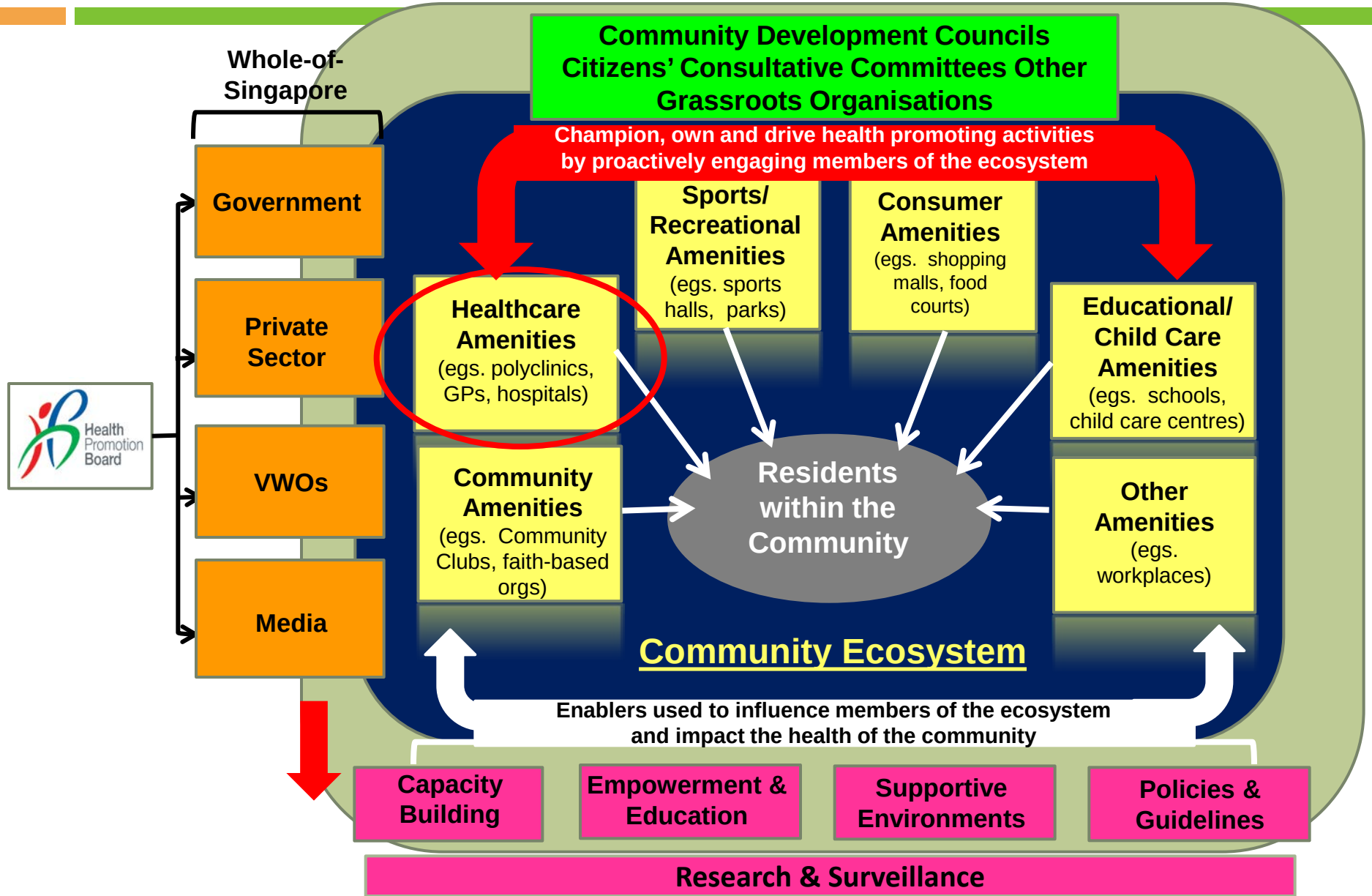
Diabetic retinal photography

Physiotherapy

ALIGN FOR SYNERGY

Ecosystem approach

From Health promotion activities to health promoting ecosystems



Health Promoting Ecosystem

40 Years & Older

*** Recommended Screening Tests**

Screening for:
- Diabetes
- High blood pressure
- Lipid disorders
- Obesity
- Breast cancer
- Cervical cancer
- Colorectal cancer

Settings

Community
- Screening Providers
- Primary Care (GPs) / Polyclinics

Workplace
- Company Doctors
- Screening Providers

Follow-up

Screening Database

CDMP Database

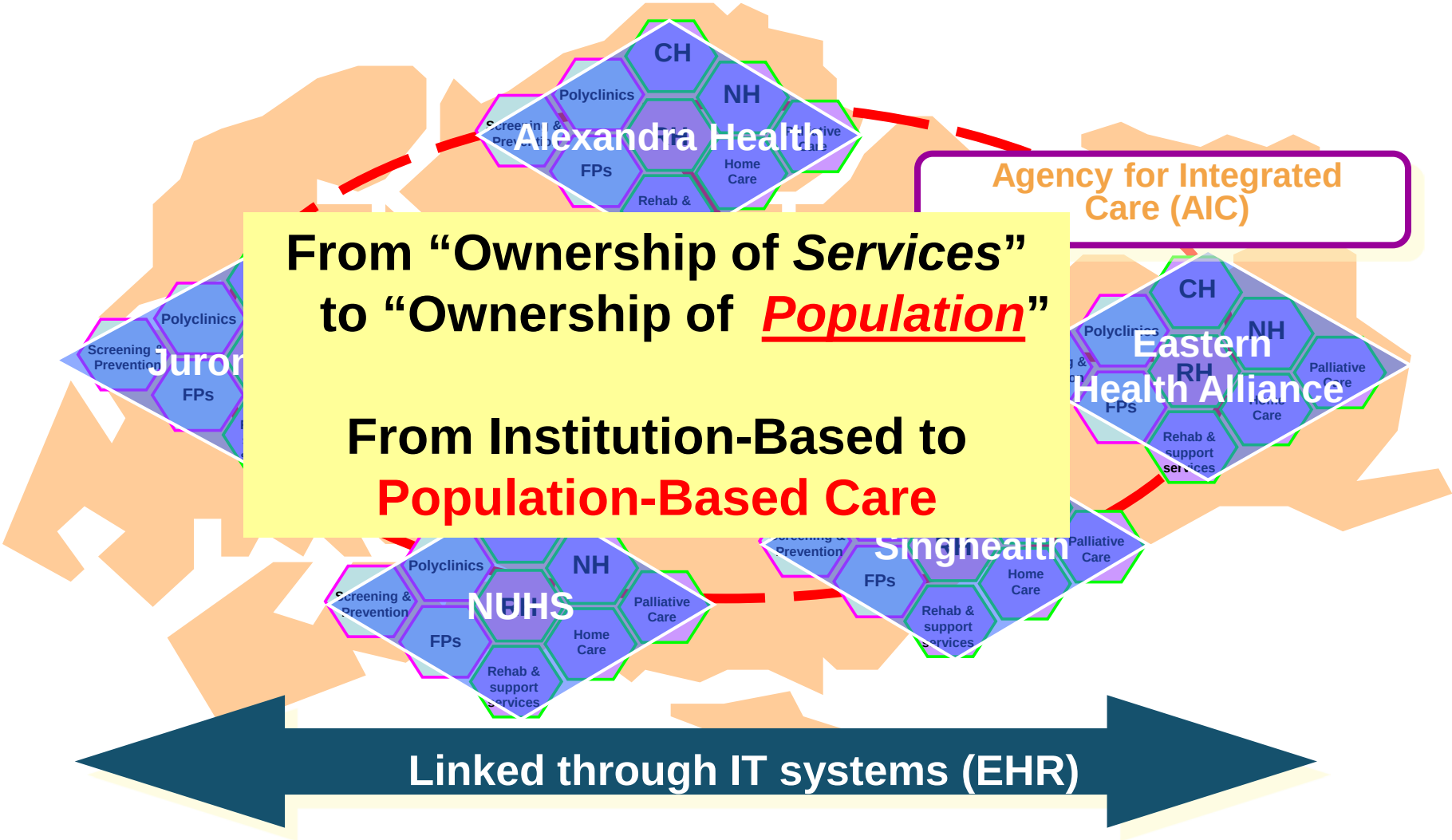
Supportive Environment for Follow-Up

- Medical Follow-Up
- Community interventions
- Workplace Targeted Intervention

1. Subsidised screening & Follow-up
2. Data collection - central system
3. Quality Assurance & Capacity Building
4. Monitoring & Evaluation

* Reference: Screening Tests Review Committee's Recommendations, 2011

Healthcare Delivery Ecosystem



ENABLE INNOVATION

Innovation

- Incentives
- Platforms
- Enabling Environment

- *Most of economics can be summarized in four words: "People respond to incentives." The rest is commentary.*

- Steven Landsburg, The Armchair Economist

In a fee for service system, not in the economic interest of doctors and hospitals to put themselves out of business by promoting disease prevention

Reductionist, mechanical and linear methods of problem solving tend to flounder against the laws of unforeseen consequences and incomplete information

FOR ILLUSTRATION ONLY

Personal Health Management

Open and secure architecture to build rich and innovative applications & services

Incentives

Supermarkets
etc

Financial

Insurers/Payors

Media, Learning

Wellness Apps

Fitness Centres
Community
Centres
Parks etc

Provider Apps

Alexandra Health
NUHS
National University Health System
Jurong Health
Health Promotion Board
National Healthcare Group
aiC

Research/Innovation

Academia

Technology enablers : Device agnostic

Capture

- Thermometer 
- Pulse Oximeter 
- Pulse / Blood Pressure 
- Weight Scale 
- Glucose Meter 
- Cardio / Strength 
- Independent Living Activity 
- *Peak Flow* 
- Medication Adherence 
- *Physical Activity* 
- *Electrocardiogram* 
- *Insulin Pump* 

Delivery

Next Gen Nationwide Broadband Network

National Health Platform

Interoperability & standards

ISO · CERTIFIED USB · Bluetooth · HL7 · W3C

Access

- Smartphone & Tablet 
- ip TV 
- Gaming consoles 
- PC 
- Smart Home 

CONCLUDING THOUGHT

Governments need

the capability to step in where they can make systems work better,

the humility to get out of the way

when they are likely to make matters worse,

and most of all,

the wisdom to know the difference