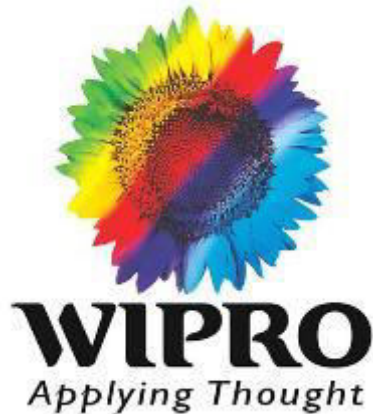


# KEYNOTE SESSION

## Just What the Doctor Ordered

### Health Systems Strengthening by Tackling Complexity



**Dr. Pallab Saha**

Chief Enterprise Architect & Head of  
Wipro Academy of Enterprise Architecture

**Symposium on Enterprise Architecture and Information Technology**  
**National Taipei University of Health Sciences**  
**Taipei | Taiwan | November 8, 2014**

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- 1 Strategy as Ecology**
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- 7 Imperatives for Sustenance**

# Enterprise Architecture Definition

- Enterprise Architecture is defined as the **ongoing** process of building the ability to **manage complexity**, with the pivotal goal of creating and sustaining **coherent and future-ready enterprises**. [Pallab Saha, 2012/2014]

**Coherence**

Versus

**Alignment**

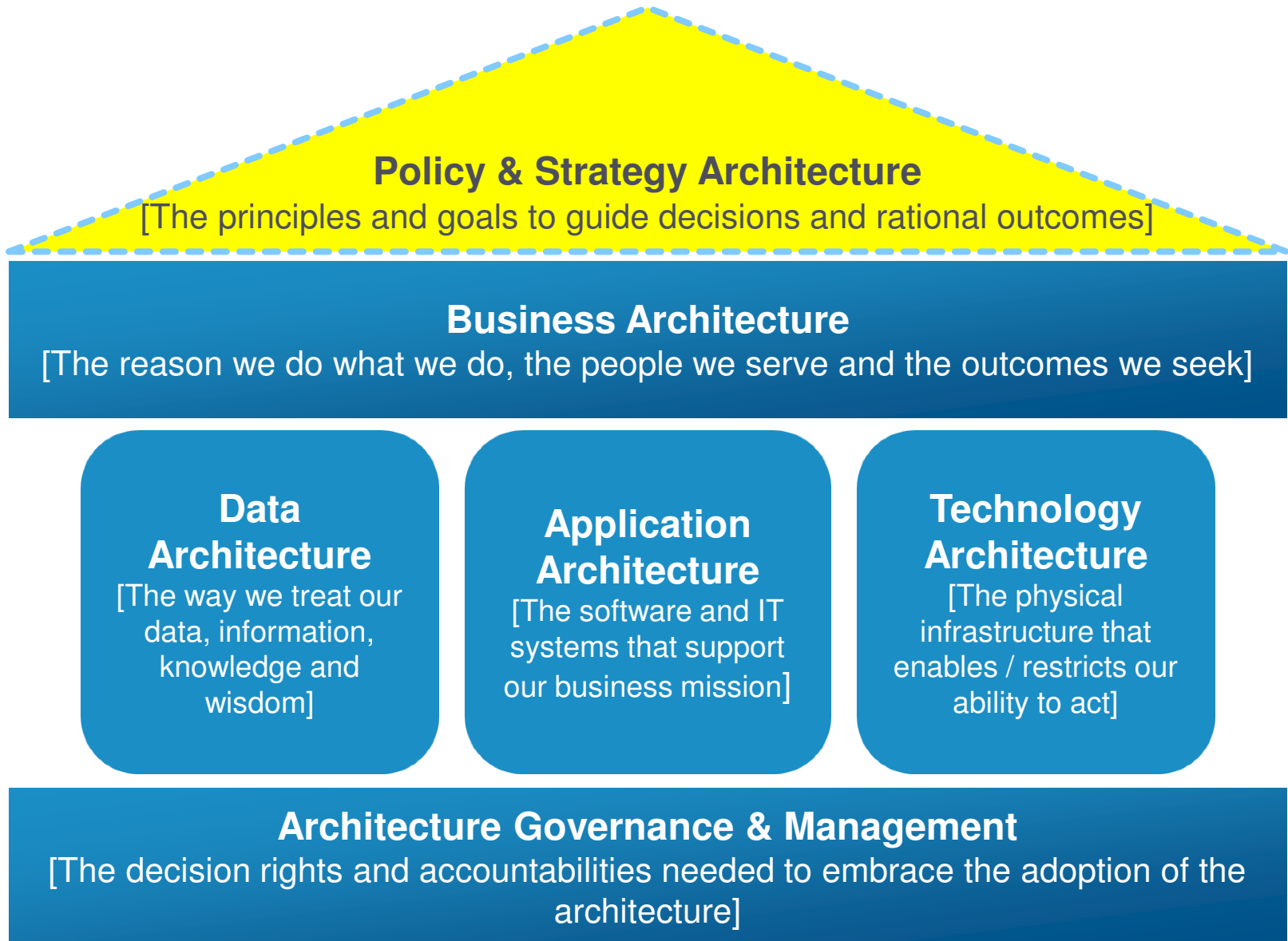


**Architected for Flux**

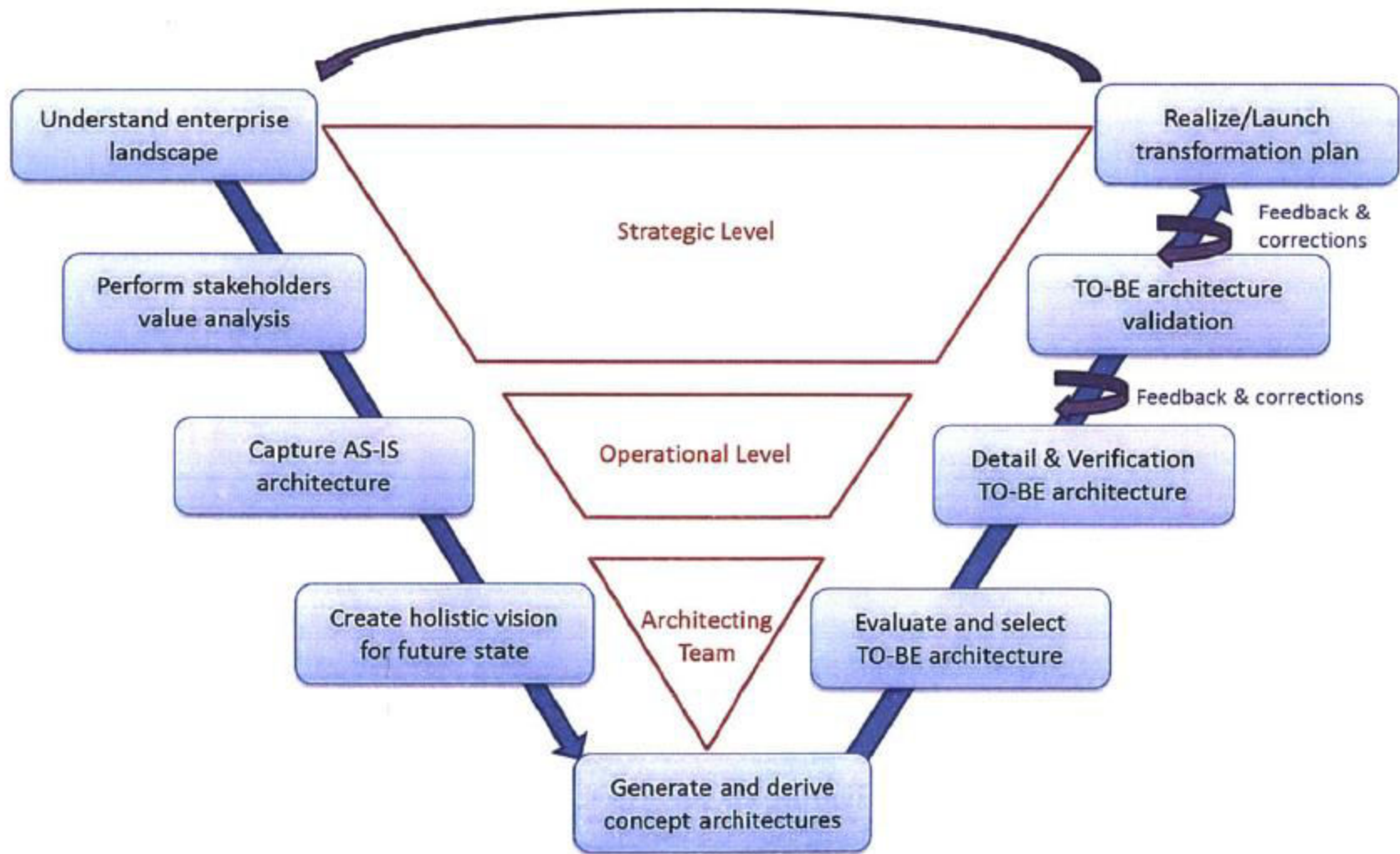


**Architected for Stability**

# Enterprise Architecture - The Building Blocks



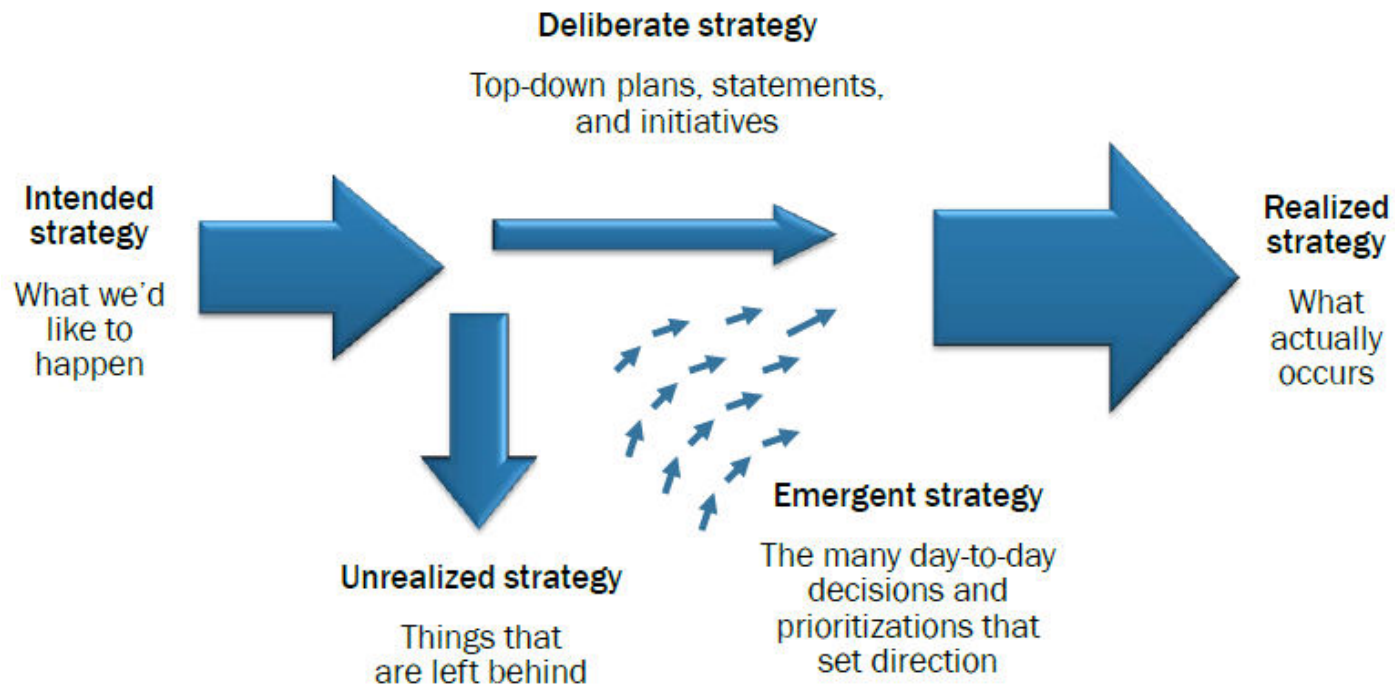
# Building Future-Ready Enterprises



Source: Rhodes & Nightingale; MIT

# Strategy as Ecology

- Stand-alone strategies don't work when the organization success depends on the collective health of a group of organizations that influence the creation and delivery of the firm's products and services.
- An organization that takes an action without understanding the impact on the ecosystem as a whole is ignoring the reality of the networked environment in which it operates.





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**1** Strategy as Ecology

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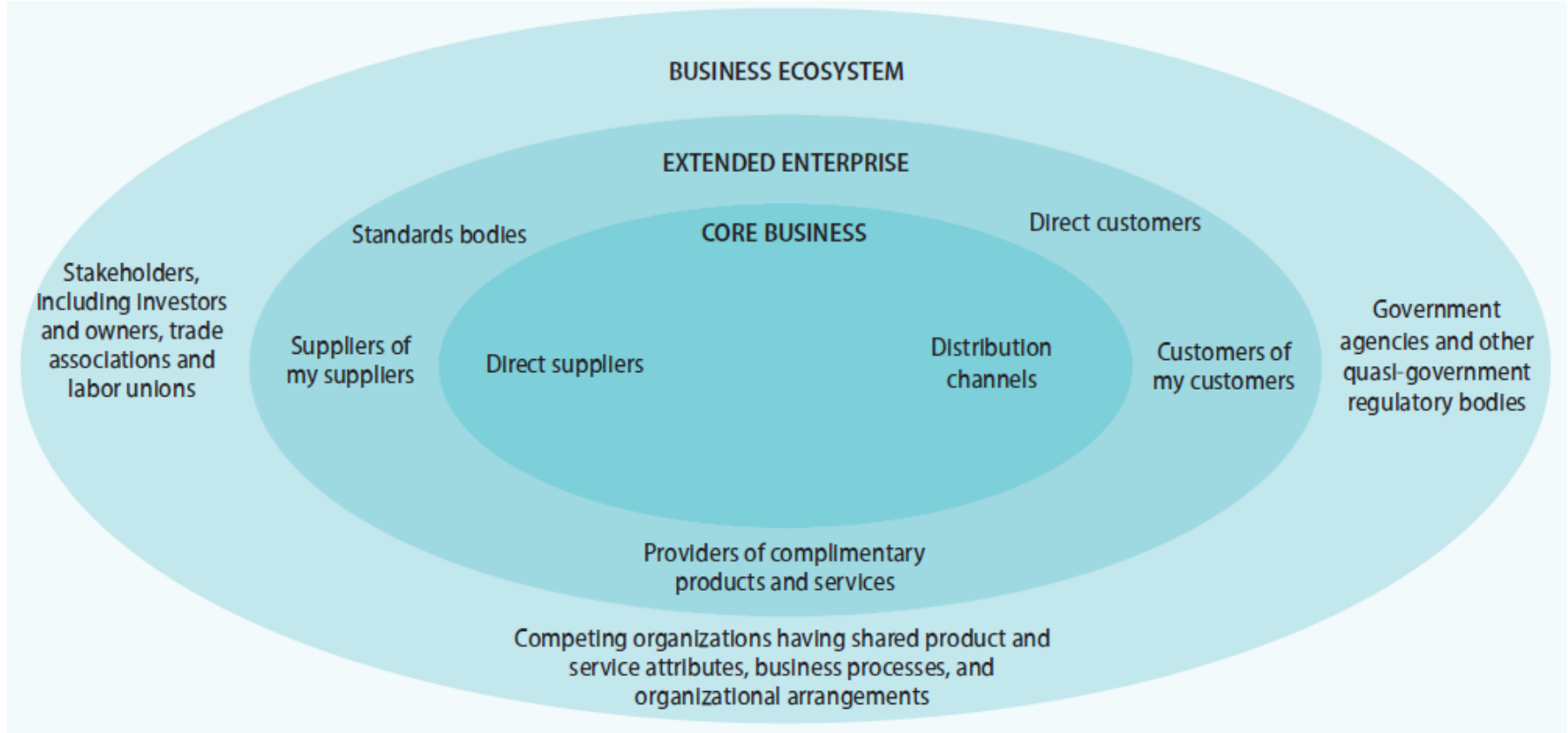
**4** Examples from the Industry

**5** Business Ecosystem Architecture Modeling

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# Business Ecosystem



- A “business ecosystem” – a network of organizations and individuals that co-evolve their capabilities and roles and align their investments so as to create additional value and/or improve efficiency.



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# Business Ecosystems Roles

## The influencers

The ecosystem outsiders that influence the hub's strategy and rules

## The hub

The ecosystem strategist and rule maker; separates the complex problem in parts, establishes priorities and oversees making of the complex solution

## Connectors & integrators

Connect the parts of the solution in complex solution

## Facilitators, representatives, promoters

Promote other players and facilitate their interaction

**SCALES:** Solve parts of problem that need economy of scale or scope

**NICHES:** Solve parts of problem that need agility & nimbleness

**INNOVATORS:** Solve parts of problem that need new thinking

Generate human resources and knowledge for solvers

Raise capital for solvers, allocate resources and risk for all ecosystem

**Talent & knowledge**

**Capital**

## Infrastructure

Provide shared infrastructure for ecosystem

**Architects**

**Constructors**

**Solvers**

**Resources**

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# Cities as System-of-Systems

## Example: City Ecosystem

### Government & utilities

City promotion  
District regeneration projects  
Employment promotion  
Business promotion  
Academia promotion  
Entrepreneurship promotion  
Digital & physical infra. promo.

City government  
State, national, EU gov.  
District government  
Water utility  
Transport utility  
Digital networks  
Housing & urban spaces

### Businesses

Large players  
SMEs  
Micro enterprises  
Business associations &  
Chambers of Commerce

Banks  
Private equities  
Business networks

### Intermediators

Job platforms  
Funding agencies  
Trusts, foundations  
Cross-ecosystem networks  
Themed alliances

### Academia

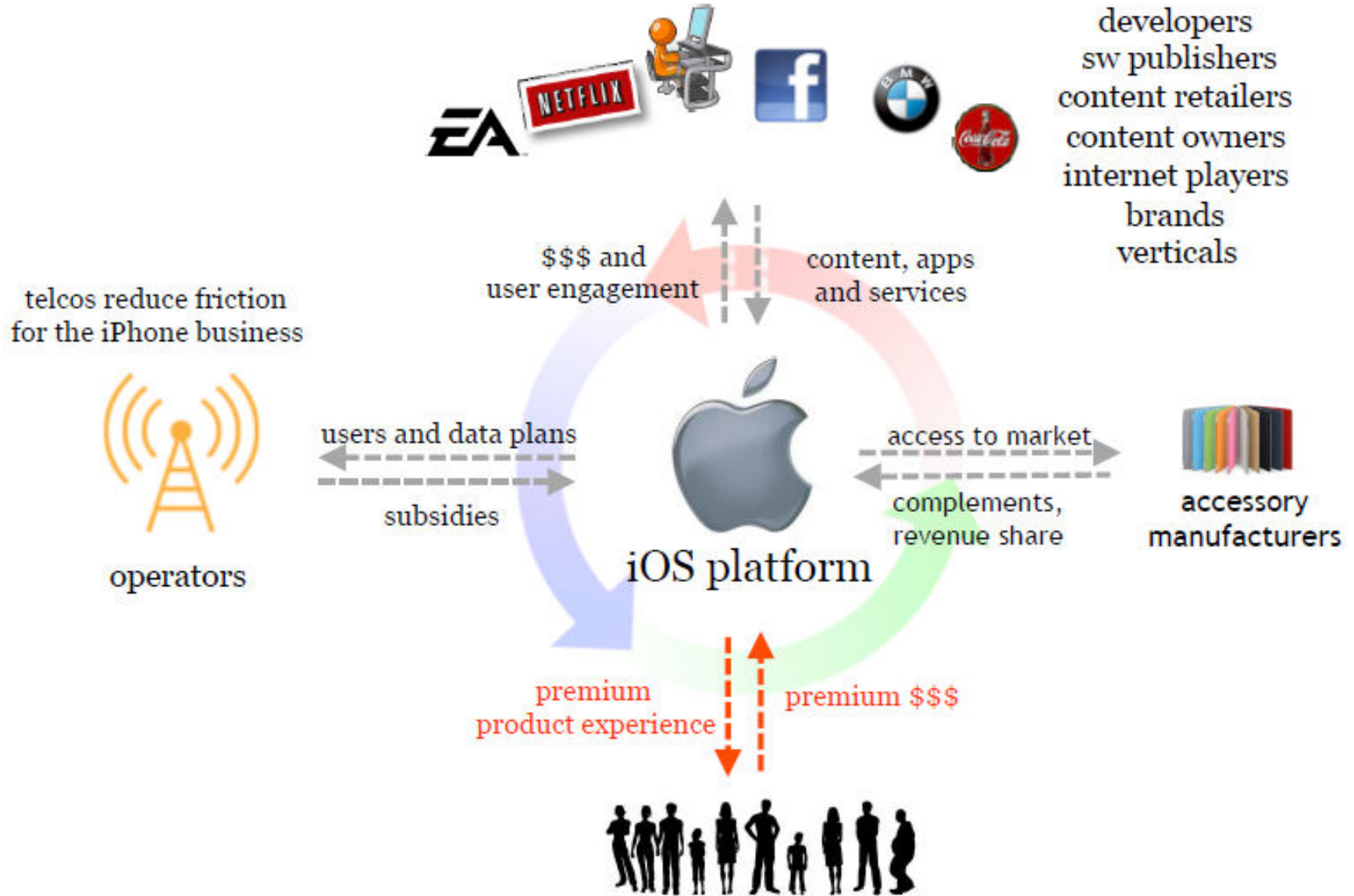
Apprenticeship programmes  
Colleges  
Universities  
Research institutes  
K12  
Research parks

### Entrepreneurs

Start-ups  
Start up grown-ups  
Incubators, accelerators  
Co-working spaces  
Events & temporary spaces  
Seed investors

Business angels (+associations)  
Venture capitalists  
Tech media  
Mentors, community,  
Networks, associations

# iOS Platform Ecosystem



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# What is a System?

- A system is defined as a set of **interrelated things** encompassed by a permeable boundary, **interacting** with one another and an external environment, forming a **complex but unitary whole** and working toward a **common overall goal**.
- Distinctive characteristics:
  1. The parts of a system must all be functioning in an unified manner for the whole system to function coherently.
  2. The parts of a system must be arranged in a specific way for the system to carry out its purpose.
  3. Smaller systems are contained within larger systems (system of systems).
  4. Systems have feedback, which are captured via causal relationships.



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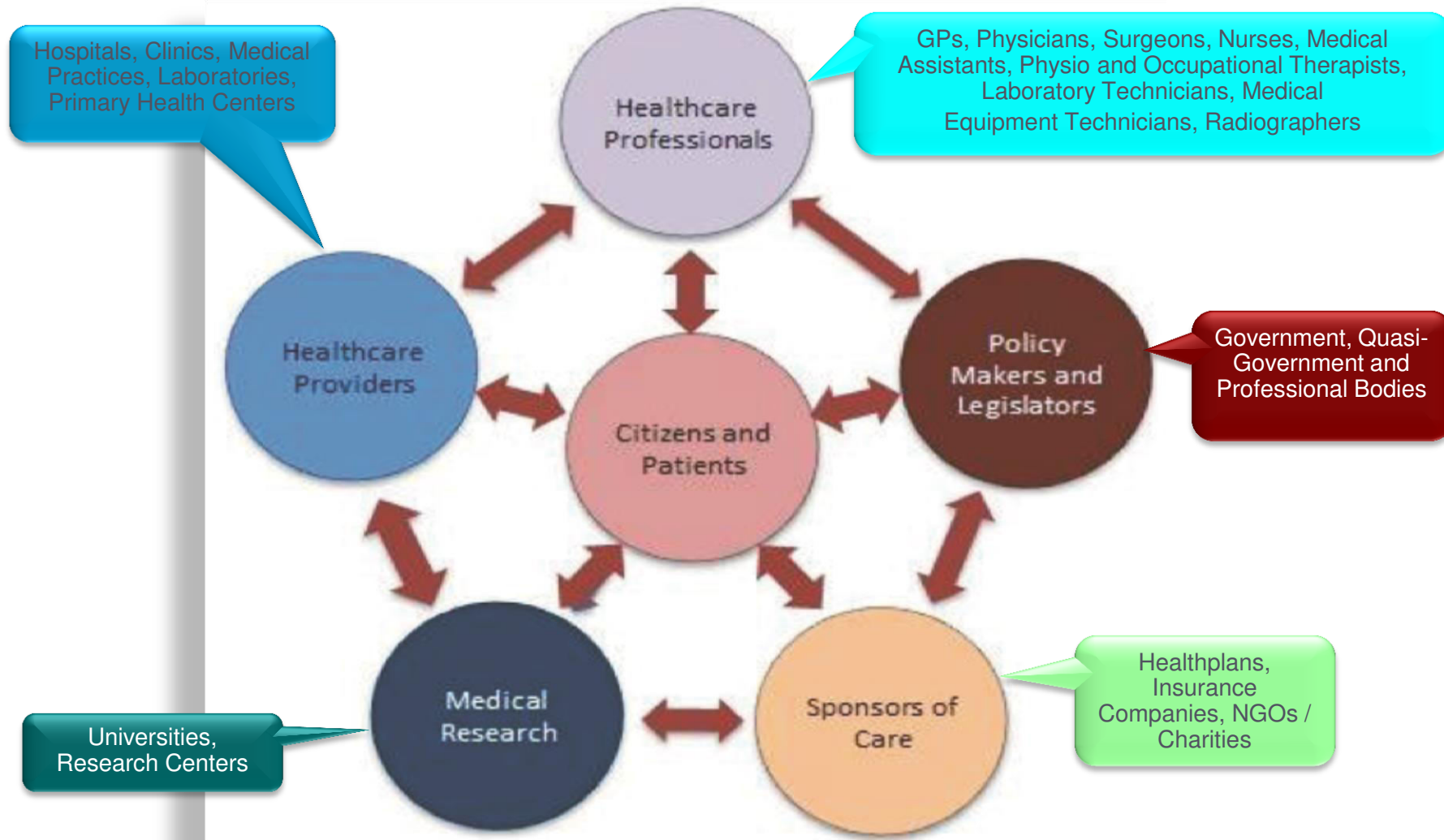
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# Global Health Challenges



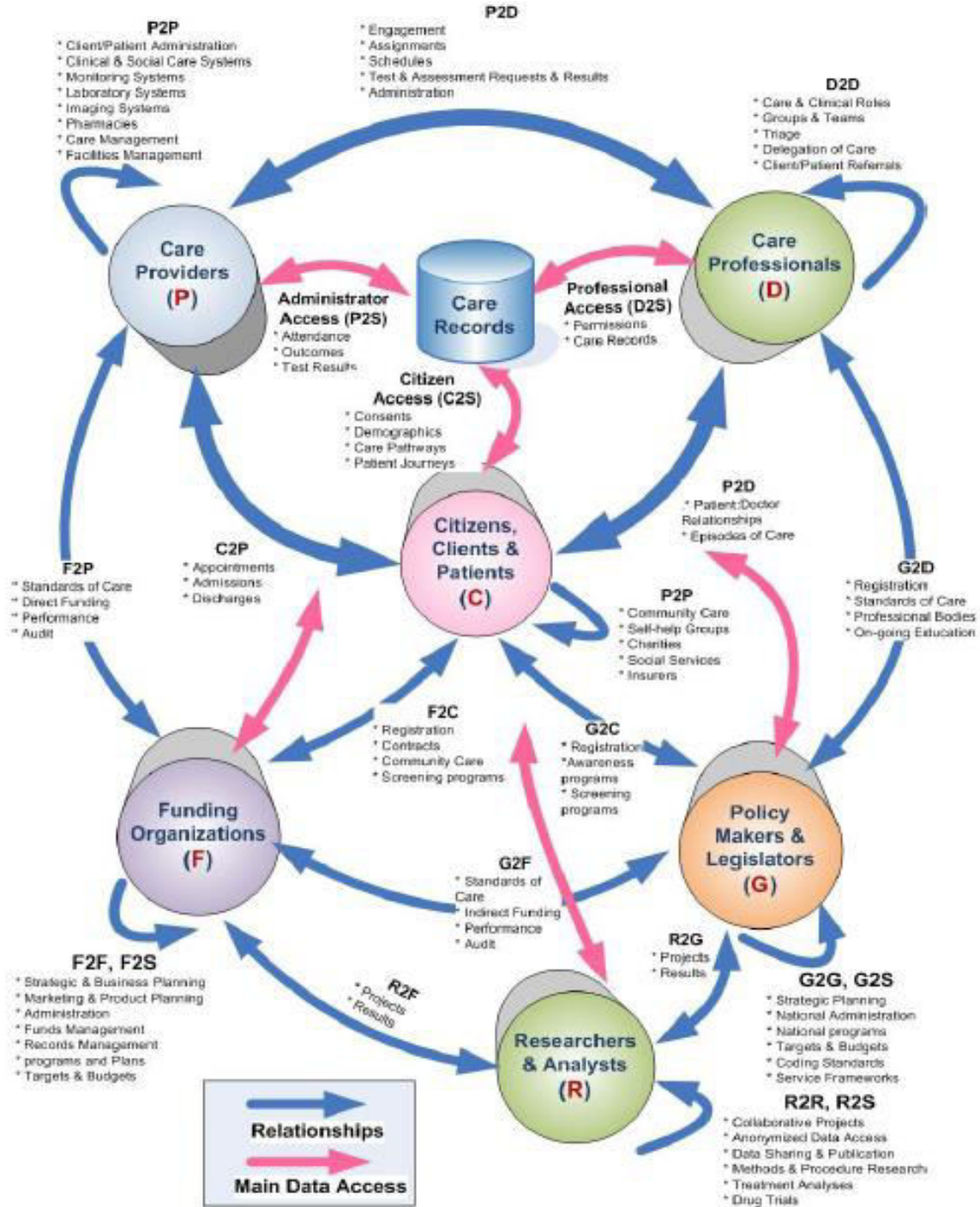
Adapted From: Connected Health Framework Version 2; Microsoft; 2010

# Health Ecosystem Stakeholders

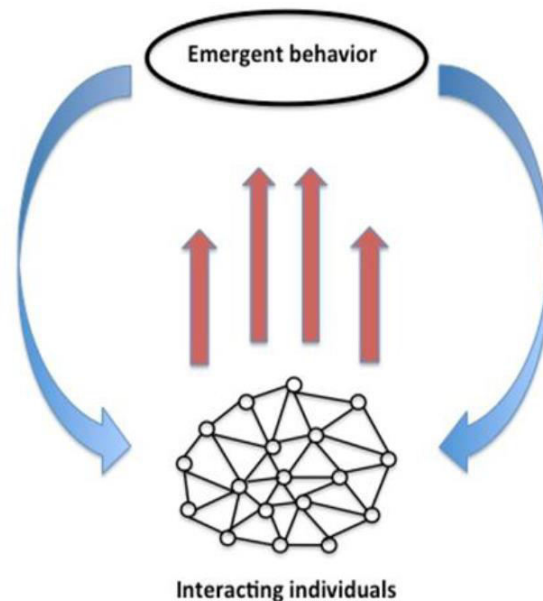


Adapted From: Connected Health Framework Version 2; Microsoft; 2010

# Health Ecosystem and Key Business Functions



Any assumption that the effectiveness of the whole will be achieved automatically, as long as the parts are optimal, are no longer true in the systemic paradigm.



Enterprises are **Complex Adaptive Systems**

# Comparing Acute and Chronic Diseases

	Acute Disease	Chronic Illness
1. Onset	Abrupt	Usually gradual; long latency period
2. Duration	Limited and time bound	Lengthy and indefinite
3. Cause	Usually single	Usually multiple (co-morbidities); changing in nature over time; may cause functional impairment
4. Diagnosis & Prognosis	Usually accurate	Often uncertain
5. Medical Intervention	Usually effective and precise	Often indecisive; adverse effects common
6. Outcome	Cure	Long term management
7. Uncertainty	Minimal	Pervasive
8. Patient Involvement	Passive; only as recipients of the treatment	Active; sometimes for administration of medication
9. Strategy	Treatment efficacy	Prevention or delay in onset; disease management



# Business Building Blocks for CDM



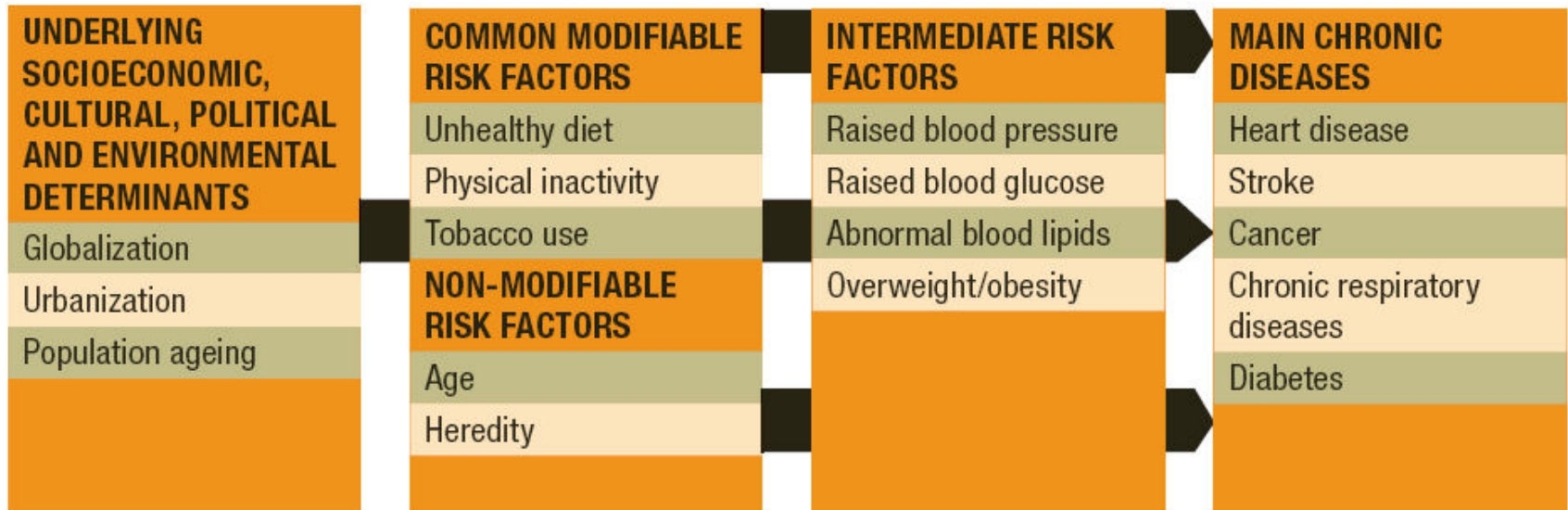


# (Disturbing) Facts about Chronic Diseases

1. 388 million people will die in the next 10 years of a chronic disease.
2. 70% of these deaths will occur in low and middle income countries.
3. Common, modifiable risk factors underlie major chronic diseases.
4. Chronic diseases constitute more than 70% of the disease burden.
5. Healthcare systems are designed for acute care, not chronic care.
6. Poverty and hindrance in economic development increases the threat.
7. The direct and indirect economic costs of chronic diseases are immense.
8. Large countries will forego in excess of \$ 1 trillion in national income.
9. 80% of premature heart disease, stroke and diabetes can be prevented.

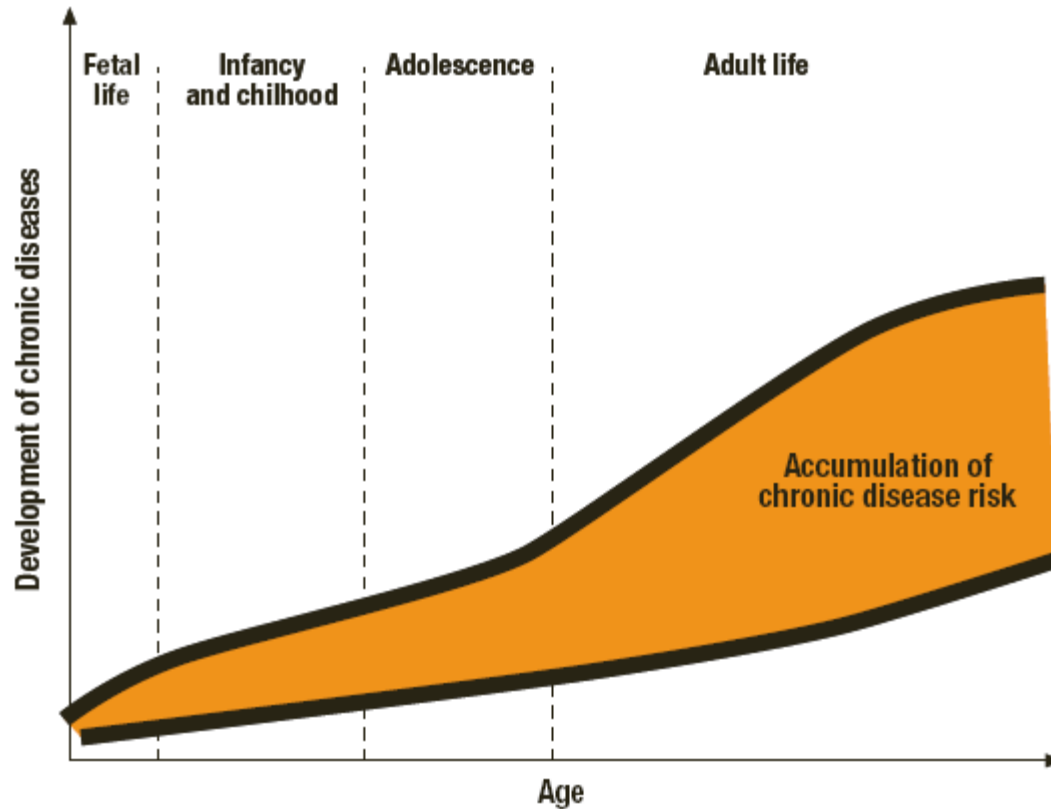
Source: Preventing Chronic Diseases – A Vital Investment; WHO; 2005

# Triggers for Chronic Conditions



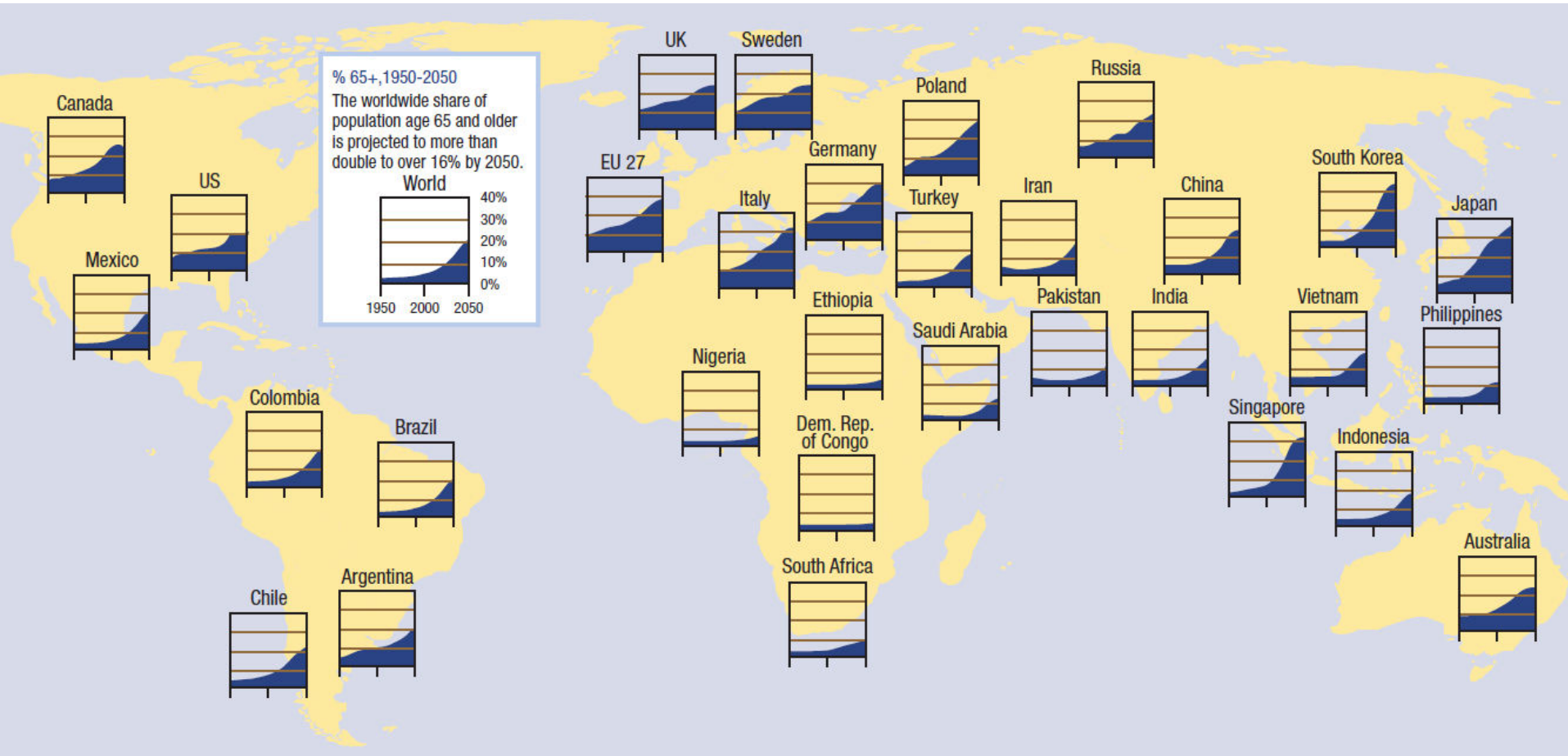
Source: Preventing Chronic Diseases – A Vital Investment; WHO; 2005

# Risk Accumulation of Chronic Diseases



Source: Preventing Chronic Diseases – A Vital Investment; WHO; 2005

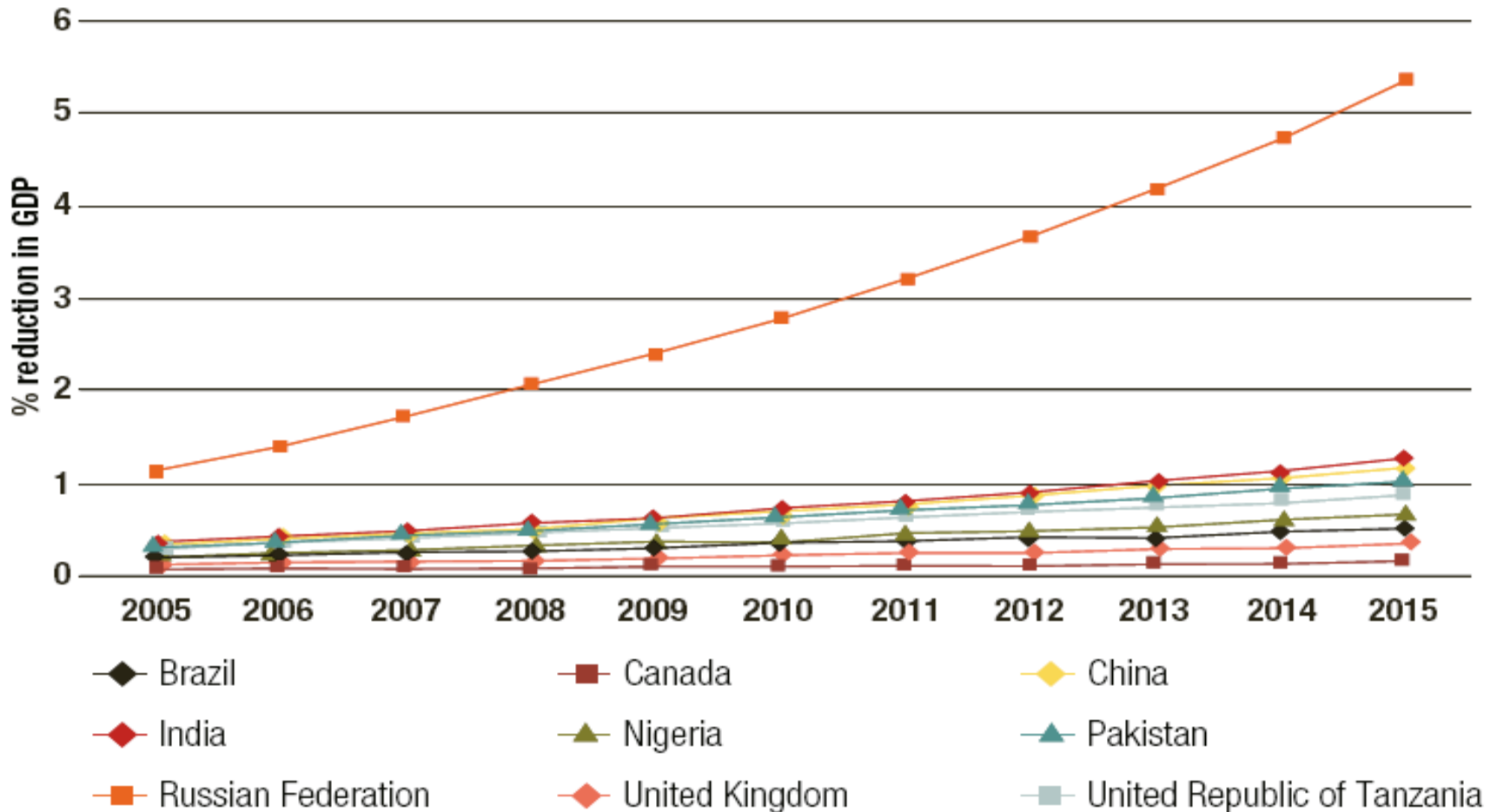
# Global Ageing 2005 - 2030



Source: Transforming Pensions and Healthcare; WEF; 2009

# The Economic Cost

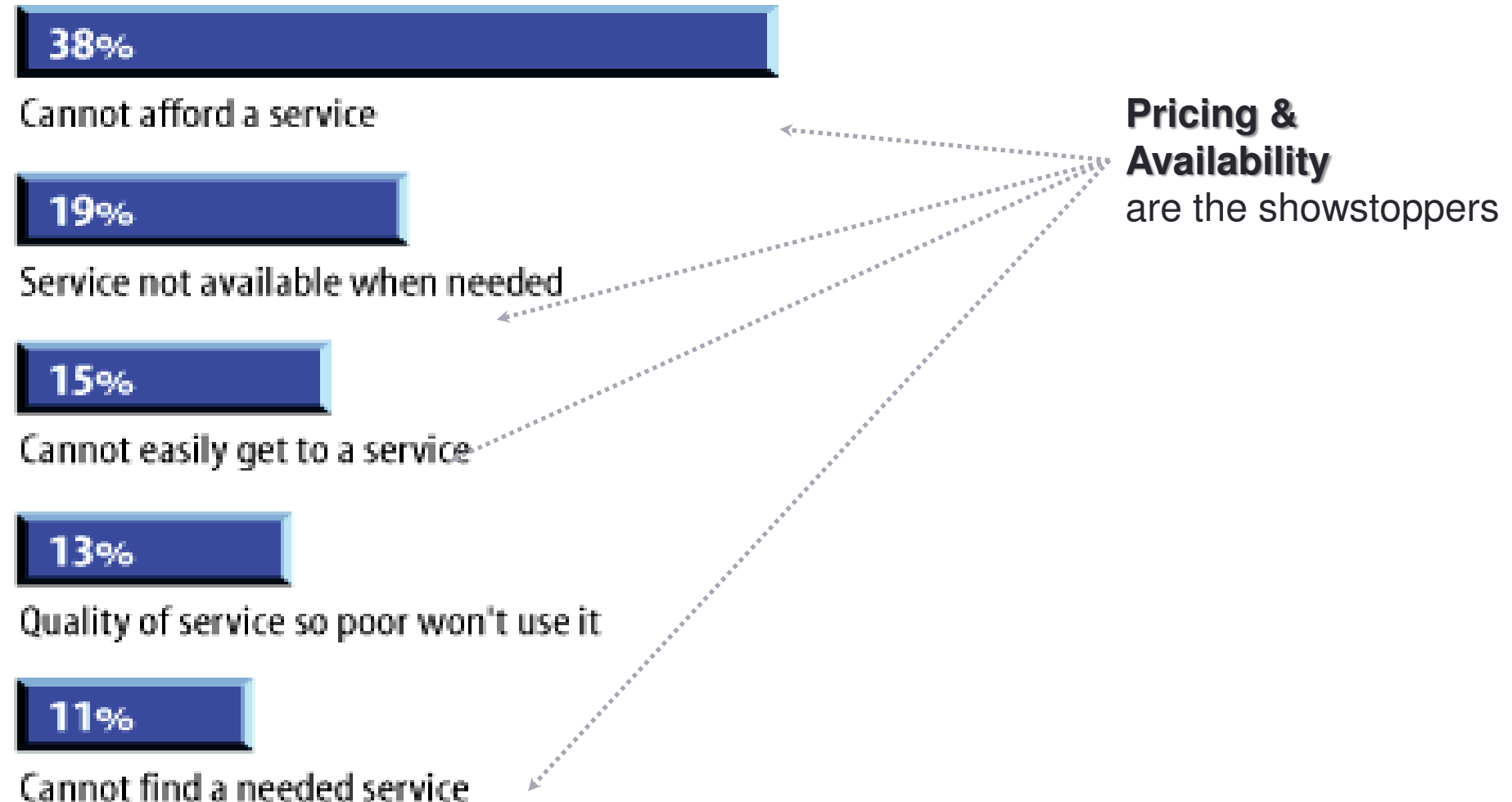
## Projected Annual Reduction in GDP from deaths due to Heart Disease, Stroke and Diabetes as a Proportion of GDP (2005 – 2015)



Source: Preventing Chronic Diseases – A Vital Investment; WHO; 2005

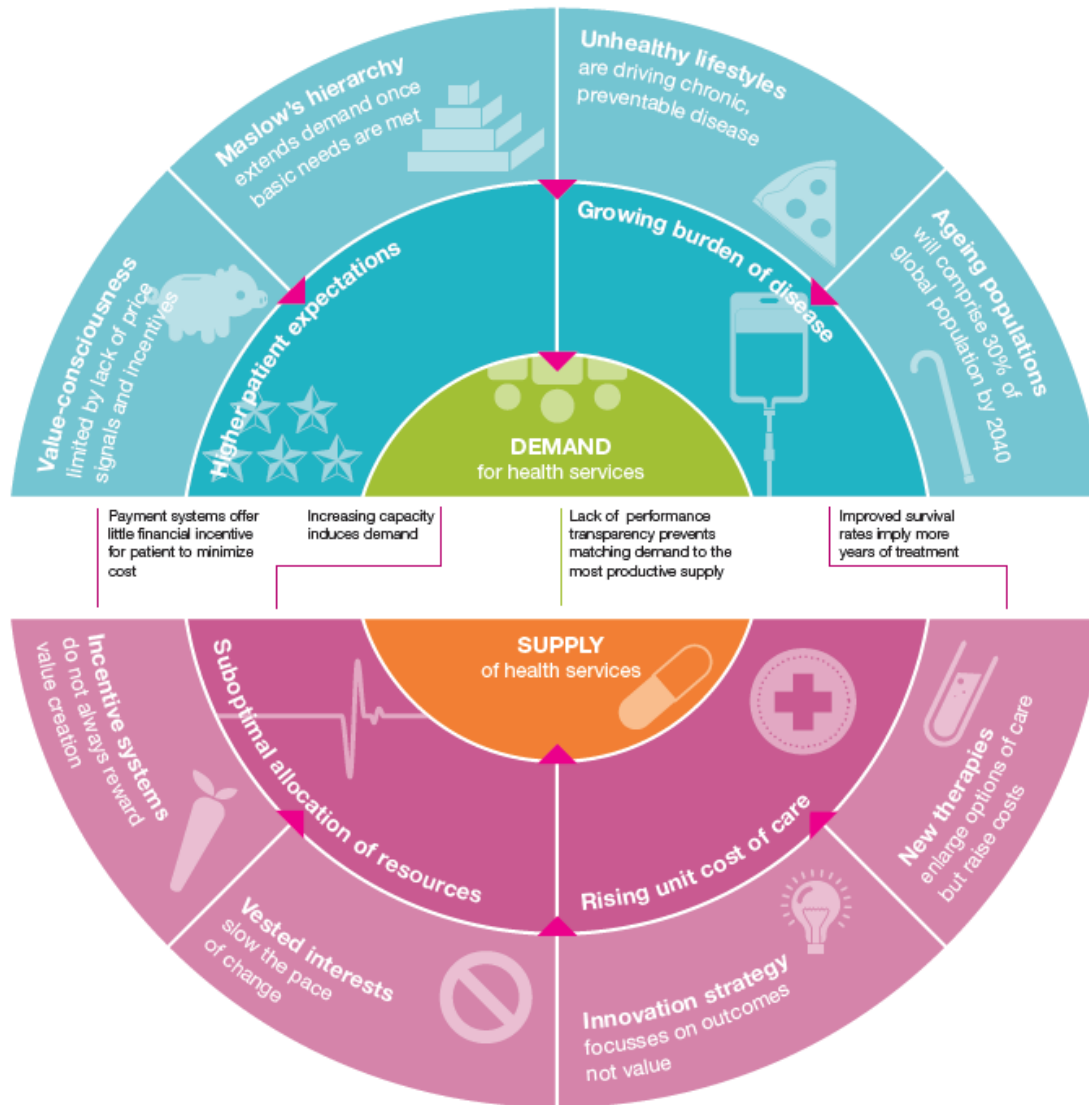
# People with Chronic Conditions Often Cannot Get the Care They Need

## Problems Encountered by People with Chronic Conditions



Adapted From: Preventing Chronic Diseases – A Vital Investment; WHO; 2005

# Drivers of Rising Healthcare Expenditure



Source: Sustainable Health Systems; WEF; 2013



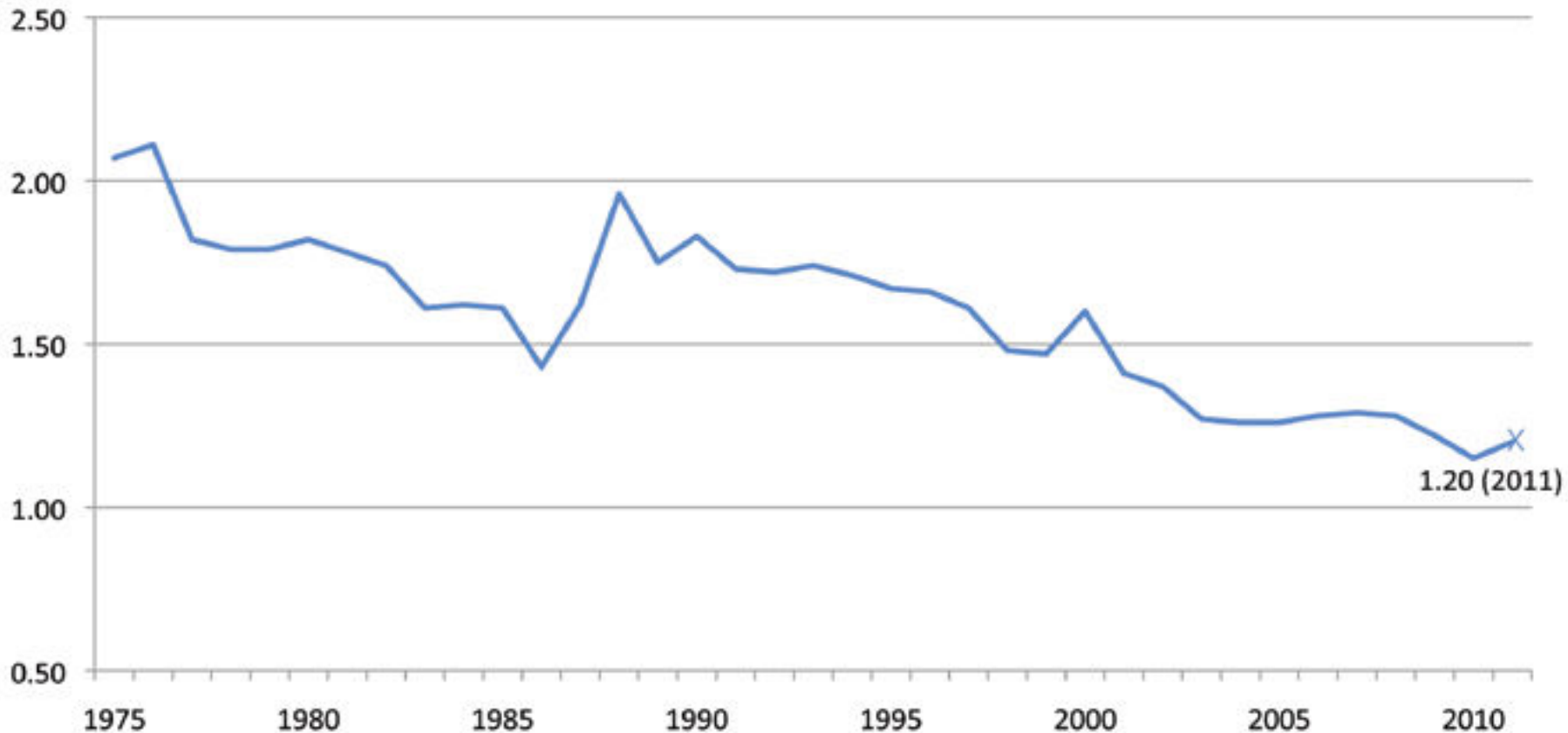
# Shrinking Pool of Potential Care Givers



**Birth rates** are falling in developed countries, in Singapore it is **precarious (TFR 1.15)**.

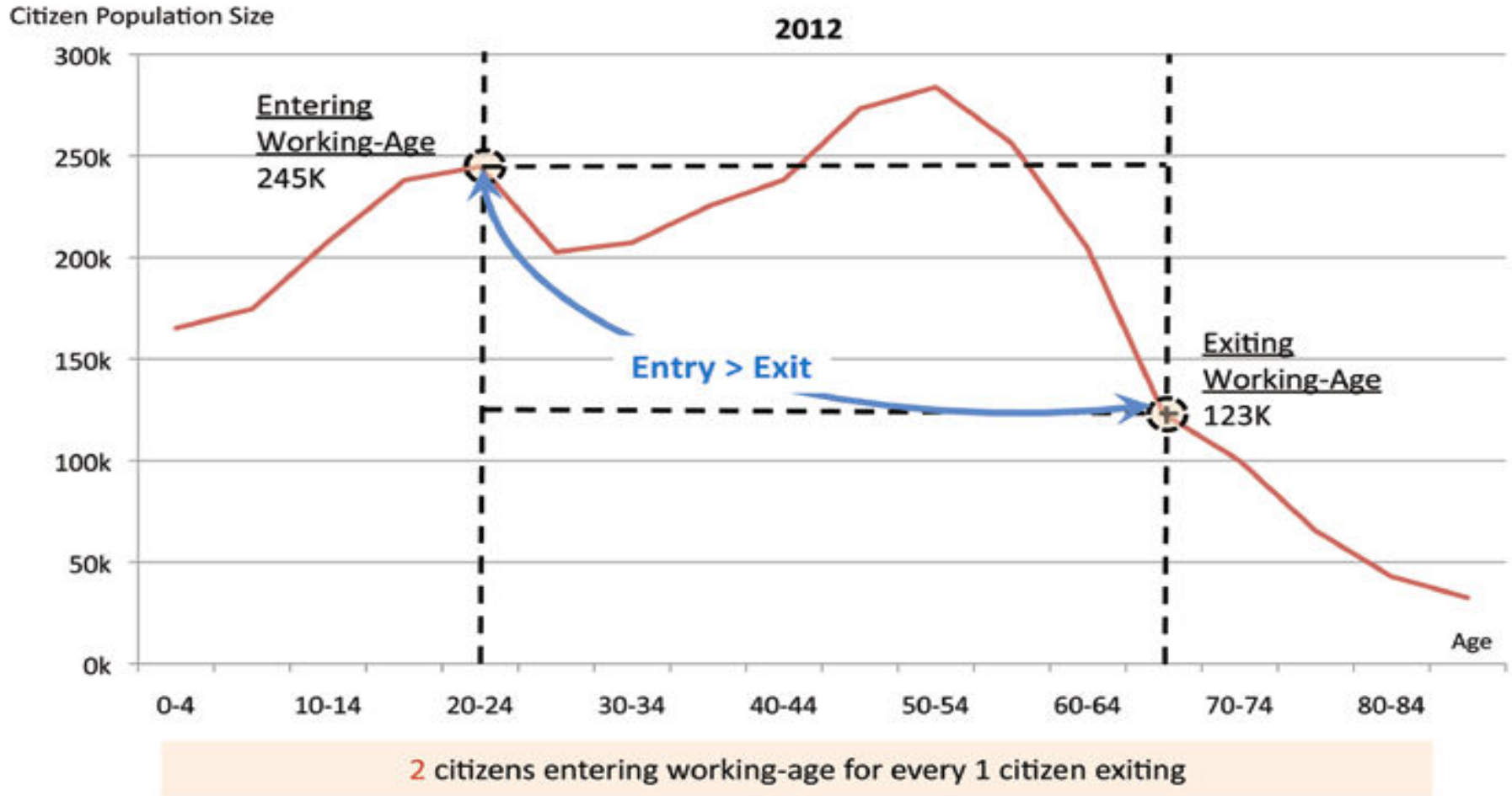
# Singapore TFR 1975 - 2011

Resident total fertility rate (TFR)



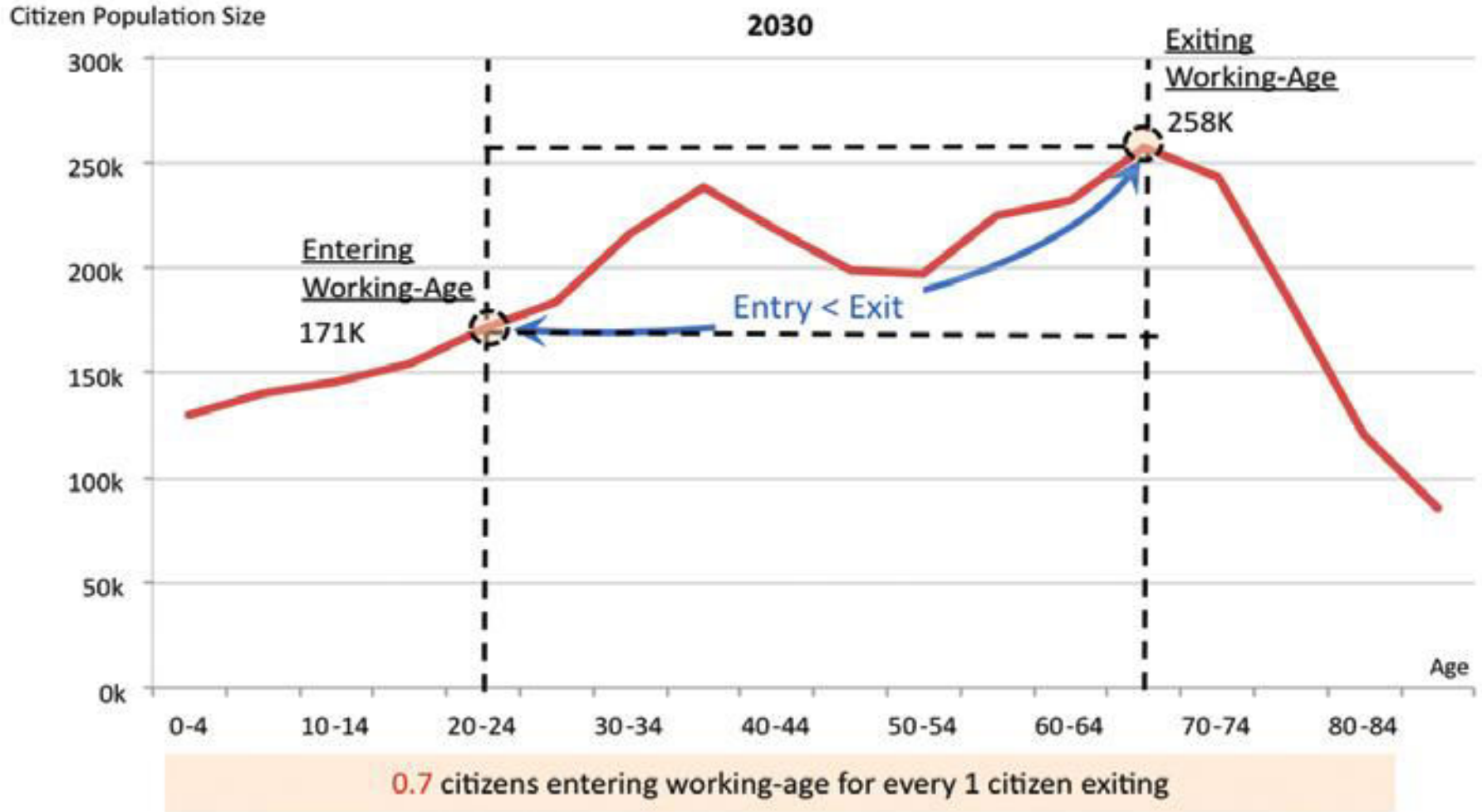
Source: Population White Paper; NPTD – Prime Minister's Office; 2013

# Citizens in Working Age Group 2012



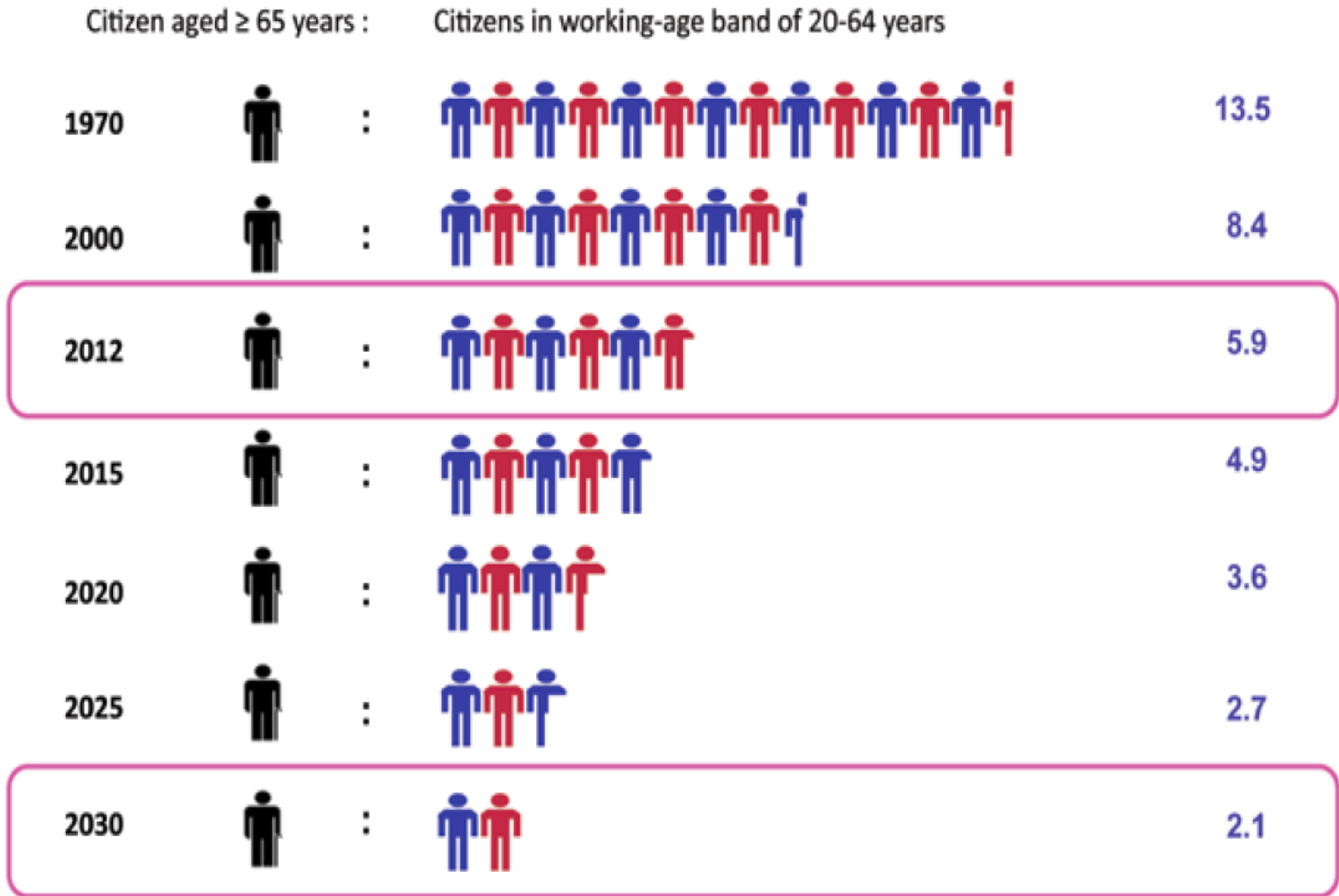
Source: Population White Paper; NPTD – Prime Minister's Office; 2013

# Citizens in Working Age Group 2030



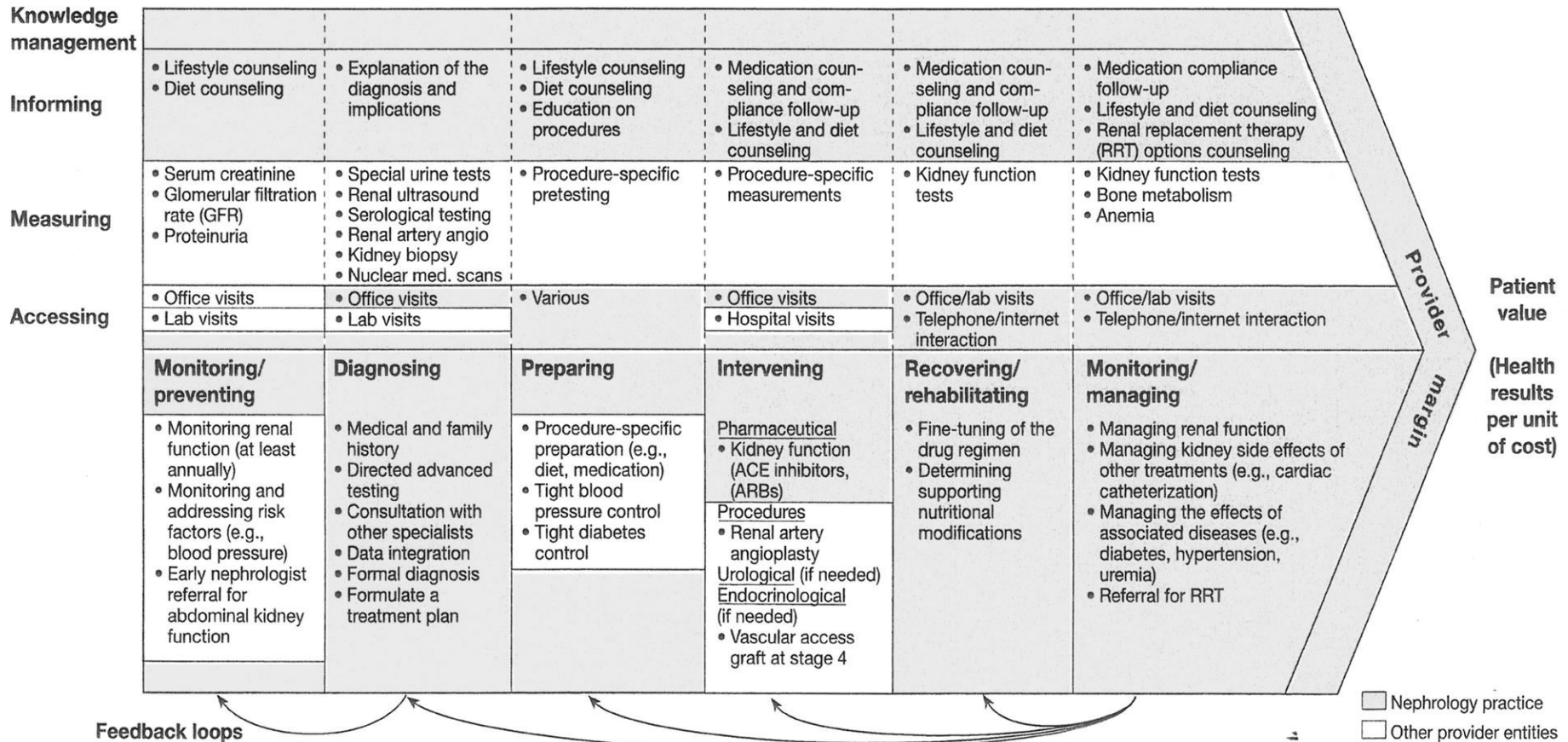
Source: Population White Paper; NPTD – Prime Minister's Office; 2013

# Old Age Support Ratio 1970 - 2030



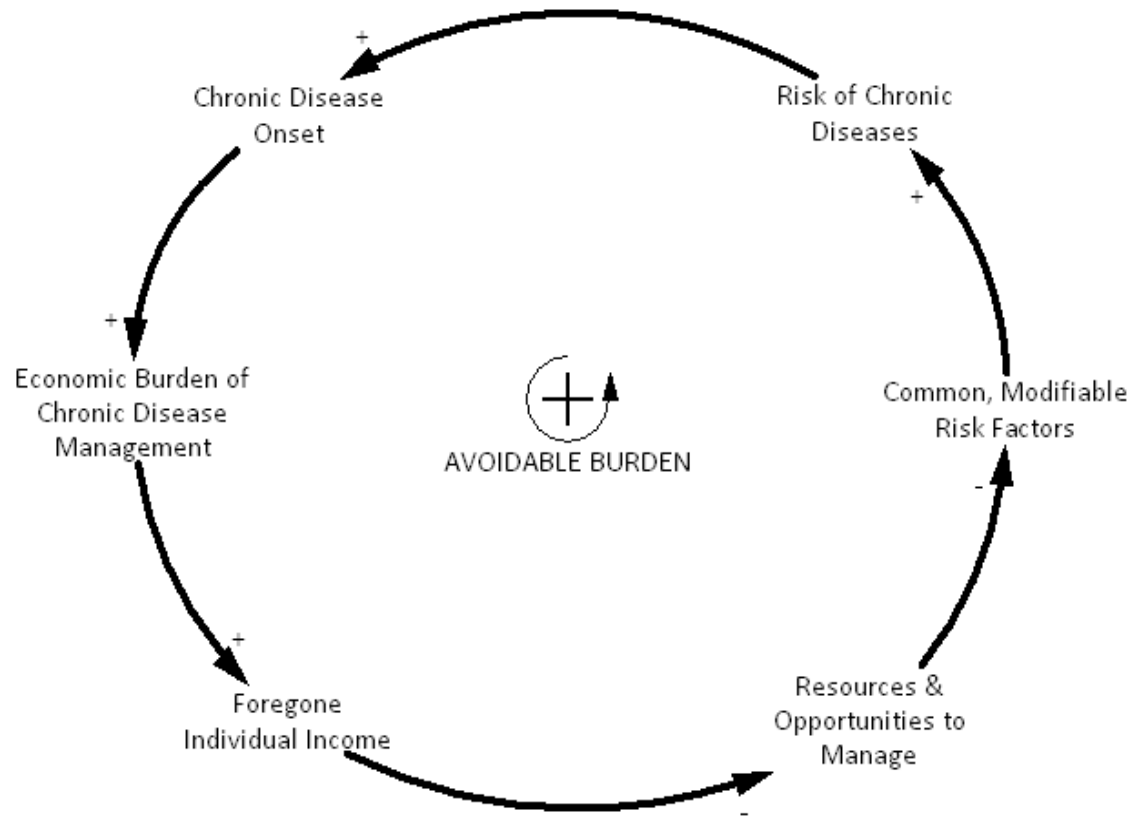
Source: Population White Paper; NPTD – Prime Minister’s Office; 2013

# CDVC for Chronic Kidney Disease





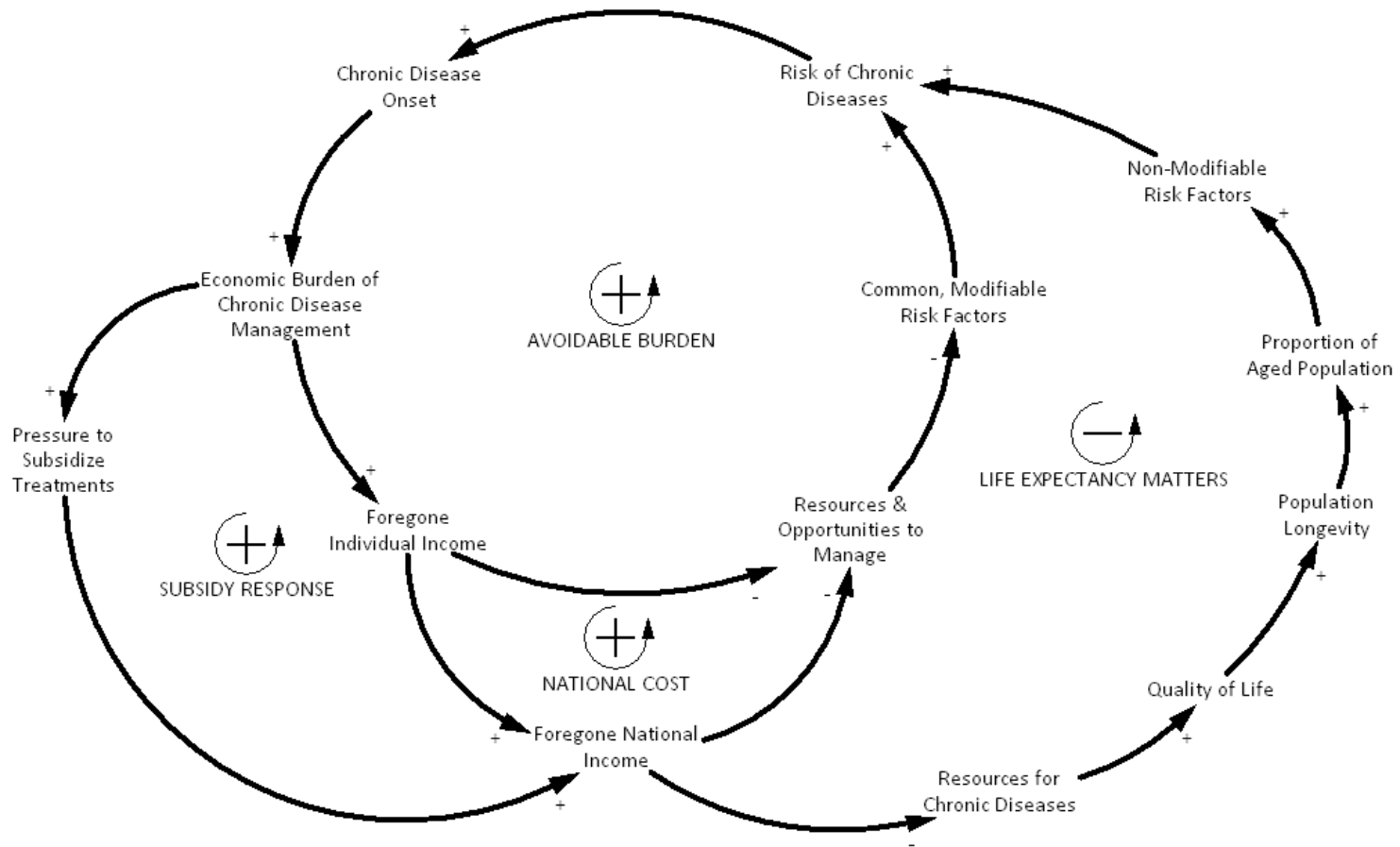
# 1: Business System Model (Nodal Loop)



Source: SingHealth Enterprise Architecture Blueprint ; NUS-ISS & JHS; 2010

Common, modifiable risk factors leads to onset of chronic diseases, which further leads to economic impact both for the individual and the country.

# 2: Business System Model (Extension 1/4)



Source: SingHealth Enterprise Architecture Blueprint ; NUS-ISS & IHS; 2010

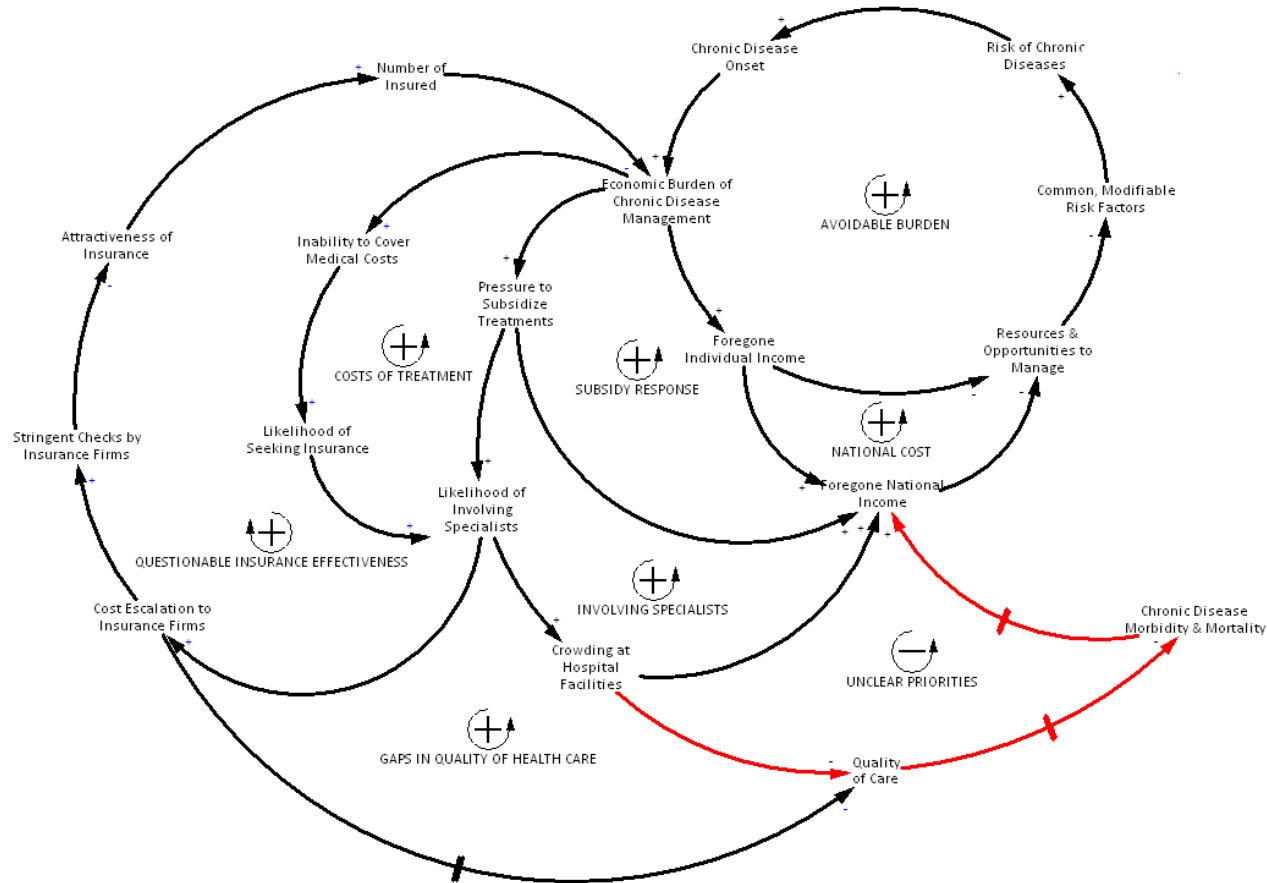
The economic burden increases pressure on the government to subsidize disease care, foregone individual income leads to negative impact on GNI. This leads to reduction in available resources for healthcare which further increases the risk of chronic diseases. Increasing life expectancy makes matters even worse.







# 5: Business System Model (Extension 4/4)



Source: SingHealth Enterprise Architecture Blueprint ; NUS-ISS & JHS; 2010

As cost of treatments escalate, people attempt to cover through insurance. The insured prefer specialists (over GPs), thus increasing the overall costs. As the costs rise, the insurance firms become more stringent in their checks and approvals. This increases the incidents of non-coverage, thereby reducing the attractiveness of insurance, which further reduces the likelihood of healthy population getting insured leading to increase in premiums.



# Action Items for Chronic Disease Management

(Singapore National Budget 2011)

---

1. Establish the Geriatric Education and Research Institute.
2. Expand the Home Nursing Foundation.
3. Scale up operations of the Agency for Integrated Care.
4. Contribute to the Community Silver Trust.
5. Expand the Medifund budget.
6. Extend the Medication Assistance Scheme.
7. Encourage step-down care with the expanded Primary Care Partnership Scheme.

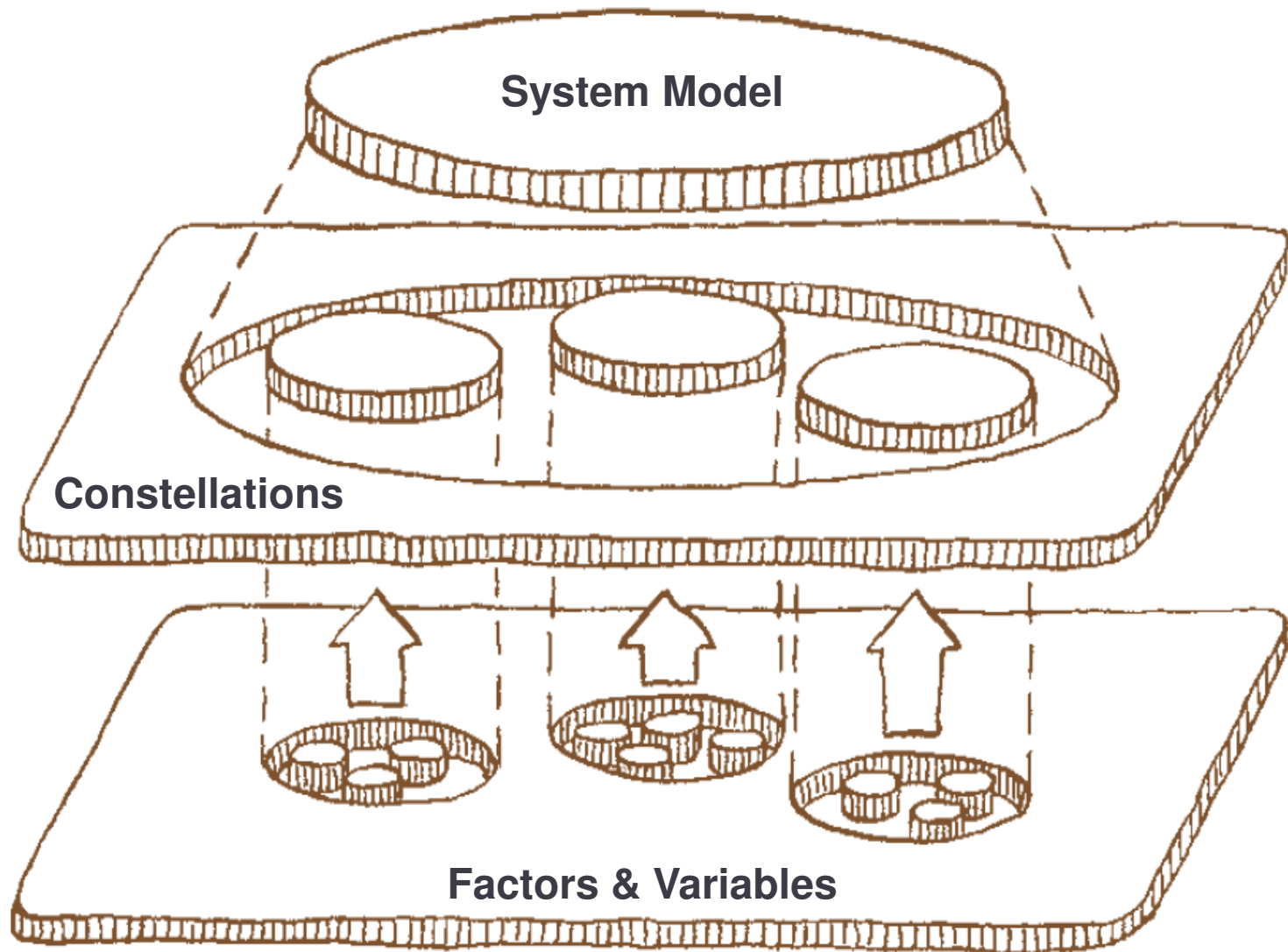
# Realizing Strategy with Progressive Action Items

Action Items Announced in Budget 2011

Strategic Interventions Identified

	1. Establish the Geriatric Education and Research Institute	2. Expand the Home Nursing Foundation	3. Scale up Operations of the Agency for Integrated Care	4. Contribute to the Community Silver Trust	5. Expand the Medifund Budget	6. Extend the Medication Assistance Scheme	7. Step-Down Care with the Primary Care Partnership Scheme
1. Mitigate Modifiable Risks							
2. Increase Screening							
3. Reduce CDM Costs	✓	✓✓	✓	✓✓	✓✓	✓✓	✓
4. Investigate Non-Modifiable Risk Factors	✓✓						
5. Accelerate GNI Growth							
6. Minimize Inequality							
7. Continuity of Care	✓	✓✓	✓✓	✓			
8. Monitor Medication Compliance		✓	✓				
9. Step-Down Care		✓✓	✓	✓			✓✓
10. Incorporate Insurance Guarantee							

# The Process of Synthesis



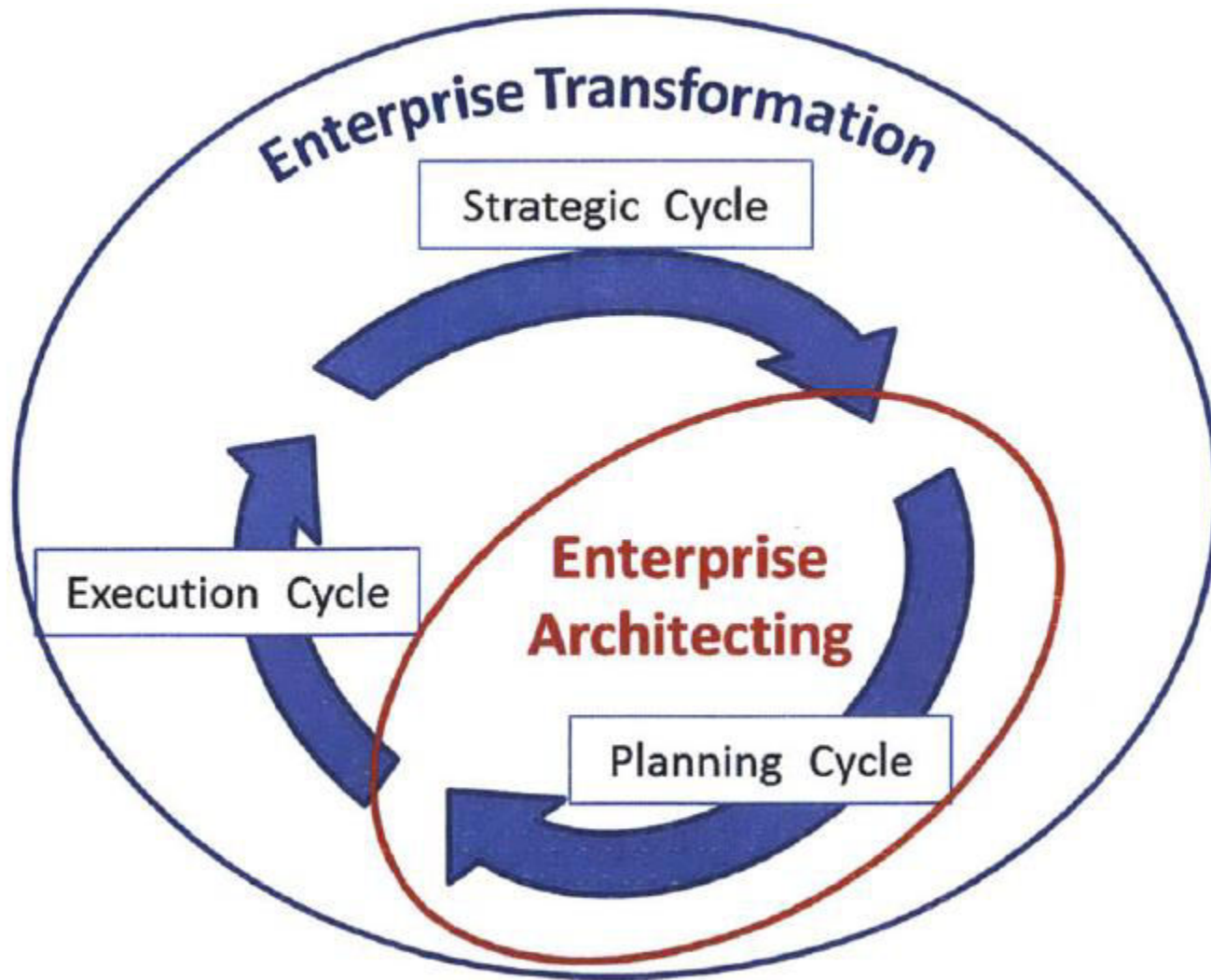
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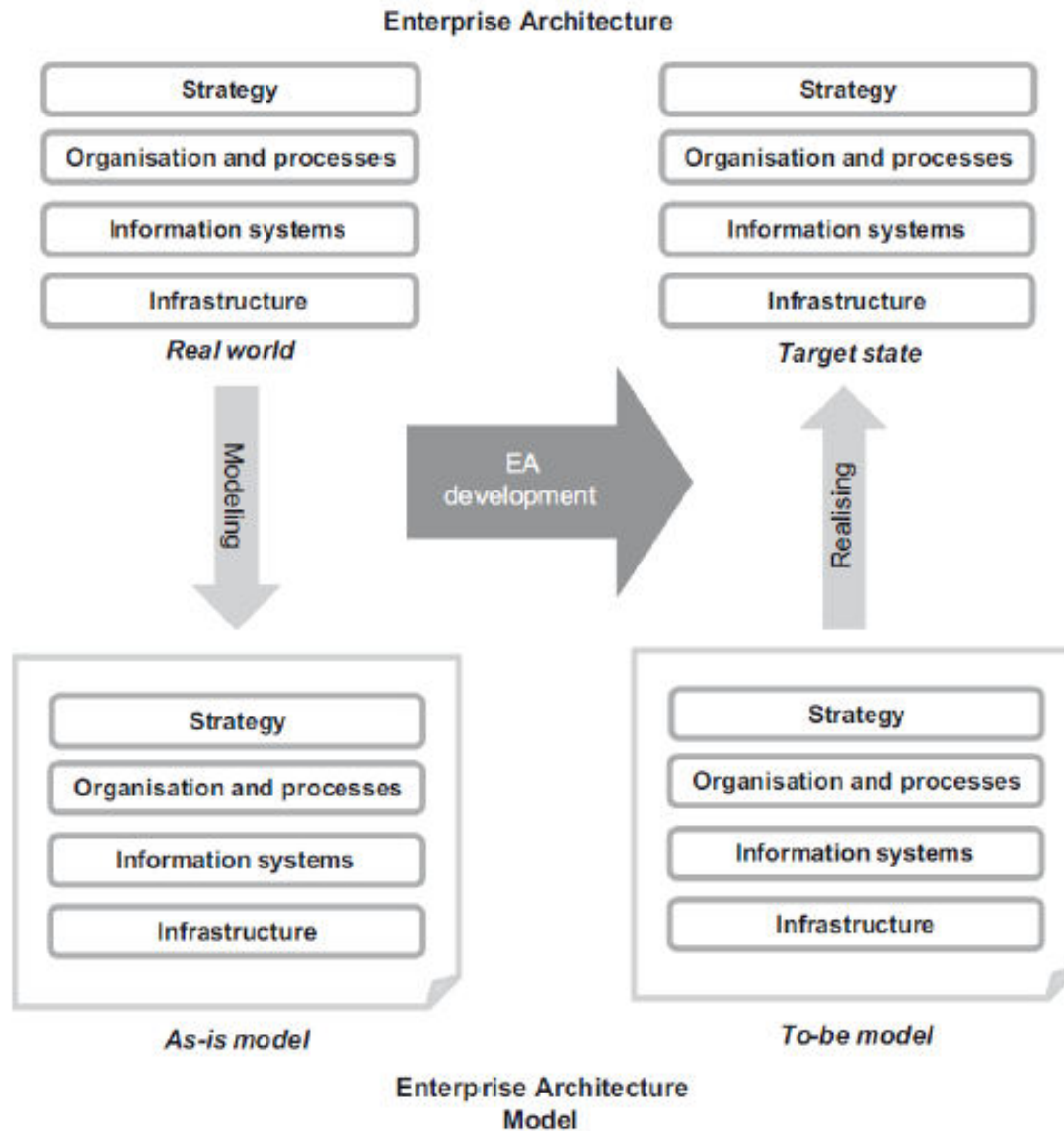


# Realizing Transformation with EA



Source: Rhodes & Nightingale; MIT

# The Cycle of Architecting



# Key Takeaways

## ■ Conclusions

### ■ We need enterprise architecture:

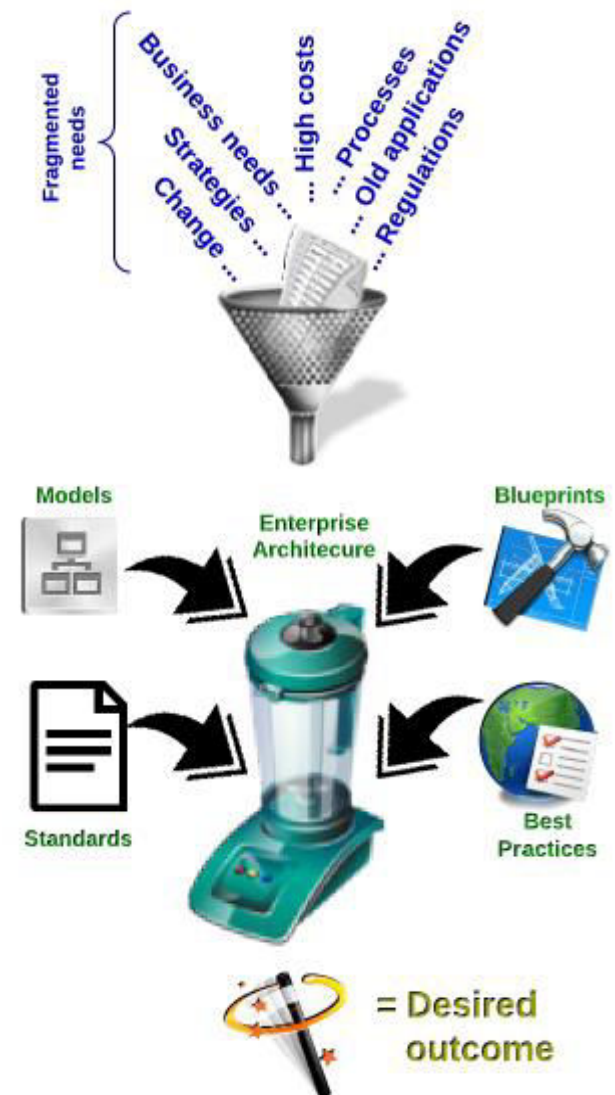
- To tackle complexity.
- To understand the enterprise on a holistic basis (business, technology and operating environment).
- To effectively direct the enterprise to deliver strategic business goals by aligning capability (or, at least minimise the gap as far as possible between want and delivery of the want) to direction.

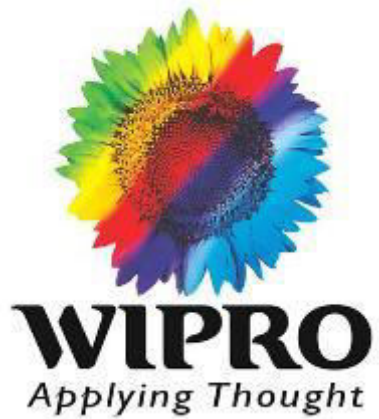
### ■ Enterprise architecture is:

- About understanding all elements that make an Enterprise and how they relate to one another
- Providing ongoing strategic alignment and optimisation of capability for business success

### ■ Wipro's view of enterprise architecture is:

- Enterprise Architecture is a discipline that engages and holistically enables the delivery of the business imperatives of an enterprise via a process that encompasses two core value propositions; capability planning and operational optimisation.
- Wipro has developed a set of products that enables and accelerates EA





**Thank You**

**[pallab.saha@wipro.com](mailto:pallab.saha@wipro.com)**

