



# Managing health claims *A Singapore Case Study*

*23 March 2018*

# Table of contents

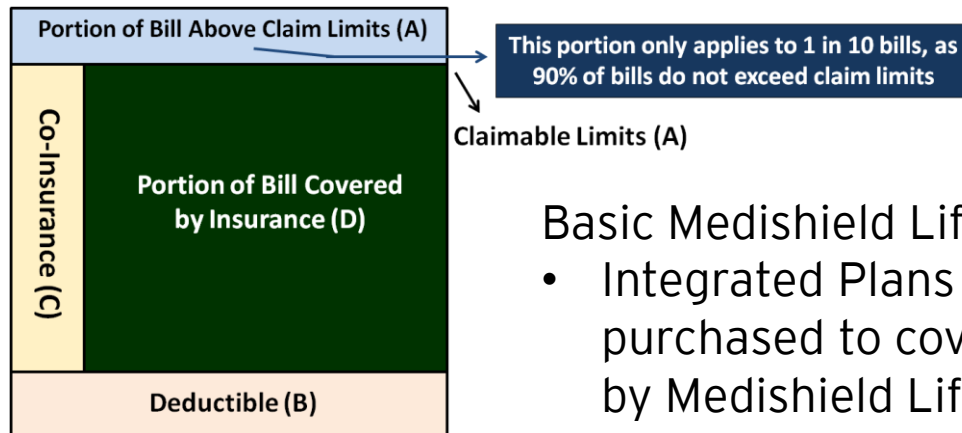
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- ▶ Overview of health insurance in Singapore
- ▶ Managing health insurance claims with Analytics
- ▶ Conclusion



# Medishield Life and Integrated Plans: The Singapore model

- ▶ Public Basic Medical Insurance scheme to cover In Patient Medical Claims from Government Hospitals Ward C
- ▶ Customers can buy additional “Integrated Shield Plans” from Private Insurers to upgrade coverage, and cover deductibles / co-insurance
- ▶ Can be paid via Central Provident Fund (CPF - DC Savings)



## Basic Medishield Life Structure

- Integrated Plans and other riders can be purchased to cover the items not covered by Medishield Life

**3.9mil Singaporeans are estimated to have cover under Medishield Life**

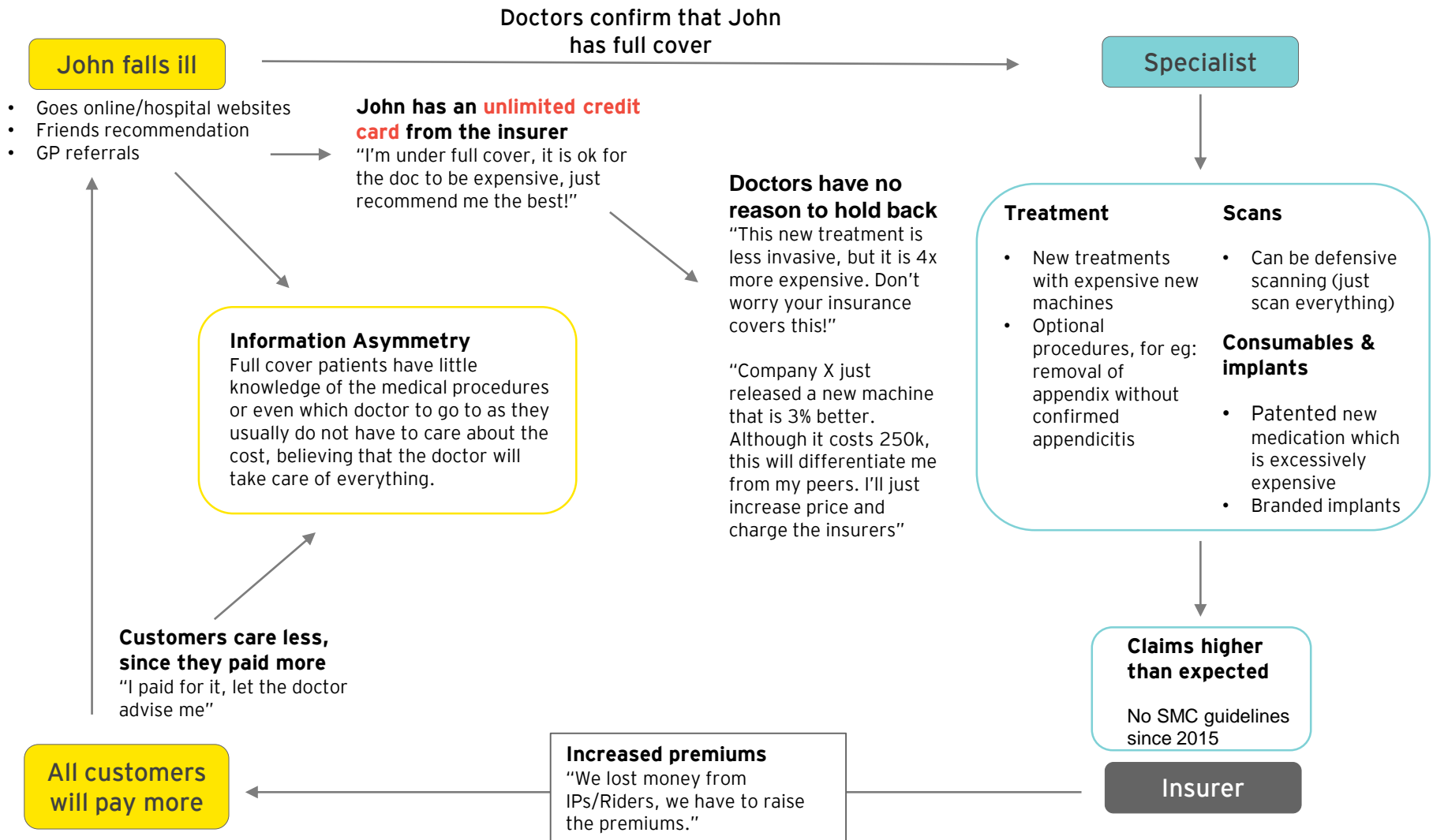
# Medical inflation in Singapore is reported at 15%, one of the highest for developed economies globally

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- ▶ Ageing population leads to higher utilization of healthcare facilities
- ▶ Greater access to public and private healthcare coupled with rising awareness
- ▶ Advances in medical technology and better treatments
- ▶ Fee for service model leading to potential over-servicing
- ▶ Increase in overheads as it's a profitable business for providers - leads to a vicious cycle

**It is important to define the business problem:  
Uncontrolled medical inflation results in significant losses on private  
health insurance portfolios**

# A typical customer / patient journey



# Raising medical insurance premiums is not a long term solution

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- ▶ Health insurance premiums are rising faster than income levels leading to pressure on affordability
- ▶ “Good risks” might downgrade coverage leaving insurers with a portfolio of “poorer risks”
- ▶ Premiums lag claims; unless premium increases allow for future claims inflation, it would be difficult to break even in the long term

## ***Australia: Fewer buying top hospital cover amidst premium hikes***

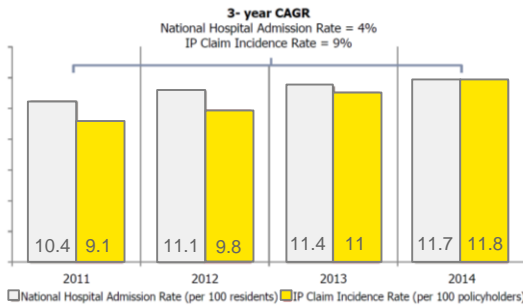
*The number of customers with top hospital cover is going to fall, as they cannot keep up with premium increases, according to the national body representing health insurance providers, Private Healthcare Australia (PHA).*

*“Premium increases above CPI are hurting consumers in a low wage growth environment,” Ms David said. “In five to six years, price sensitivity modelling shows that premiums will potentially become unaffordable for at least one-fifth of people with private health insurance.”*

# LIA Singapore 2016 Study

## Avenues for claims increase

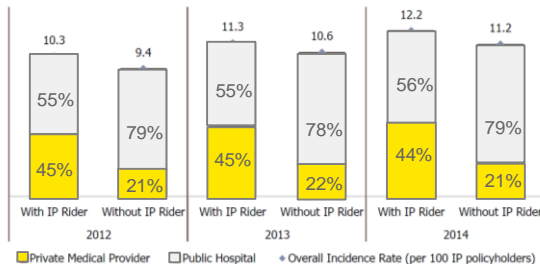
### Growth in Claim Incidence - Hospital Admission vs IP Claims Incidence



Claim incidence is increasing faster than admission rates.

- Potential that people are **finding new ways to claim**.
- Or there are **unnecessary “upgrades”** to claimable procedures.
- For instance, wisdom tooth extraction is not claimable, but wisdom tooth extraction on the basis of a suspected cyst is claimable.

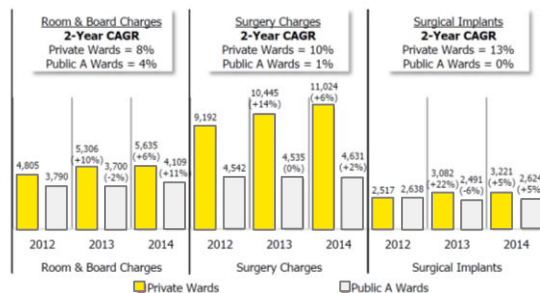
### Growth in Claim Incidence - IP Rider vs IP Claims Incidence



Claim incidence of people with rider is similar to those without riders

However, they are far more likely to go to a private hospital.

### Growth in Claim Cost by Components - Private vs Class A

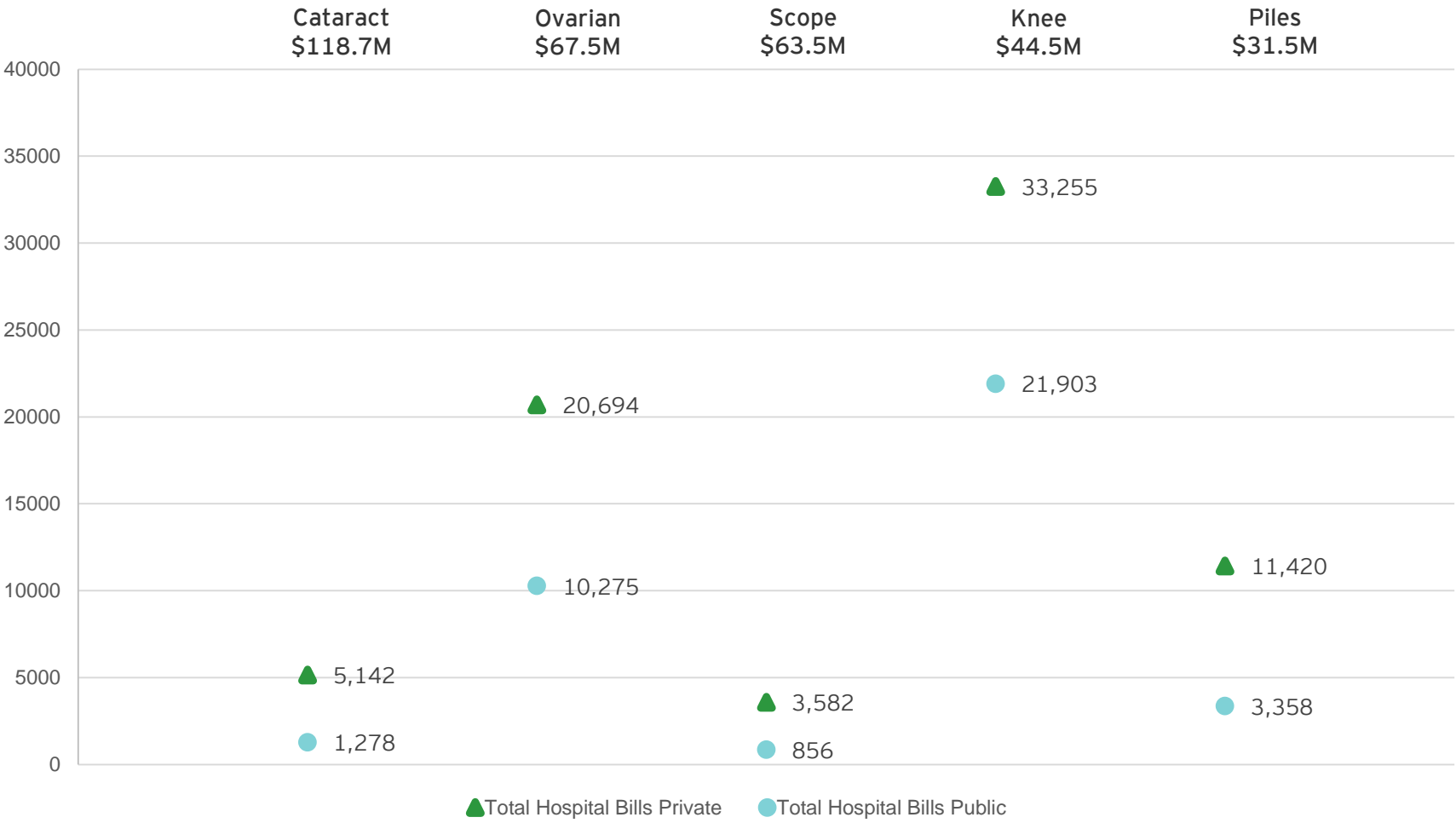


Claims inflation in private is many times of public. Surgery is already 2x the price.

- Room and board charges are increasing in Private despite shorter stays (3.6 -> 3.4 days from 2012 to 2014)
- Big price inflation in implants for private

Source: HITF report

# Top 5 contributors of hospital bills (exclude childbirth) makes up 27.5% of total billing



Source: Ministry of Health, Singapore



A nighttime cityscape featuring illuminated skyscrapers and light trails from traffic on a road. The scene is partially obscured by a dark, semi-transparent overlay on the right side.

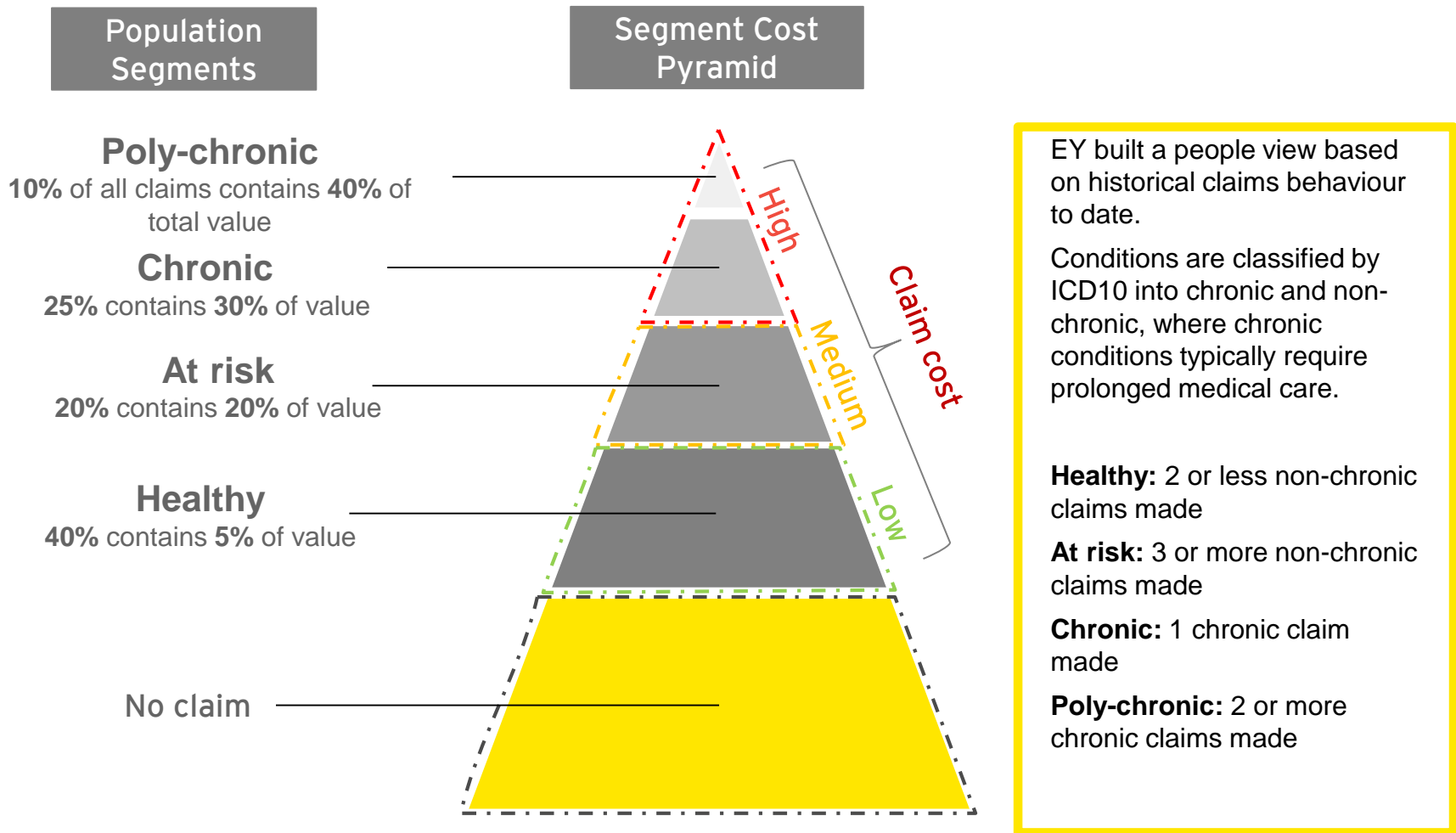
# Managing health insurance claims with Analytics

The EY logo, consisting of the letters 'EY' in a bold, white, sans-serif font, positioned in the bottom left corner of the image.

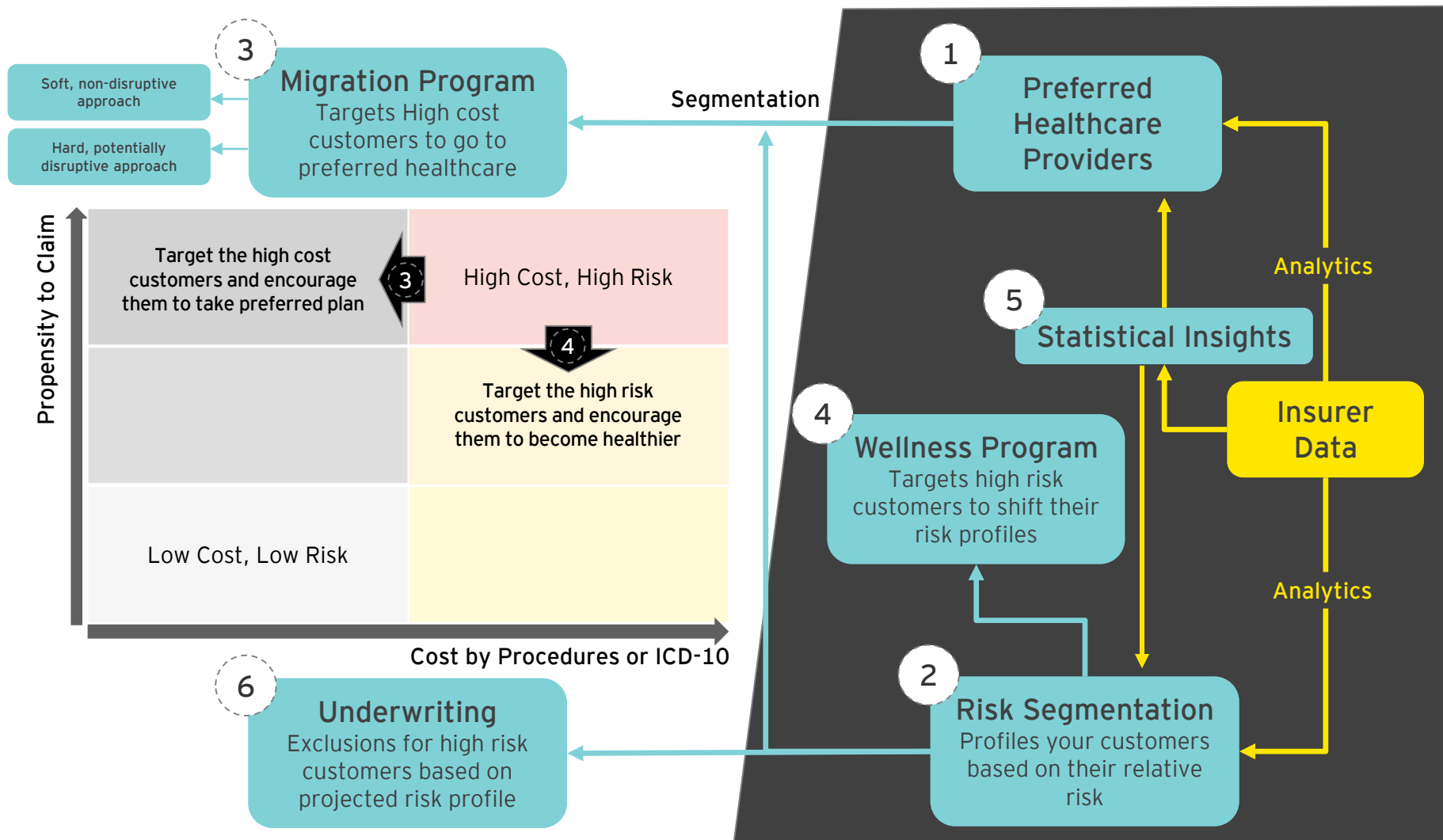
**EY**



# Management of in-force health insurance portfolio

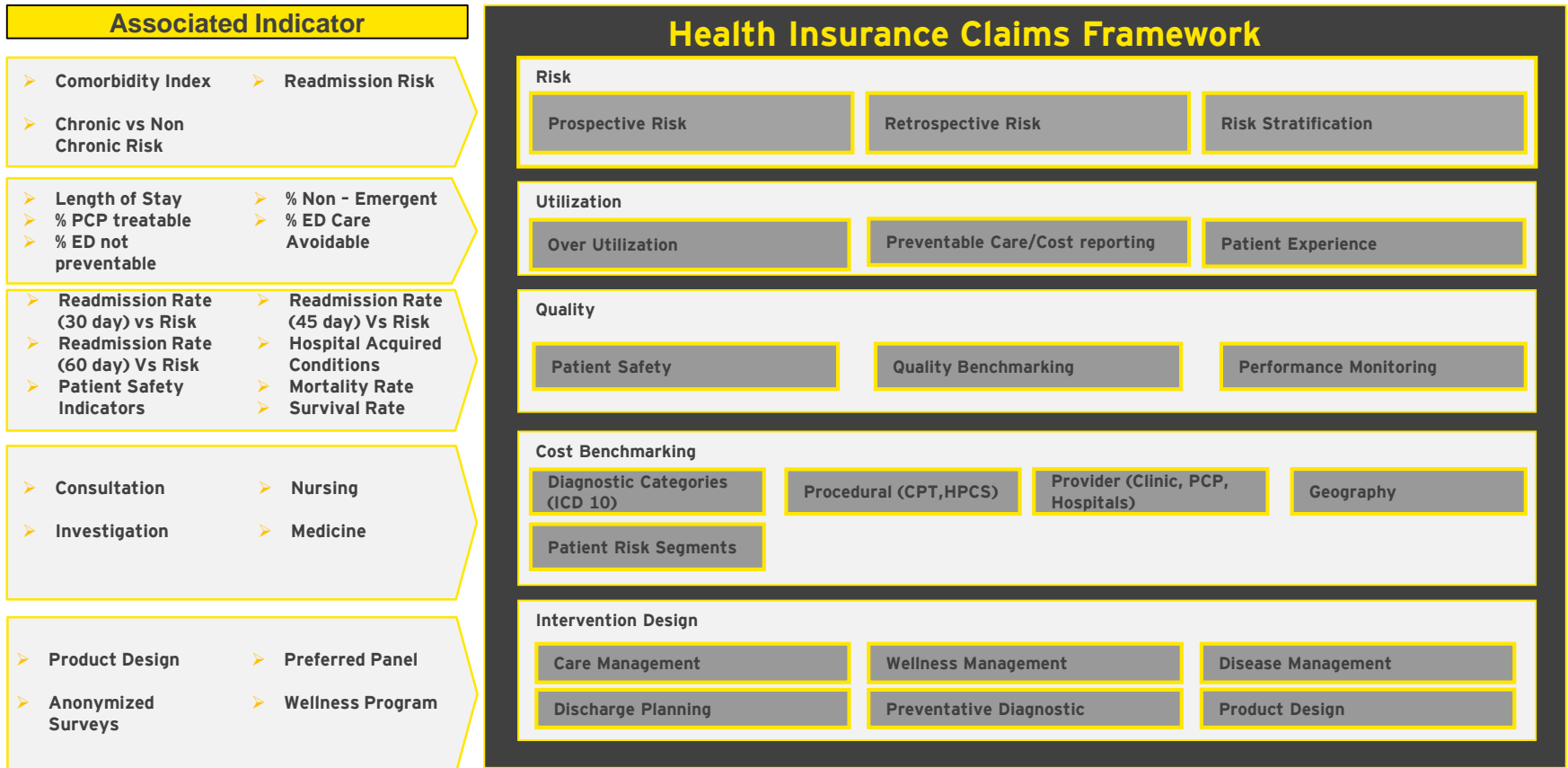


# Interventions for health insurance portfolio

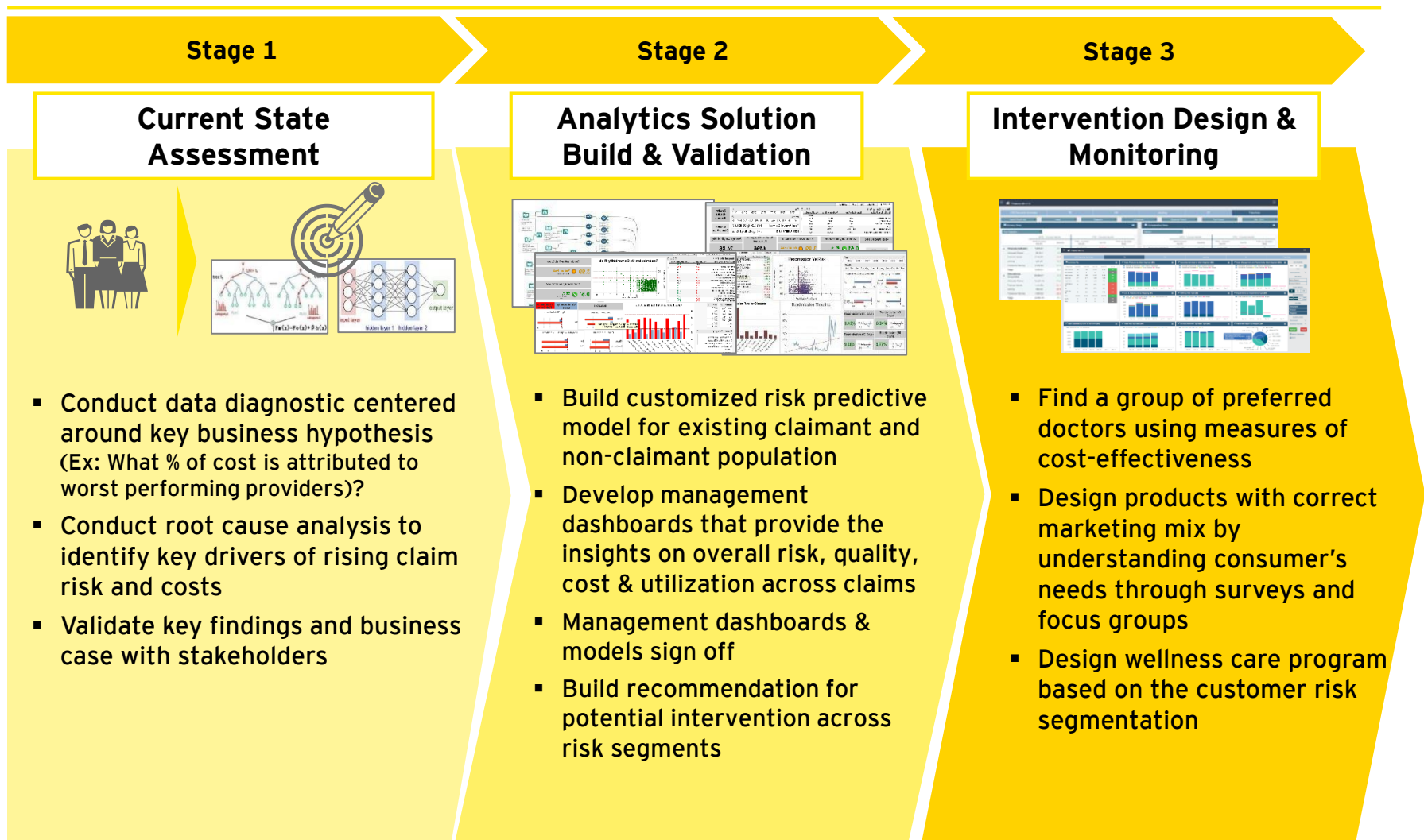


# EY health claims framework

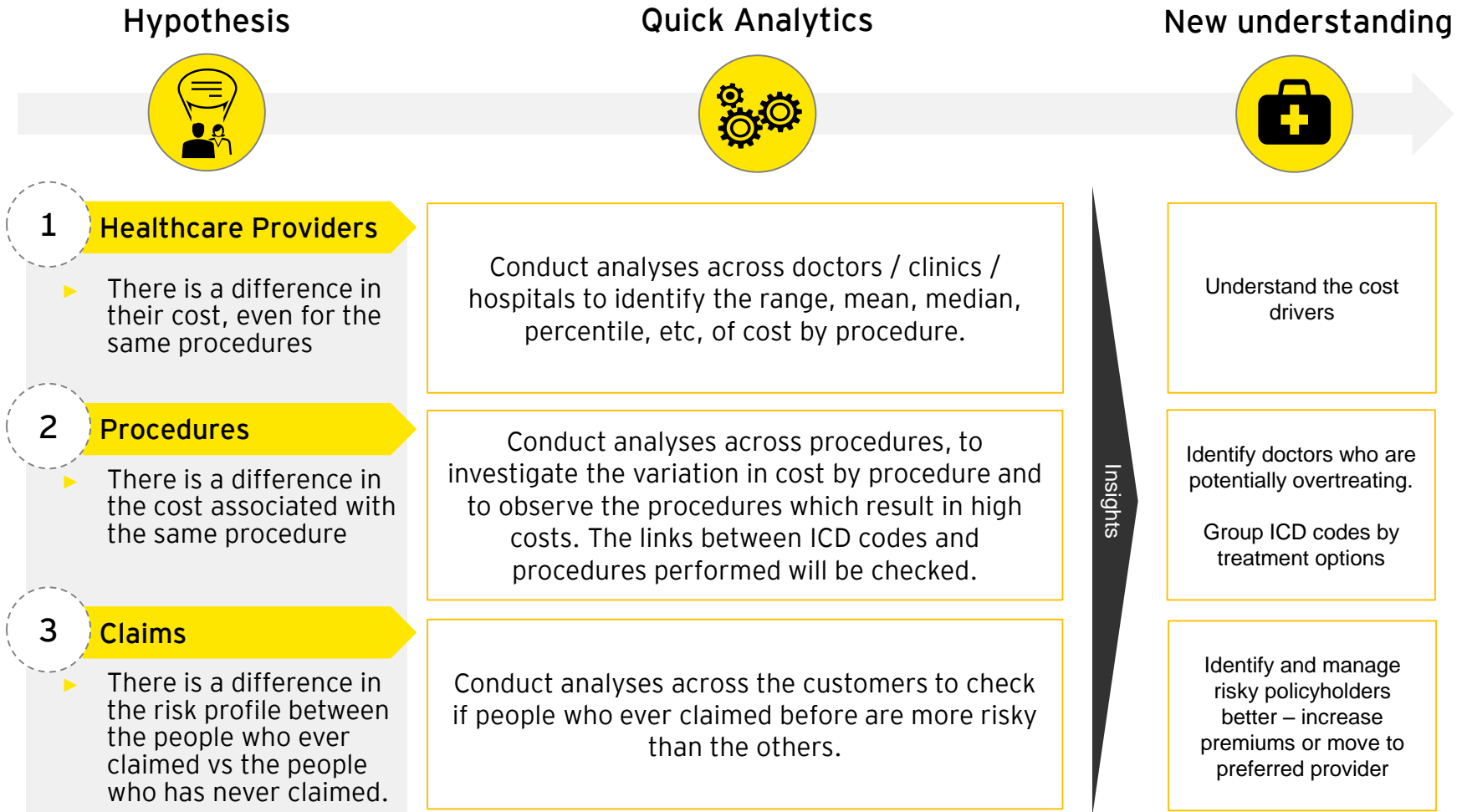
The health insurance claims framework enables insurers to evaluate the health book in terms of overall risk, quality and cost benchmarking. The framework also provides areas for potential intervention for insurers to reduce their current & future risk



# A typical approach taken is as follows:

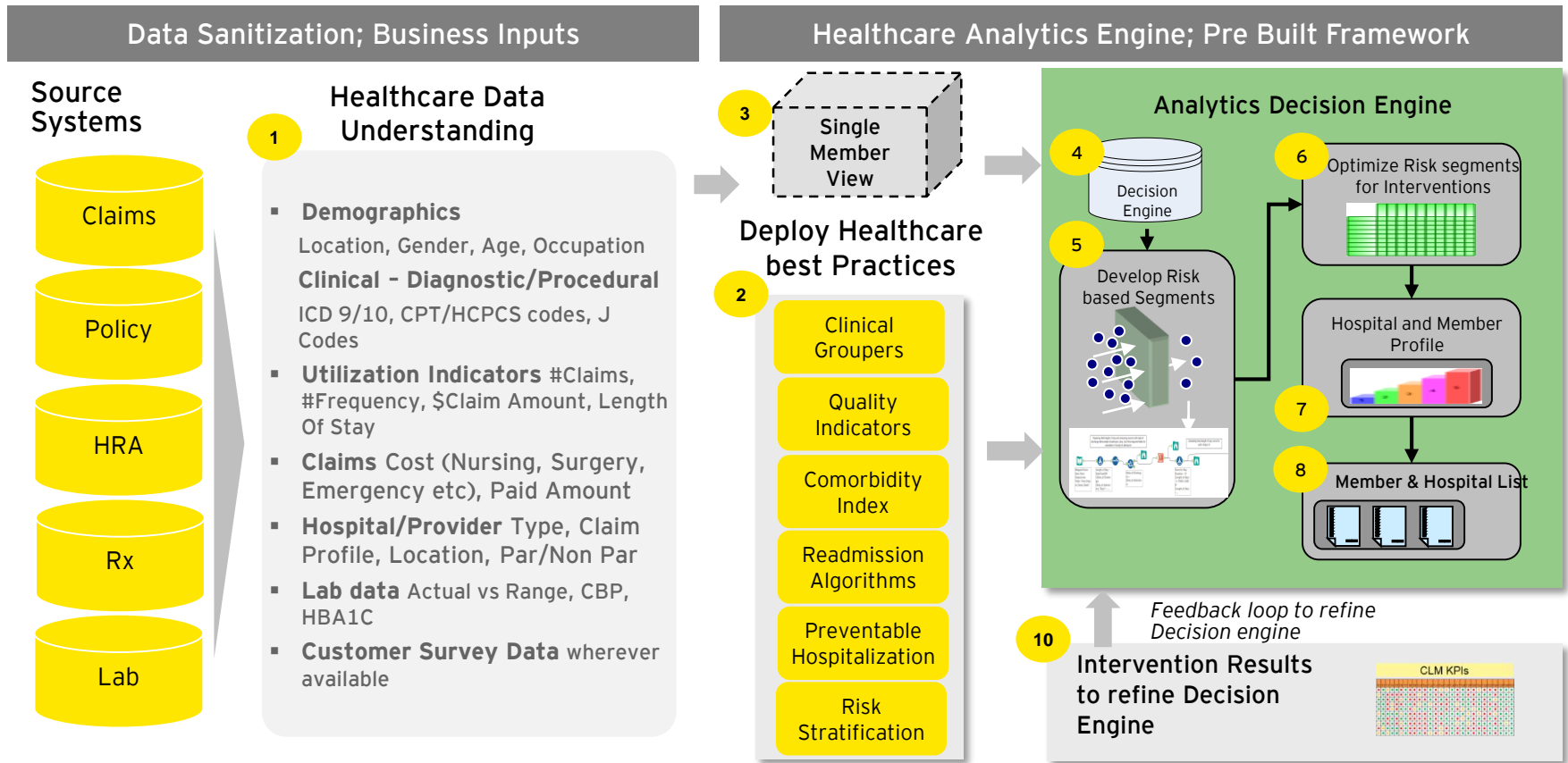


# Stage 1: Current state assessment



# Stage 2: Analytics solution build & validation

- ▶ Customize risk predictive models for segmenting existing claimant and non-claimant population into different risk groups
- ▶ Management dashboards that provide the insights on overall risk, quality, cost & utilization across claims
- ▶ Agree on the potential interventions with business stakeholders to address high risk segments



# Example Models: Transition Matrix

The transition probability matrix allows us to predict the future state of the existing claims population. This can be further extended to non-claimants data by joining with health indicators, new entrants and decrements.

## 1 year transition probability matrix (2008-16)

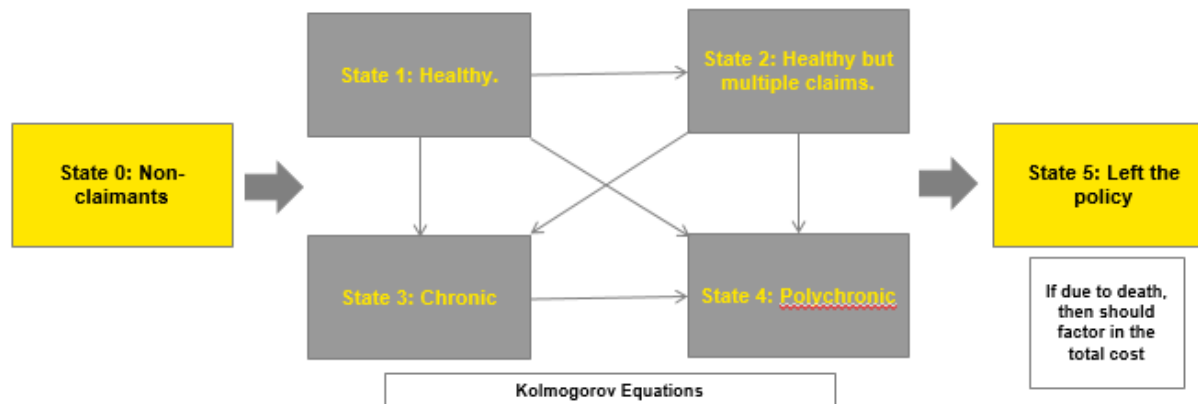
		To			
		1	2	3	4
From	1	75%	10%	10%	5%
	2		90%	8%	2%
	3			80%	20%
	4				100.0%

## Expected cost of being in each state

	1	2	3	4
	\$900	\$6000	\$8000	\$50000

## Expected value of future claims

By estimating the impact of various initiatives to manage claims better, the lifetime expected cost benefit analysis can be calculated using a Markov claim model to take management decisions



# Example Models: Propensity Modelling

## Multi-variate regression

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Example multi-variate linear regression equation

$$\text{Policy premium} = \alpha + \beta_0 \text{Age} + \beta_1 (\text{No. of vehicles}) + \beta_2 (\text{Income}) + \beta_3 (\text{No. of years driving}) + \varepsilon$$

- ▶ Multi-variate regression is widely applicable throughout insurance value chain. Example uses:
  - ▶ Developing a model to determine the customer's premium (price optimisation)
  - ▶ Predicting the increase in customer spend based on marketing strategy (customer growth)
  - ▶ Modelling the value of the settlement offer based on customer demographics to determine the likelihood of accepting an offer (claims protection)
- ▶ The performance of regression model is assessed by reviewing an ANNOVA . An ANNOVA contains a p-value, based on a hypothesis test for  $\beta_i = 0$ , for each of the coefficients in the regression equation.
- ▶ Other metrics are also considered to determine the performance of a model such as  $R^2$ , *adjusted*  $R^2$ , residuals assessment, F-values, etc..







# Stage 3: Intervention design & monitoring framework

Long-Term Solution with Quick Wins				
		Gains	Strategy	
Quick	<b>Product Design</b>	<p><b>What will make the product sell?</b></p> <p>Find the product features most attractive to consumers, how to increase its distribution, and how to digitalize.</p>	<p>Better understand the population's needs</p> <p>New health product with the appropriate Price, Place, Positioning and Packaging</p>	<p><b>Market research</b> with representative sample</p> <p><b>Focus group</b> sessions with industry experts</p>
	<b>Preferred Panel</b>	<p><b>How to construct a preferred panel of specialists?</b></p> <p>Based on data collected over many years, find the best doctors for customer's needs</p>	<p>Find good doctors for your customers</p> <p>Become a price setter</p> <p>Deeper involvement in the medical industry</p>	<p><b>Quantitative approach</b> to find the best specialists</p> <p>Setting up deals with specialists, such as <b>price negotiations</b></p>
	<b>Wellness Program</b>	<p><b>Who &amp; How to target?</b></p> <p>Use Risk Models to segment clients, so as to design specific intervention strategies for each group</p>	<p>Risk modelling allows you to monitor the overall 'health' of the portfolio</p> <p>Able to move beyond one-size-fits-all into specific strategies</p>	<p><b>Migration Program</b> to gradually move costly people into preferred plan</p> <p><b>Wellness Program</b> to gradually improve the risk profile of your customers</p>

## Gaining value from counterparty engagement

- 1 Achieve a **long-term solution** through **deeper interaction** with your customers and healthcare providers
- 2 **Your data** is a valuable and rich repository of information for us to find the good healthcare providers and your vulnerable customers.
- 3 **EY's** assets and expertise in the **Insurance Industry** and **Health Analytics** makes us your ideal cooperation partner to navigate through this journey



# Conclusion

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- ▶ Insurance practice is moving from beyond simplistic deterministic models / one-way analyses
- ▶ The growth of technology and data management allows for the use of analytics to address many business problems today, such as the case described for health insurance above
  - ▶ Other suitable candidates include distribution optimization, fraud detection, etc.
- ▶ Actuaries are well placed to participate in these new developments - our training allows us a good understanding of both:
  - ▶ The underlying business problems faced
  - ▶ Statistics and other analytical tools available



**Thank You**

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