



**Driving Performance**

# **The Impact of Underwriting & Claims Assessment on Profitability**

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# Presentation Outline

Introduction

Mortality Theory and Product Pricing

Theory of Risk Selection

Protective Value Theory

Underwriting & Claims Profiles and Skills

Profitability Measures

Underwriters & Claims Assessors Contribution to Profit

Conclusion



## Why Underwrite?

In many non-insurance businesses, the concept of underwriting is foreign! As the original term indicated “carrying risk” this is a misnomer today – now it means assessing the risk.

*“The process of selection where we determine what premium should be charged according to the circumstances presented in order that any risk contributes fairly and equitably to the common fund.”*

- **Accept risks within pricing assumptions**
  - Categorise risks
- **Prevent anti-selection**
  - Weed out the liars and cheats
- **Avoid selective lapses**
  - Select only those who want and can afford the cover



## Moral and Uncertainty Risk

Risk comprises two elements in varying degree – randomness and uncertainty.

Uncertainty Risk exists where we disbelieve the source or validity or adequacy of information supplied or the nature of the insured event

Absolute certainty exists (for us as underwriters) where:

- all supporting information has been made readily available
- we have no reason to doubt the validity of the information

Randomness, moral Risk or anti-selection exists where we believe the randomness of an event insured against has been removed or influenced

Absolute randomness exists (and less of a moral risk for us as underwriters) where:

- excessive insurance has not been applied for
- the timing of the insurance is not co-incidental to an increased likelihood of an insured event occurring





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## Standard Structure of Mortality Table

The starting point of mortality theory is the standard mortality table.

**Table 4.7. Extract from Table 5 of 1979–81 US Life Tables, white males.<sup>a</sup>**

Age interval  Period of life between two ages	Proportion dying	Of 100,000 born alive		Stationary population		Average remaining lifetime
	Proportion of persons alive at beginning of age interval dying during interval	Number living at beginning of age interval	Number dying during age interval	In the age interval	In this and all subsequent age intervals	Average number of years of life remaining at beginning of age interval
1 $x$ to $x + t$	2 $q_x$	3 $l_x$	4 $d_x$	5 ${}_tL_x$	6 $T_x$	7 $\bar{e}_x$
<b>Days</b>						
0–1	0.00438	100 000	438	273	7 081 671	70.82
1–7	0.00256	99 562	255	1 635	7 081 398	71.13
7–28	0.00139	99 307	138	5 709	7 079 763	71.29
28–365	0.00403	99 169	400	91 378	7 074 054	71.33
<b>Years</b>						
0–1	0.01231	100 000	1 231	98 995	7 081 671	70.82
1–2	0.00092	98 769	90	98 724	6 982 676	70.70
2–3	0.00066	98 679	65	98 646	6 883 952	67.76
3–4	0.00053	98 614	52	98 588	6 785 306	67.81
4–5	0.00043	98 562	43	98 540	6 686 718	67.81
5–6	0.00039	98 519	39	98 499	6 588 178	66.87
6–7	0.00037	98 480	36	98 462	6 489 679	65.90
7–8	0.00034	98 444	34	98 428	6 391 217	64.92
8–9	0.00030	98 410	29	98 395	6 292 789	63.94
9–10	0.00024	98 381	24	98 369	6 194 394	62.96



## Mortality Rate and Risk Premium

The following example illustrates the use of the standard mortality table in basic risk premium calculation.

Table 4.7. Extract from Table 5 of 1979-81 US Life Tables, white males.\*

Age interval Period of life between two ages	Proportion dying Proportion of persons alive at beginning of age interval dying during interval	Of 100,000 born alive		Stationary population		Average remaining lifetime Average number of years of life remaining at beginning of age interval
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- Mortality Rate: is the number of people dying at the end of a period divided by the number of people living at the end of that same period –  $q_x = d_x / l_x$  (Let's look at example of age 10)
- If an insurance company was insuring a group of individuals, the concerns they would have would be to ensure that they have enough money (reserves) to pay all claims. Premium will cover this. What is this risk charge?
- EXAMPLE: 100,000 lives aged 52 –  $q_x = 0.00850$ . How does this help us?

## Risk Premium Calculation

Risk price for insurance is based on mortality rate – we want to know how much we need to charge to be able to pay claims. This allows us to set up a premium.

Example: 52 year old male – mortality rate 0.00850. We expect a portfolio of 100,000 lives, what premium do we charge?

- **Step 1:** Death rate for the 52 year old is 8.50 per thousand people (0.00850)
- **Step 2:** to cover one thousand lives for one dollar each, we need to have \$8.50 (to cover the 8.5 claims worth 1 dollar each).
- **Step 3:** We have 1000 people who we charge to pay the \$8.50 of total claims charges – each person has to pay \$0.00850 ( $\$8.50/1000$ ), to cover claims the company would have to pay (The same as the  $q_x$ !)
- **Step 4:** If you insure 100,000 of this group for 1 year for \$1000, what income (premium) would be needed to cover anticipated claims?
- **Step 5:** to cover 100 thousand lives for one dollar each, we would need to have  $(8.50 \times 100)$  \$850 to cover the 850 claims worth 1 dollar each.
- **Step 6:** However, they are to be covered for \$1,000 each so the premium needed to cover all claims would be \$850,000. If we spread the premium over the group, each person pays \$8.50





## Gross or Tabular Premium Calculation ...

**Gross Premium is the amount the client for insurance sees as their final premium. This includes all charges!**

- Risk Premium is \$8.50 per thousand dollars of cover
- Profit – which each company needs to survive (and which each premium payer must contribute to is set at, say, 15% of the risk premium \$1.28
- Administration Costs (which includes all underwriting, administration and claims management costs is set at, say, 35% of the risk premium = \$2.98
- Other costs, which would include all the medical screening costs, advertising, product development, etc, could be around another 25% = \$2.13

**Gross rate therefore = \$14.88 per thousand \$ of cover requested.**

- So on the 100,000 lives applying for insurance, the company receives, \$850,000 risk premium + \$128,000 for profit + \$298,000 to pay all its underwriters, claims and admin staff + \$213,000 for medical expenses, advertising, product development, etc
- This totals a whopping \$1,489,000.

**BUT ...**



## New Business Strain ...

New business strain is effectively the costs of acquiring new business. Note that we lumped underwriting in the costs before but a large portion of their work is new business! Fortunately, each year, only the risk premium for each individual goes up, not the other costs!

In the first year ... Received \$1,489,000 in total premium payments.

- Outgo: paid administration costs \$298,000; reserved \$850,000 for expected claims; paid screening and other costs of \$213,000. Total - \$1,361,000
- Profit retained was \$128,000

### HOWEVER ...

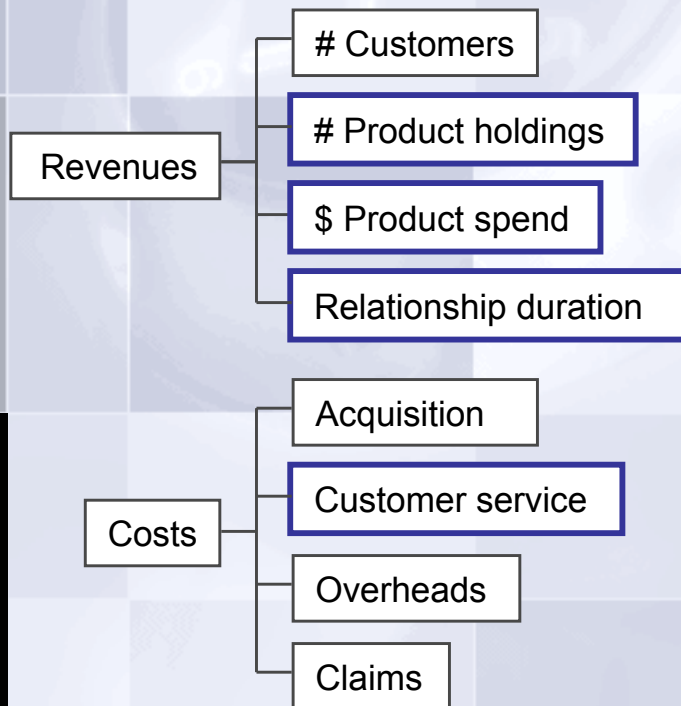
- paid 75% commissions of \$1,116,750
- This means that the company is left with its claims reserve but all profit is wiped out and it has a net loss position of **-\$988,750** at the end of this first year of business.



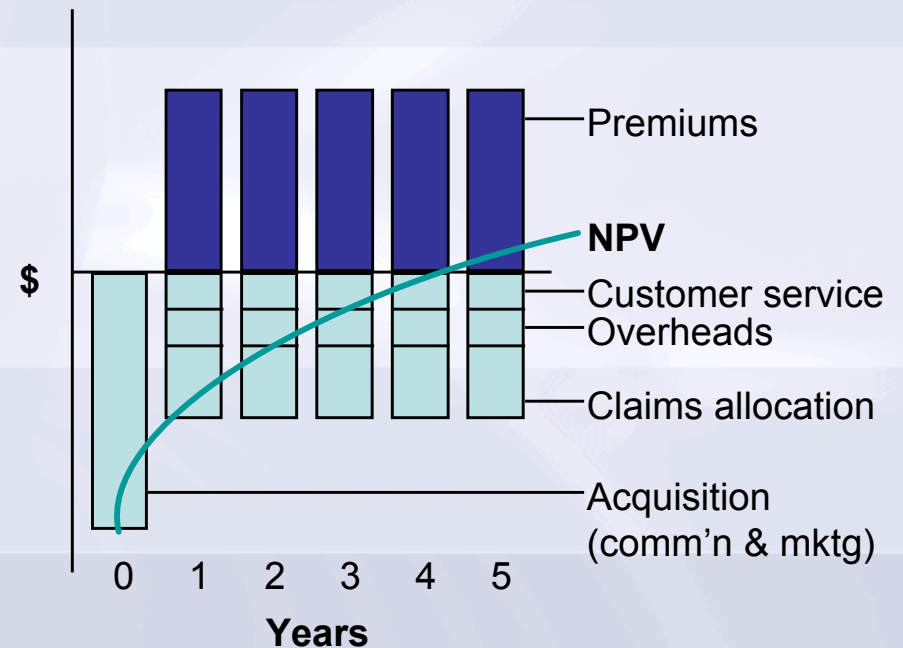
## Customer Relationship

The typical cash flows from a customer relationship highlight the need for this relationship to be long term.

### Insurance Co. Profitability Drivers



### Customer Cashflows





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## What if the risk is not Standard?

- Can the rates remain the same for substandard groups?
- Not with that portfolio (as described in the previous slides) running at a loss from first year!
- We would have to charge the appropriate premium so that the standard group of people do not have to subsidize the substandard group.

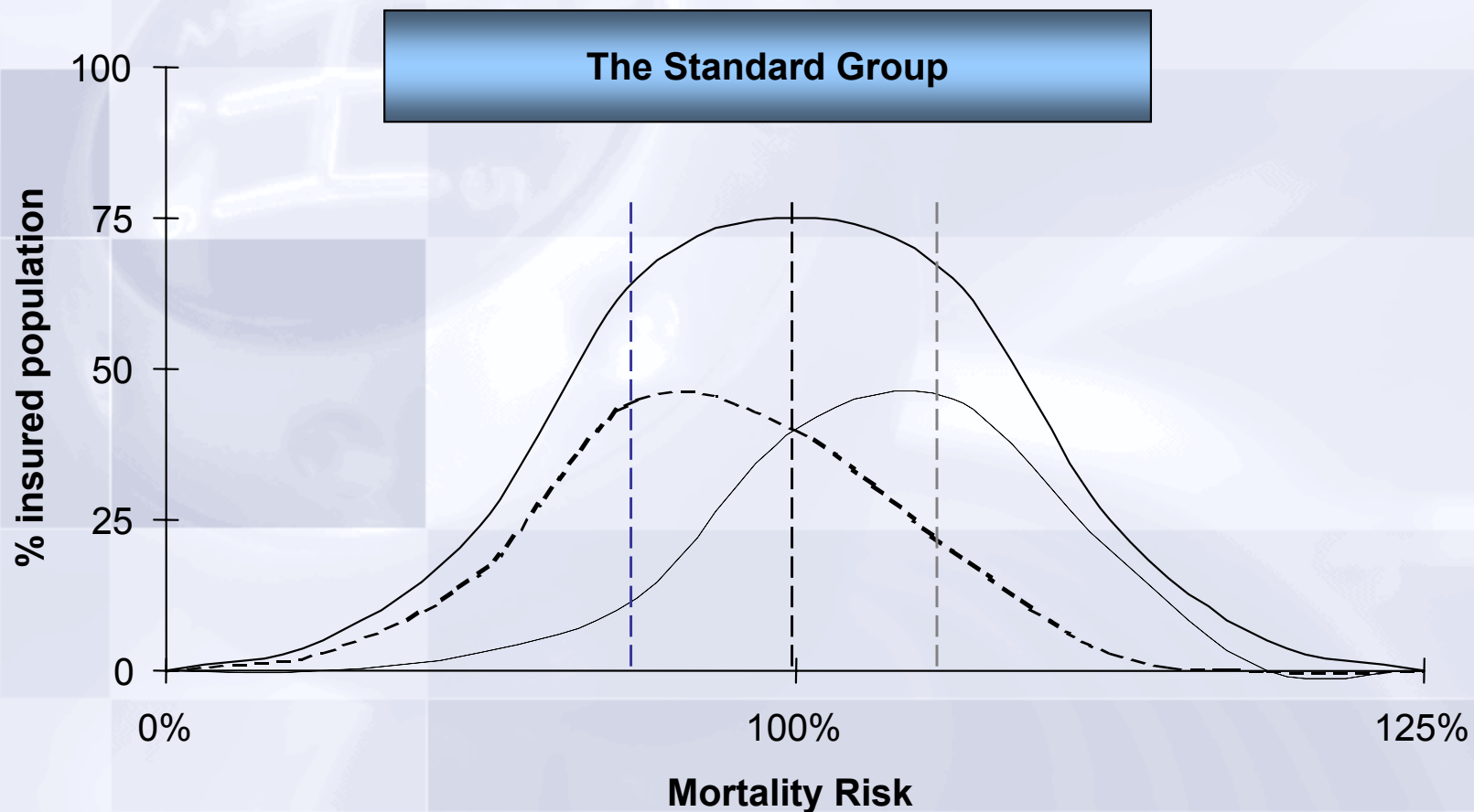
### SO WHERE DO WE GET OUR RATINGS FROM?

- Effectively, mortality investigations have to take place on each impairment and compare expected standard mortality against actual standard mortality
- Additional mortality investigations have to take place for each impairment to be underwritten reviewing actual impairment mortality against actual standard mortality
- The resultant rating tables are multiples of expected standard mortality

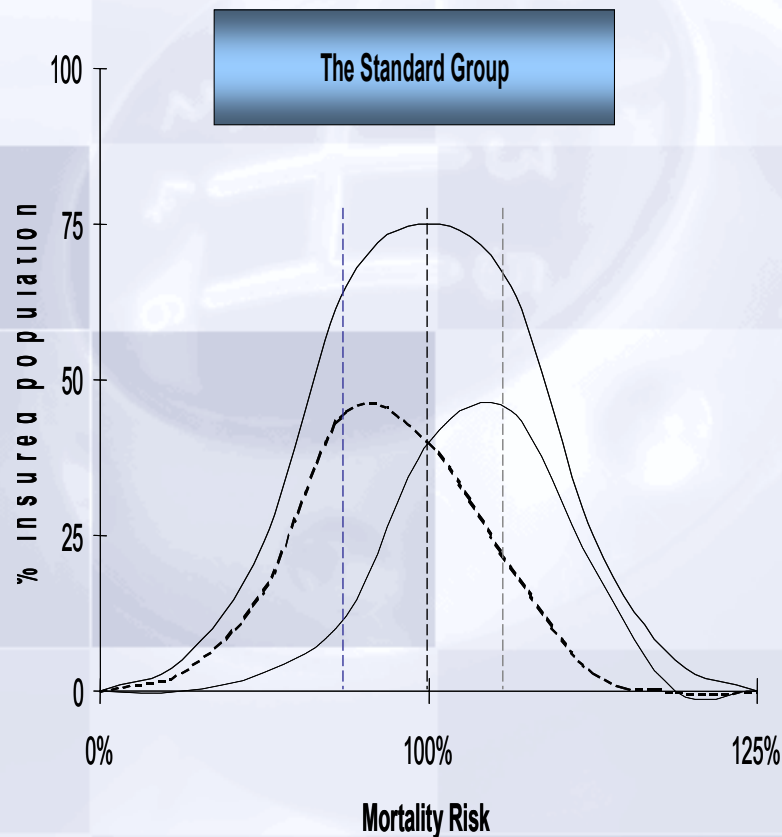


## Dimensions of Standard

Standard is a mixture of some risks whose central mortality is less than 100 and some risks whose central mortality is greater than 100.



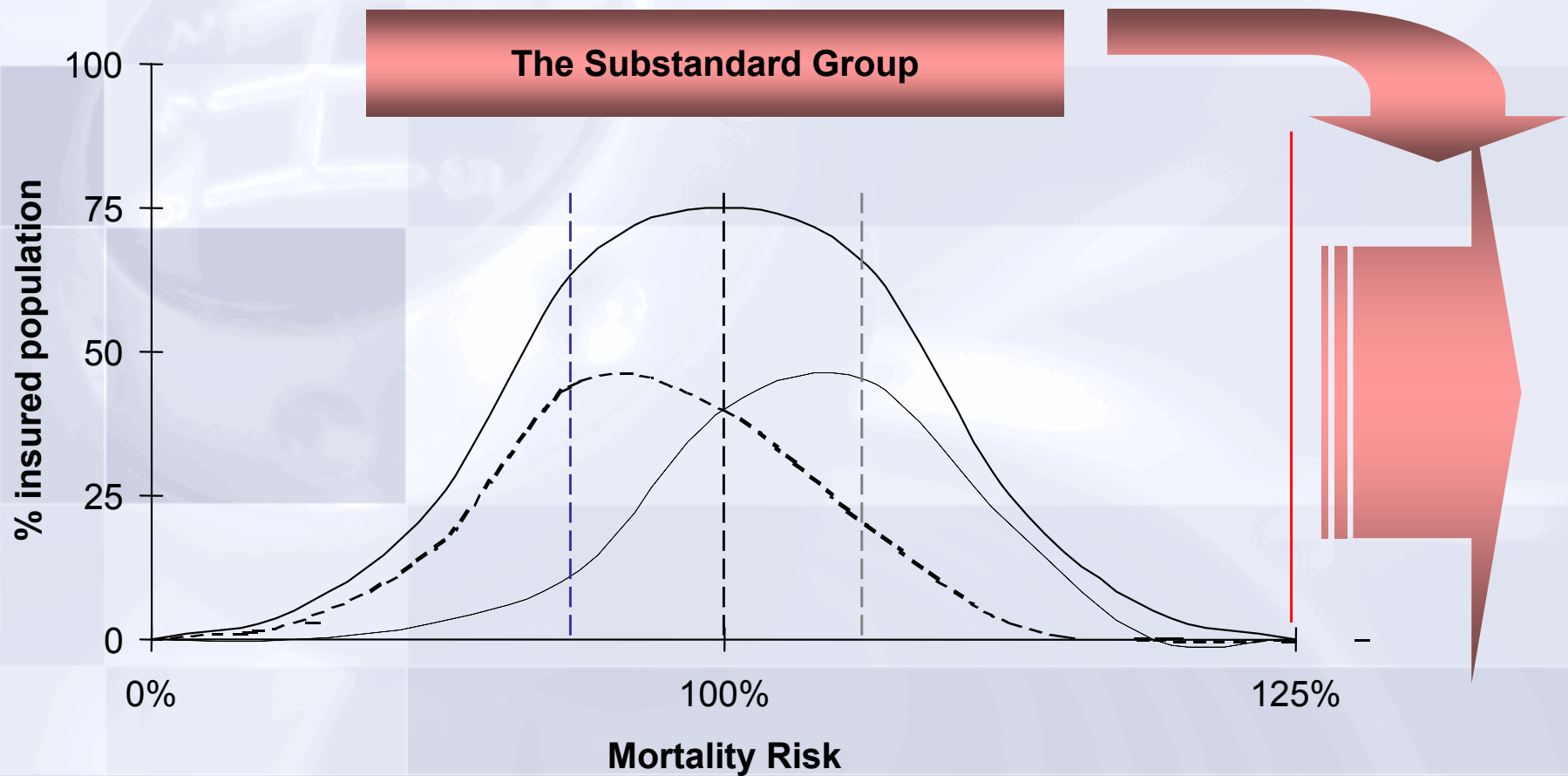
## Meaning of Standard



- Risks that are acceptable at tabulated standard premiums
- Satisfying eligibility criteria set by underwriting section
- Possessing similar mortality risks to that of others in the standard class
- Accepted unconditionally
- Any situation that the company feels it can monitor as substandard while it offers standard tabulated premium rates.

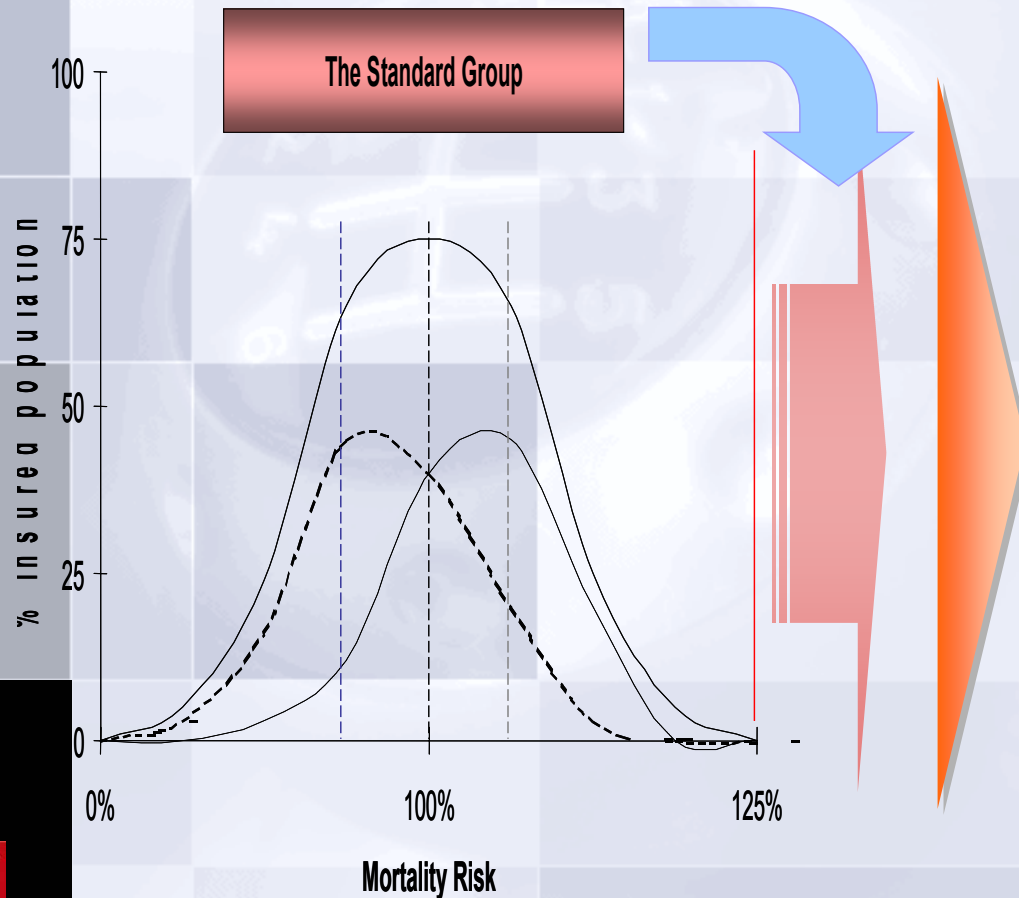
## Dimensions of Substandard

Substandard risks are those that are regarded as having .





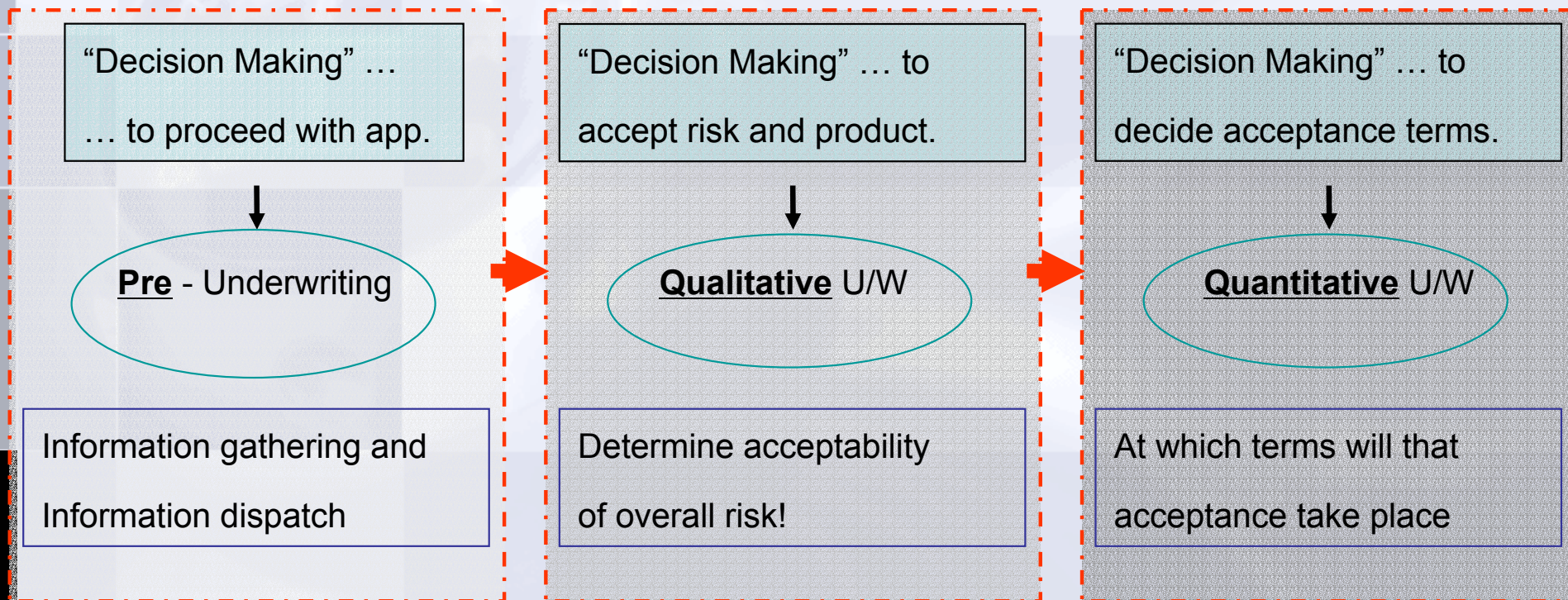
## Meaning of Substandard



- Lives that are impaired or represent a greater risk of mortality (accident or disease)
- Long term risk not necessarily impacting health currently
- Cohort (group) predisposing premature mortality
- Imminent or inevitable consequence of mortality
- Most importantly, measured at this instant in time

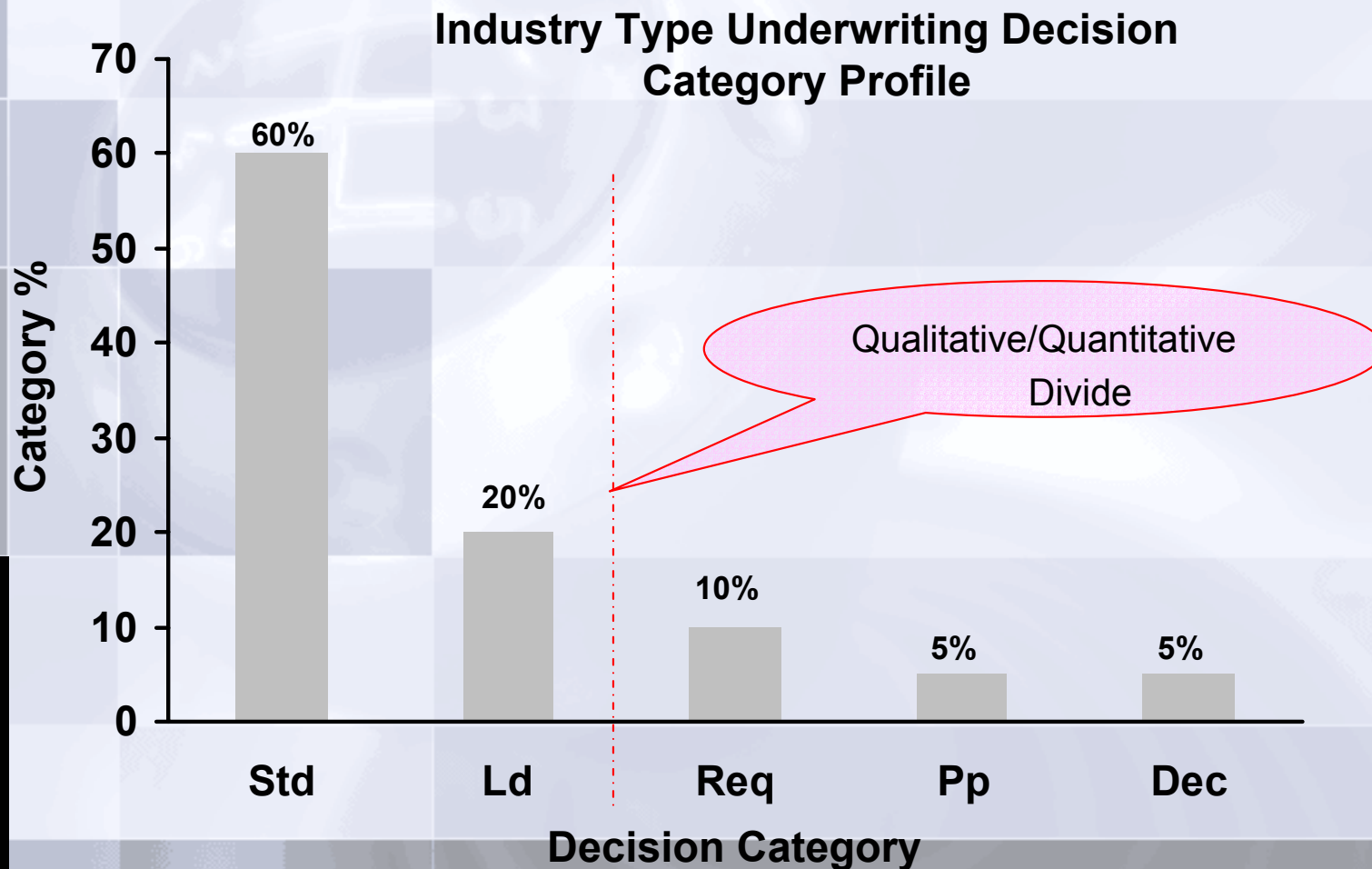
## Underwriting Process

The underwriting process has a direct correlation with the new business acquisition process and completion performance.



## Underwriting/acceptance of New Business

Standard and loaded “non-clean-skin” applications ratios are an indication of underwriting quality.



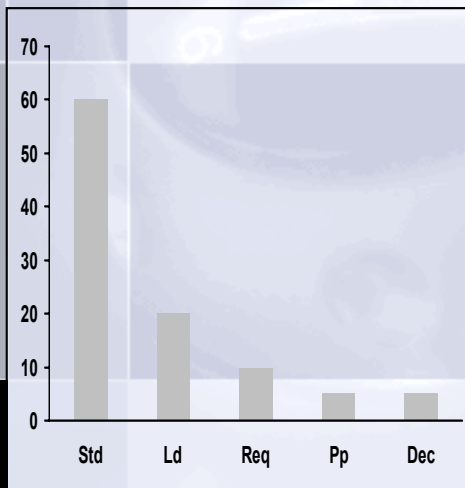
Source: LIMRA, SOA, AHOU, HOLUA Statistics.



## Company Underwriting Process

The efficiency and effectiveness of the underwriting process is reflected in the number of completions, irrespective of the product type.

### Industry Underwriting Norms



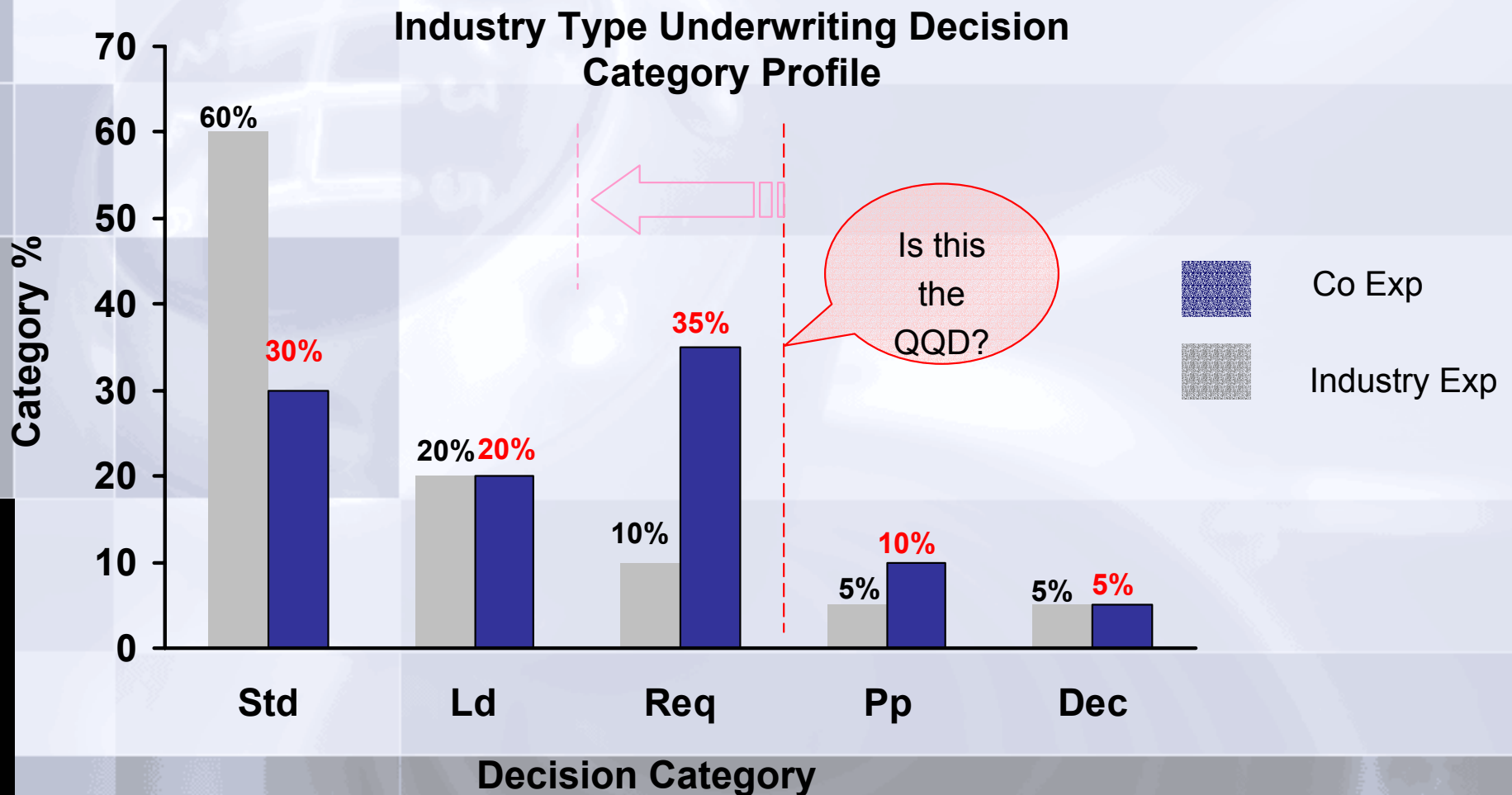
### Co Underwriting Statistics

- Statistics should be produced for the underwriting department by all product lines
- These statistics should also be produced for each underwriter
- Benchmarked against industry norms (and product expectations), anomalies should be noted immediately, investigated and corrective actions instituted.
- While some companies capture this data, not all do neither is there an industry standard against which to measure.



## Underwriting/Acceptance of New Business

The NMG review of Out-of-Force business highlighted that this distribution differs markedly from that of the industry.



Source: NMG Out-of-Force Case Review.





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## Appropriate Screening

Purpose is to ensure mortality savings by identifying and pricing for appropriate impairments

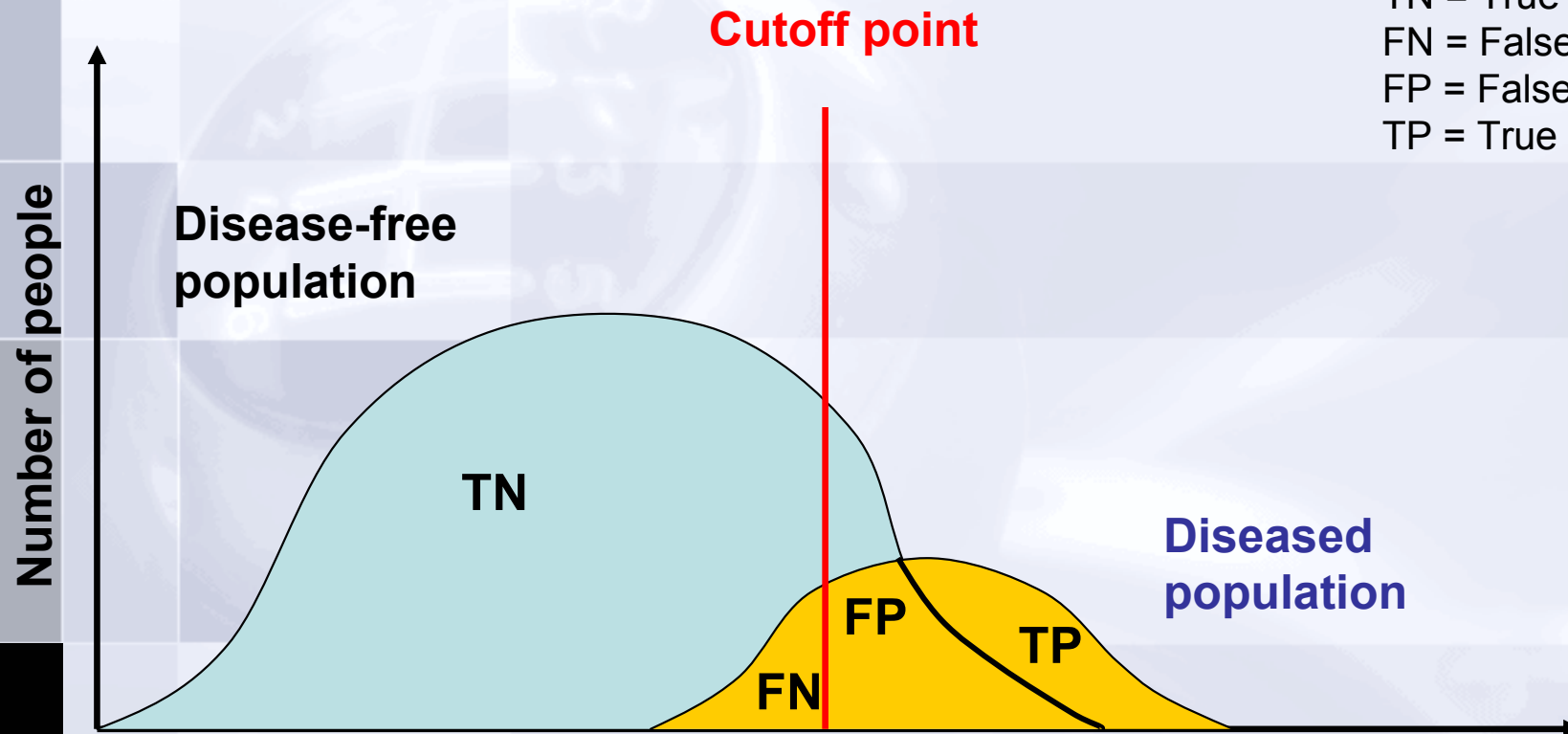
- **Must be cost effective**
  - **Must be non-invasive**
  - **Must not be too inconvenient**
  - **Must be appropriately sensitive and specific**
  - **Must consider a meaningful proportion of the population (prevalence)**
  - **Must not lose business**
- **Screening intended to weed out highest prevalence diseases or other causes of death**
  - **Currently, these tests are inappropriate given changing epidemiology and medical advances**
  - **There is a need for a guideline which calls for less, more appropriate tests.**



## Distribution of Results

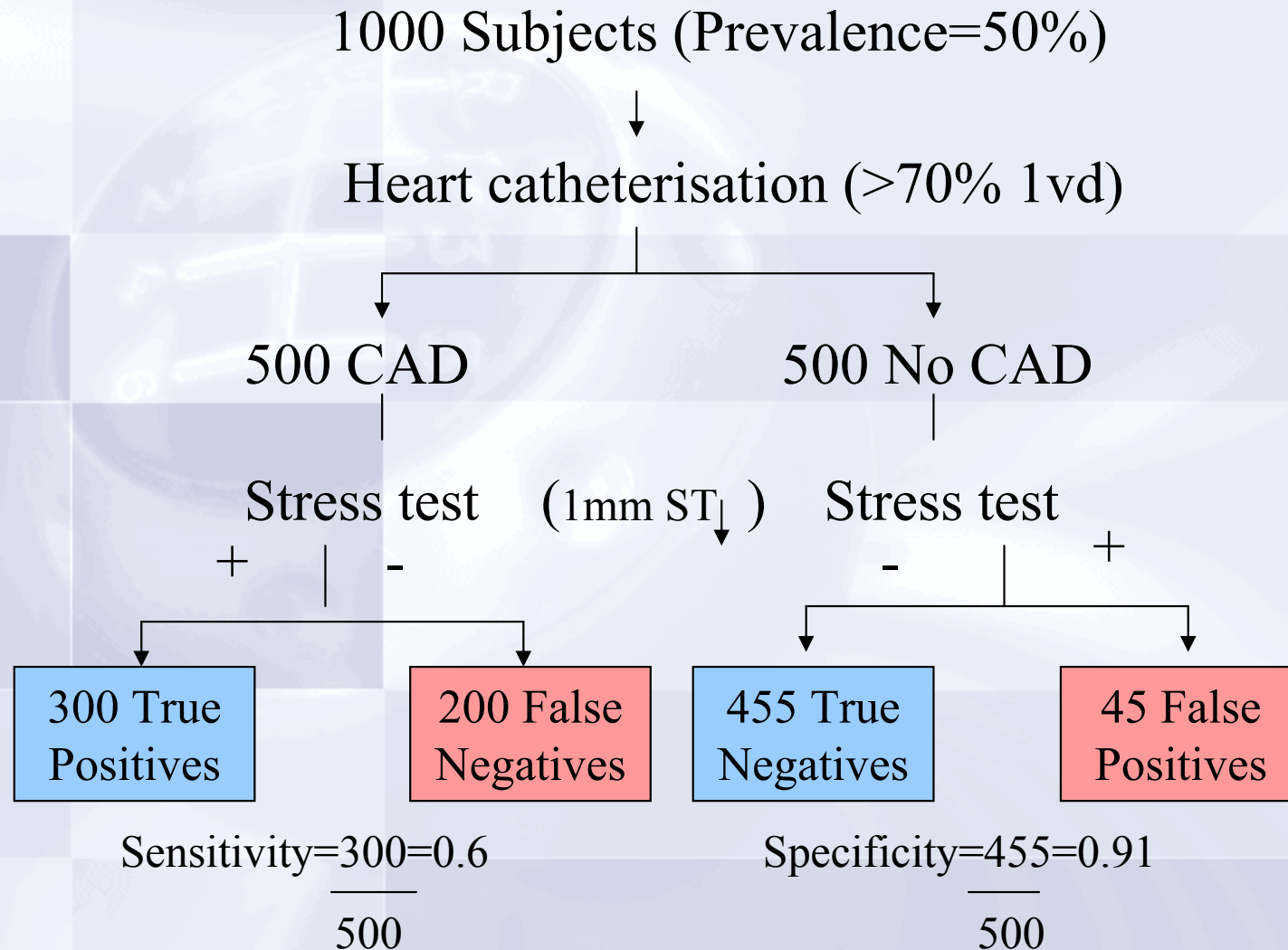
Legend:

- TN = True negatives
- FN = False negatives
- FP = False positives
- TP = True positives





## Sensitivity/Specificity Relationship



## Predictive Value

### Random Disease Example

Test	+	48	83	$T+ = 131$
	-	32	837	$T- = 869$
		$D+ = 80$	$D- = 920$	(Total=1000)

Prevalence = 8%

Sensitivity = 60%

Specificity = 91%

Predictive Value of Positive test (PVP) = 37%



## Predictive Value

		Disease		
		D+	D-	
Test	+	300	45	T+ = 345
	-	200	455	T- = 655
		D+ = 500	D- = 500	(Total=1000)

Prevalence =  $D+/Total = 50\%$

PVP =  $TP/T+ = TP/TP+FP = 87\%$

Sensitivity =  $TP/D+ = TP/TP+FN = 60\%$

PVN =  $TN/T- = TN/TN+FN = 69\%$

Specificity =  $TN/D- = TN/TN+FP = 91\%$



## Benefits of Screening

Fundamental benefit is ability to achieve mortality savings - the protective value.

Factors in determining this saving include the following:

- Present value of excess mortality (risk for which the test was obtained)
- Prevalence of impairment in the population
- Sensitivity of the test that is ordered to screen for particular disease
- Proportion of savings attributable to the test

Potential mortality savings per thousand dollars of sum assured, is estimated by the formula:

*Mortality savings = present value of excess mortality \* prevalence \* sensitivity \* proportion of savings attributable exclusively to test*



## Present Value of Excess Mortality

This figure provides an estimated value (per thousand dollars of cover) of finding a case with the impairment for which test was ordered (TP)

**Consider a ECG: What is the present value of excess mortality for those with a positive test**

**Step 1: estimate the average mortality which can be expected. Let's settle for +100%em**

**Step 2: calculate the present value of +100% em compared to standard (how much you would loose if risk accepted at standard rates = double the risk premium)**

**Present value of excess mortality: \$50 (~approximately 100%em)**

**Prevalence of CAD(1mm st depr): 0.05**

**Test sensitivity: 0.60**

**Proportion of savings attributable to the test: 1.00**

Mortality savings attributable to the test =  $(50 \times 0.05 \times 0.60 \times 1)$

= \$1.5 per mille of S.A.



# Cost of Marketing Considerations

Cost of tests are not only the actual test cost but also the marketing cost, which includes inconvenience (potential loss of business)

Three steps are needed to determine these costs:

- threshold (break-even point), at which a test becomes cost effective, is calculated
- difference between this threshold and current or proposed testing level is determined
- calculate cost (difference between (1) & (2), multiplied by the mortality savings, divided by requirement amount)

The threshold (testing level at which it becomes cost justified to screen) is calculated by dividing the actual cost by the mortality savings multiplied by 1000 (per mille) – Assume the cost of the ECG to be \$50, the calculation of the threshold is as follows:

$$\$50 / \$1.5 * 1000 = \$33,333 = \text{Testing limit for ECG's}$$

*Result for illustration purposes only*





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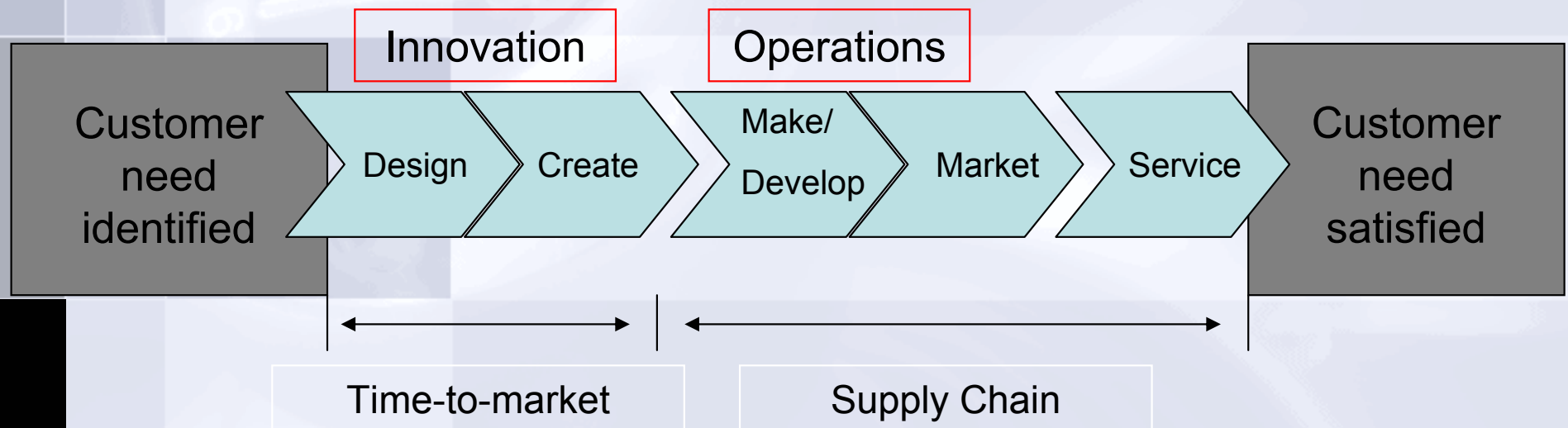
Conclusion



## Process Value Chain

Operating parameters within the value chain should be optimized for the underlying business mix and customer needs.

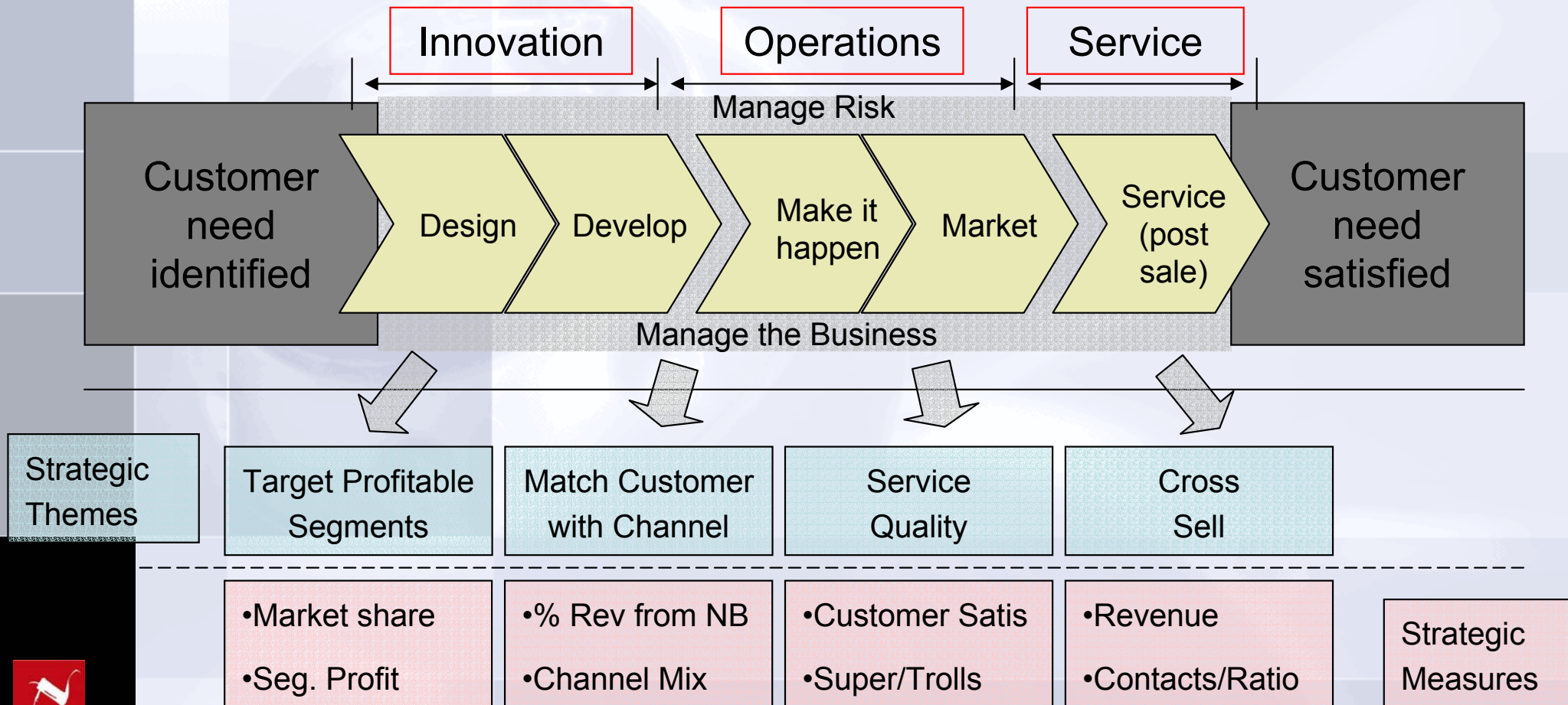
The internal business process Value Chain Perspective





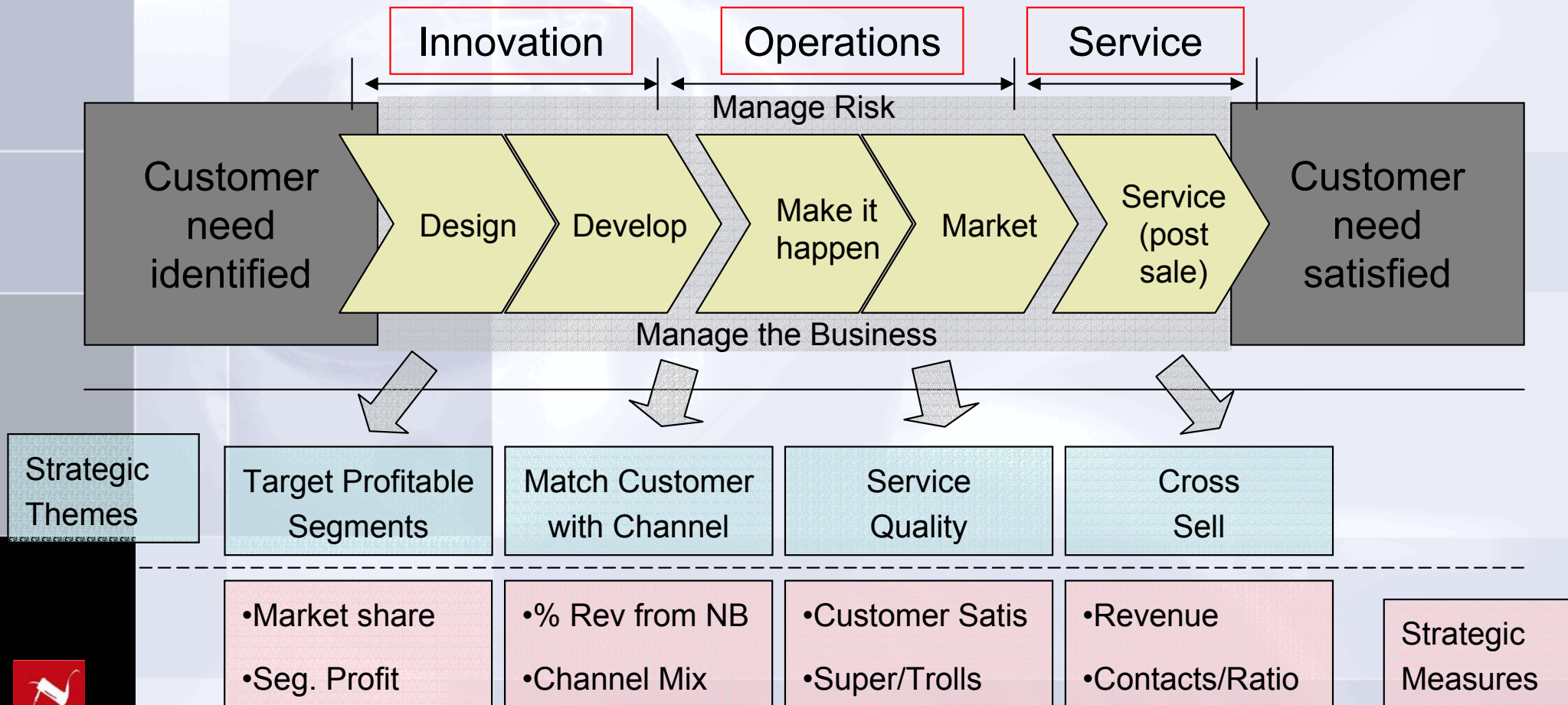
## Operational Value Chain Perspective

Purpose of the business process is ultimately to be profitable!



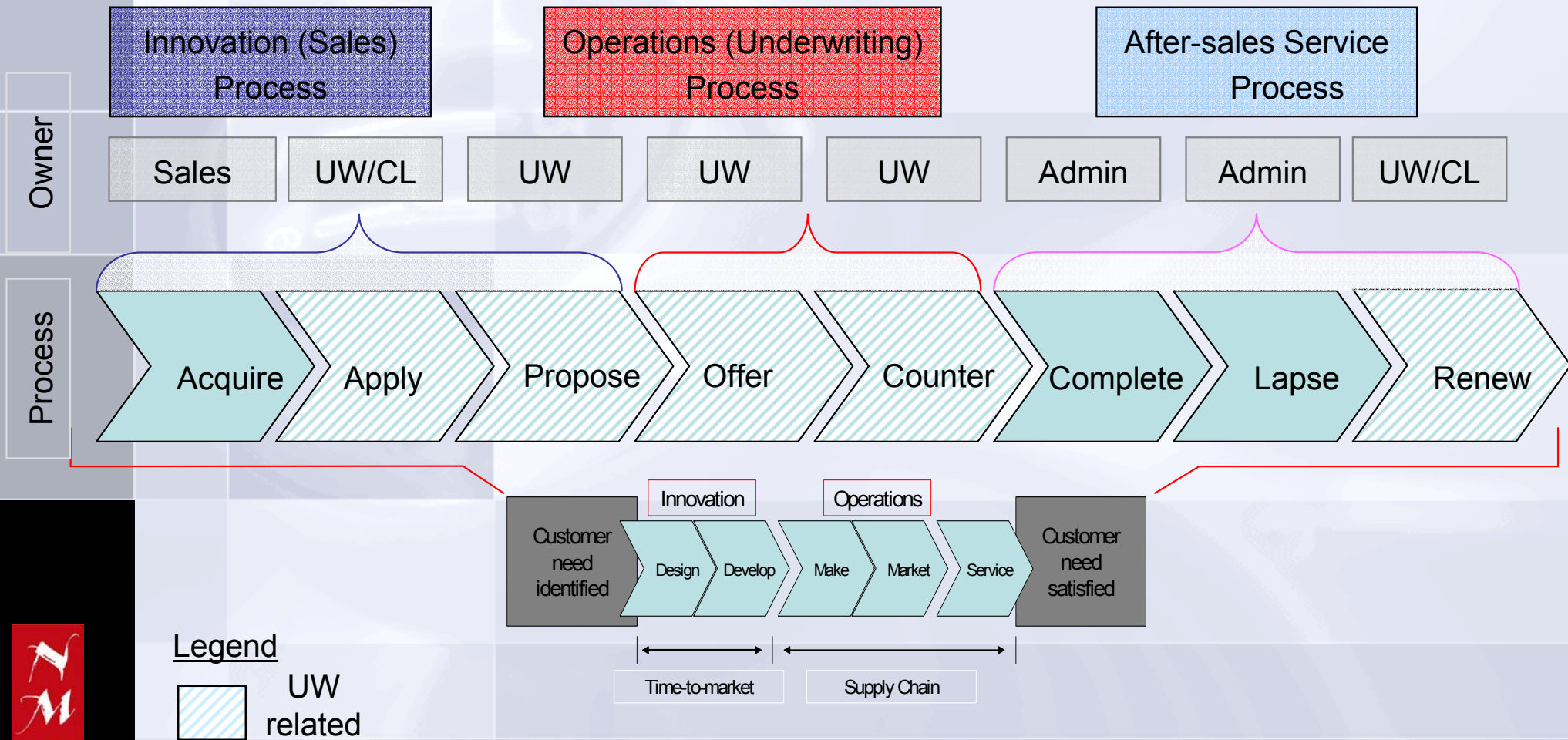
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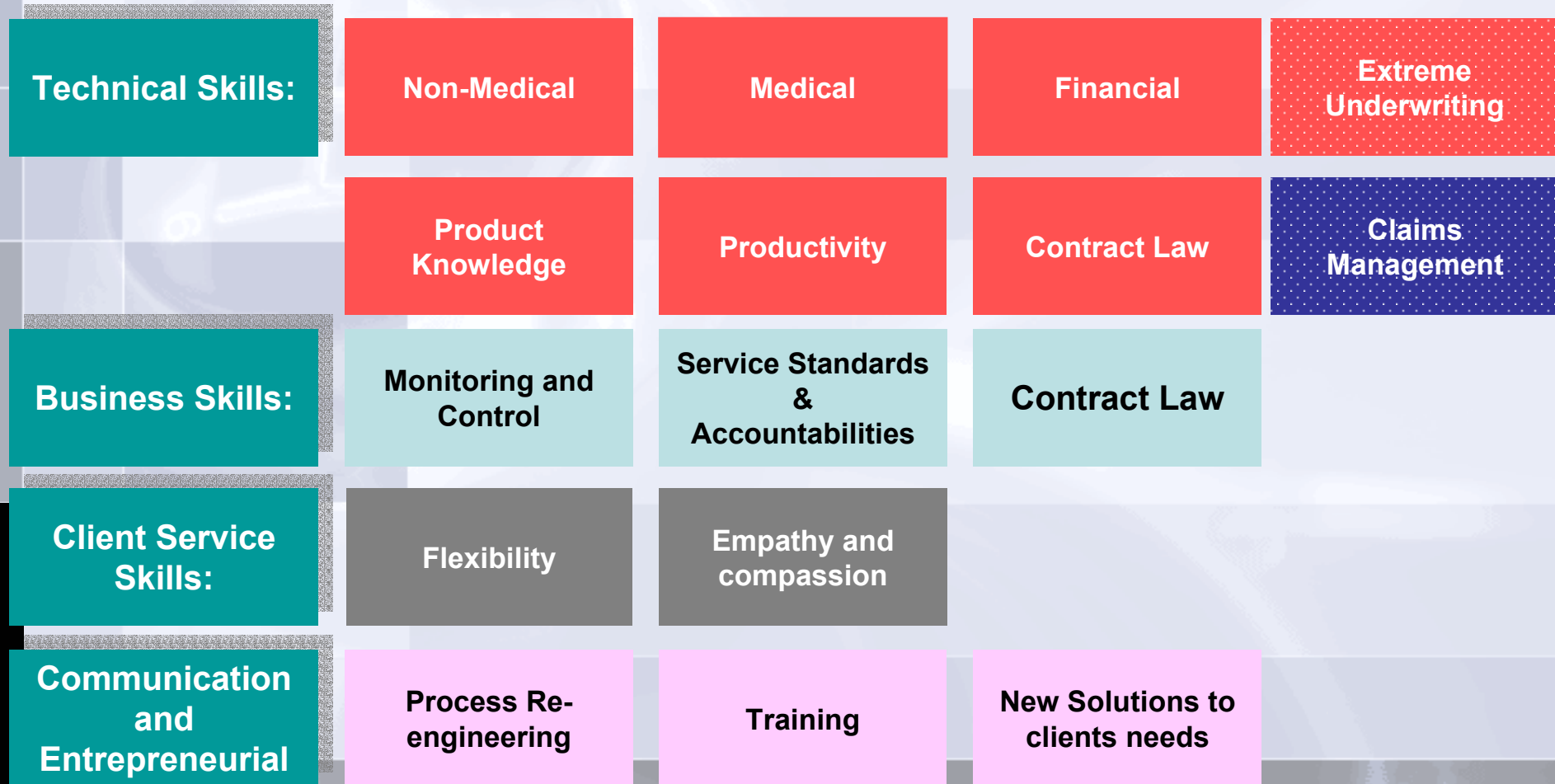
## Continuum of Responsibility

A further eight elements of the process reside within the three operational components of the value chain, each with "Owners"



## Underwriting & Claims Skills Sets

There is such a great overlap in the skills sets required for both underwriters and claims personnel it is surprising that companies don't exploit these synergies.





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## Profitability

**Profitability is the most important pricing objective. It is a real challenge to estimate profitability in advance.**

- Ultimately, company solvency depends on profitability
- Profitability builds company's value.
- Profitability is the result of the long term future experience of the portfolio, it can only be estimated within a certain level of accuracy (until the last policy is finally off the books).

## Factors Determining Profits

The following key factors determine the profitability of a portfolio. The importance of each factor depends on the nature of the product.

- **Underwriting experience: Is the most important factor for protection plans.**
- Persistency rates. Lapses in the first year are bad for all parties. Some products are 'lapse supported' in later years (financially ok, but not customer friendly!)
- Expenses. Companies with expense overruns still need to charge appropriately
- Cost of distribution: e.g. commissions, overrides, bonus.
- Investment yields. Most important for saving plans.
- Reserving requirements ('soft cash-flows'): regulator typically requires the use of net premium reserves with a conservative basis
- Solvency Margin (& Taxation)





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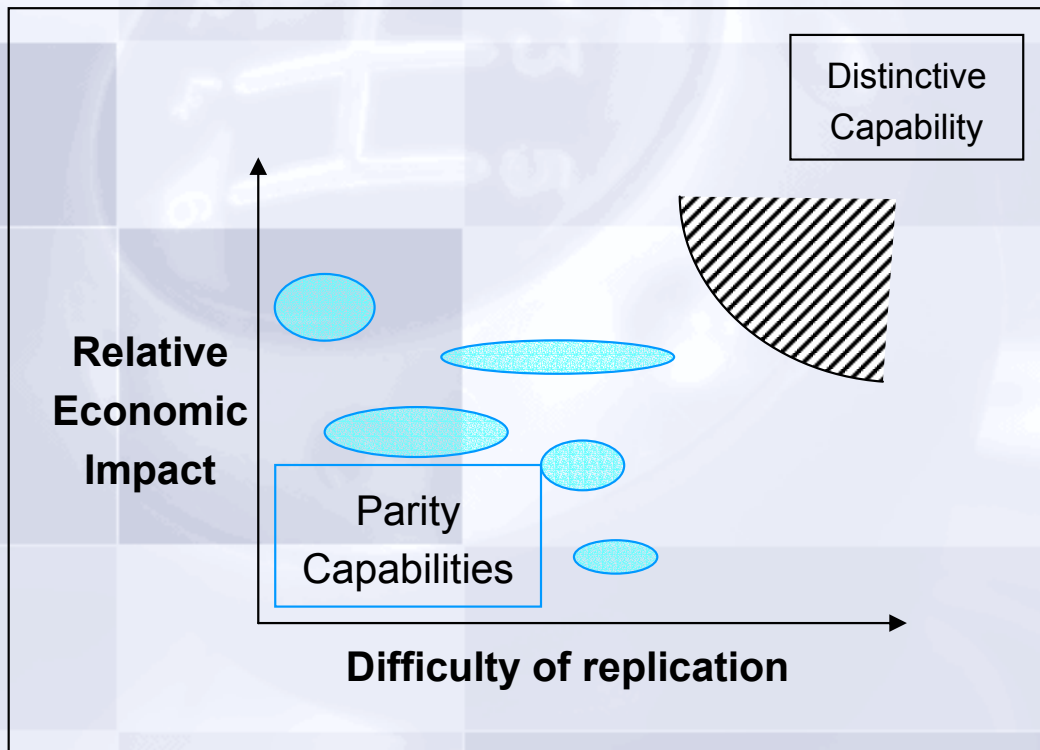
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## Distinctive Capability

The goal of identifying and developing hard-to-imitate organizational capabilities is a crucial competitive strategic consideration, leading to competitive advantage.



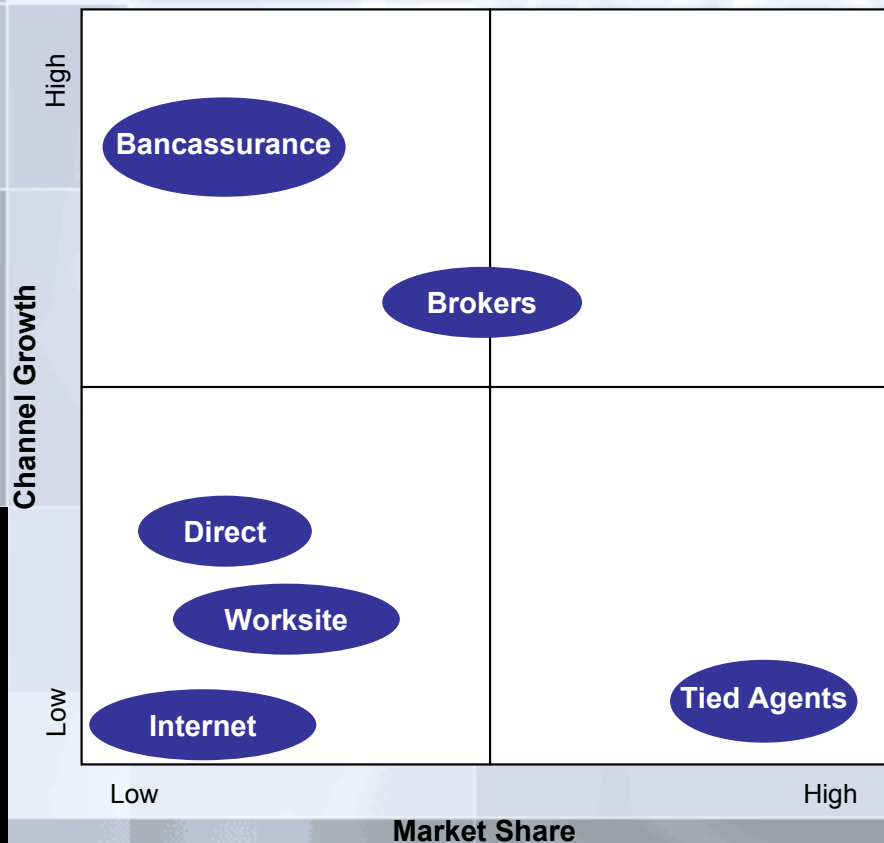
### What is it ...?

- Lowest cost producer!
- Highest quality producer!
- Most flexible producer!
- Exploits unique processes!
- Uses efficient controls!
- Access to cheap supplies or scarce resources!

## The Balanced Distribution Portfolio

Best practice insurers have embraced alternative distribution and adopted a balanced multi-channel distribution portfolio thereby reducing their dependence on agency forces.

### Channel Opportunity Map



- *The challenge is to determine the right channel portfolio, especially in a changing competitive environment*
- **A balanced channel portfolio provides for different types of customers and products**
- *Best practice among large, multi-product and global players is to adopt a multi-channel distribution strategy*
- *An ideal channel portfolio contains 'cash cows' for the present and seeds for future growth*



# Underwriting/Claims Contributions (1)

The underwriting/claims options available irrespective of distribution type is limited the risk management philosophy and chosen by the business philosophy

Product  
Development &  
Design

- Understanding the pricing bases for products allows RM to assist with appropriate product devp.
- Policy terms and conditions must be done by RM

Pricing  
Philosophy

- Understanding and appreciation allows for product development and innovation.
- When dimensions understood, marketing can be done

Productivity  
& Processes

- Increasing productivity reduces costs – note, integrity of RM must remain intact.
- Tele-underwriting &-claims the most efficient medium

Conservatism  
vs Correctness

