

Using Evidence to Support the Business Case: the route to adoption

Christopher P Price

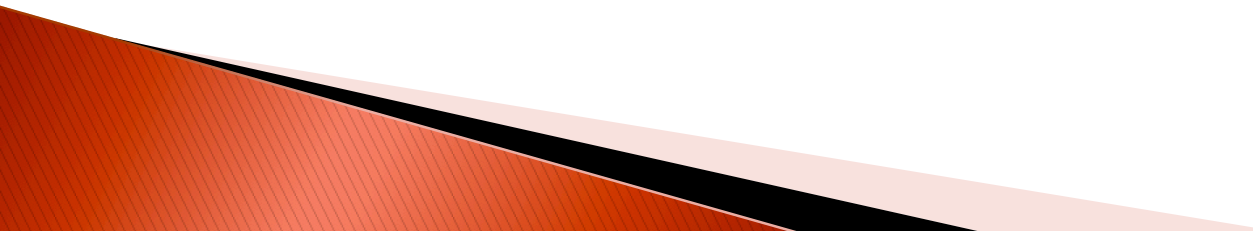
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University of Oxford

A decorative graphic element in the bottom-left corner of the slide, consisting of overlapping orange and black geometric shapes.

Technology Adoption in Healthcare

innovation improving patient outcomes

- Care of individual patients
 - Maximising benefit
 - Minimising risk
 - Reasonable cost
- 

Innovation, Adoption and Value

Invention: an idea made manifest

Innovation: an idea applied successfully in practice

introducing a new method or process

new 'stuff' made useful

enhancing value

- ★ Technology, of itself, is not innovative
- ★ Innovation involves process change

**Adoption is the process of translation
from invention to innovation**



Definition of Value

The regard that something is held to deserve:

- importance or worth
- material or monetary worth
- the worth of something compared to its price

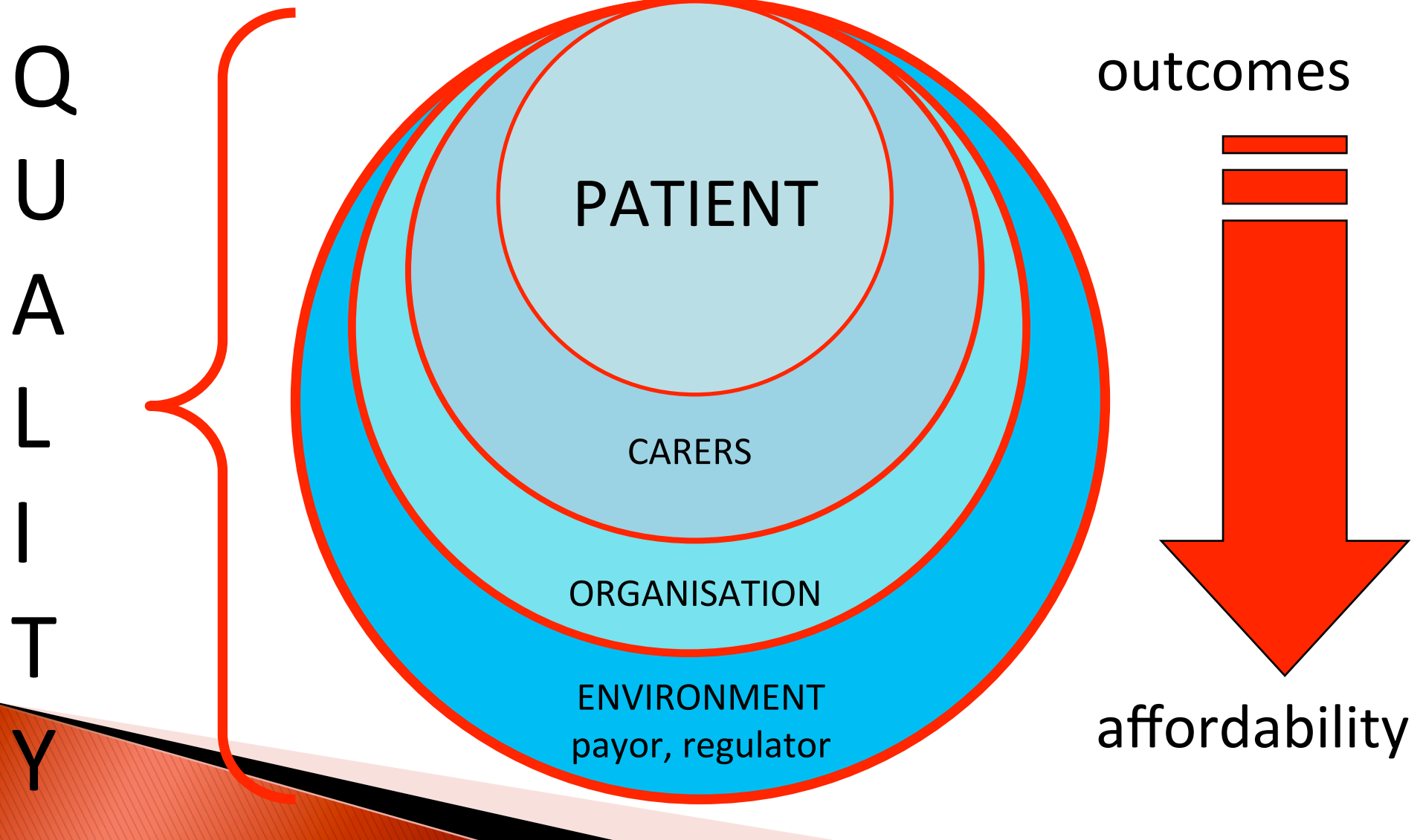
$$\text{value} = \text{benefit/cost}$$

to whom?

what, where
and
how much?

what, where
and
how much?

Perspectives on Biomarker Adoption



The Process from Invention to Practice

an NHS insight into innovation

INVENTION

The originating idea for a new service or product, or a new way of providing a service

ADOPTION

Putting the new idea, product or service into practice, including prototyping, piloting, testing and evaluating its safety and effectiveness

DIFFUSION

The systematic uptake of the idea, service or product into widespread use across the whole service.

Adoption: What it is not

INVENTION

The originating idea for a new service or product, or a new way of providing a service

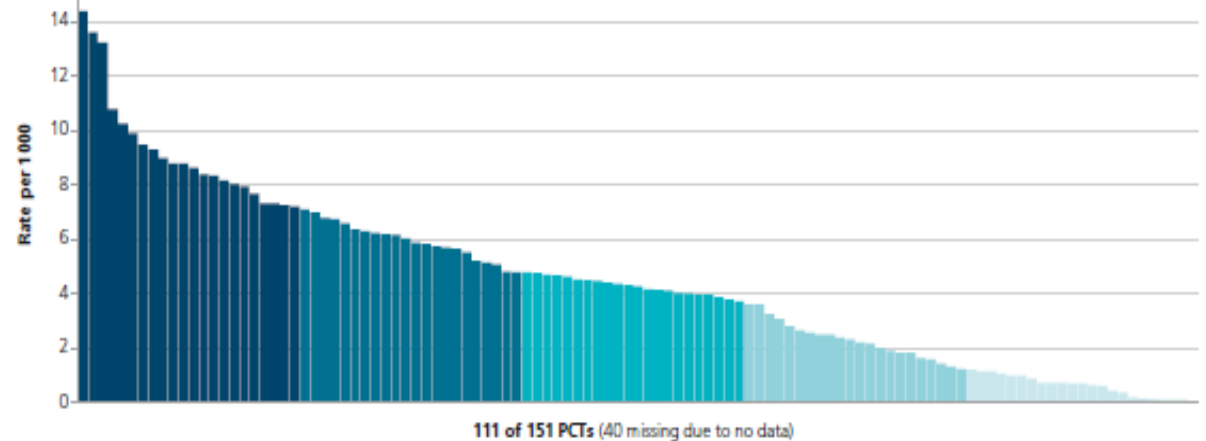
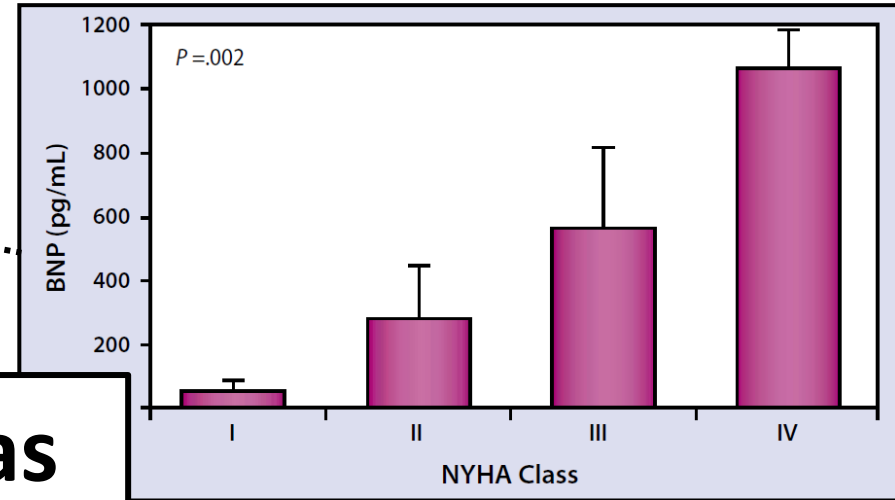
ADOPTION

Putting the new idea, product or service into practice, including prototyping, piloting, testing and evaluating its safety and effectiveness

DIFFUSION

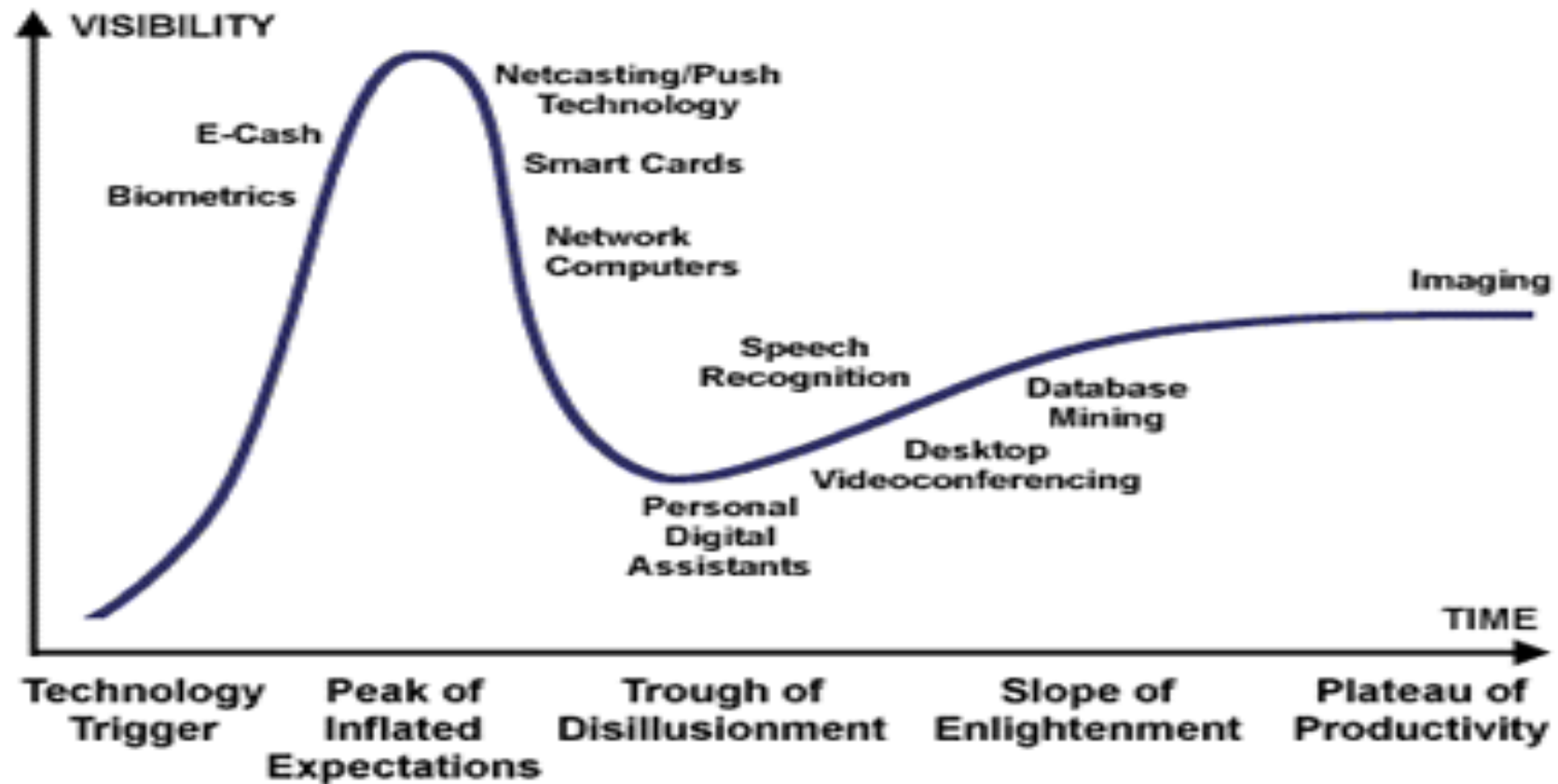
The systematic uptake of the idea, service or product into widespread use across the whole service.

**Putting ideas
into practice**



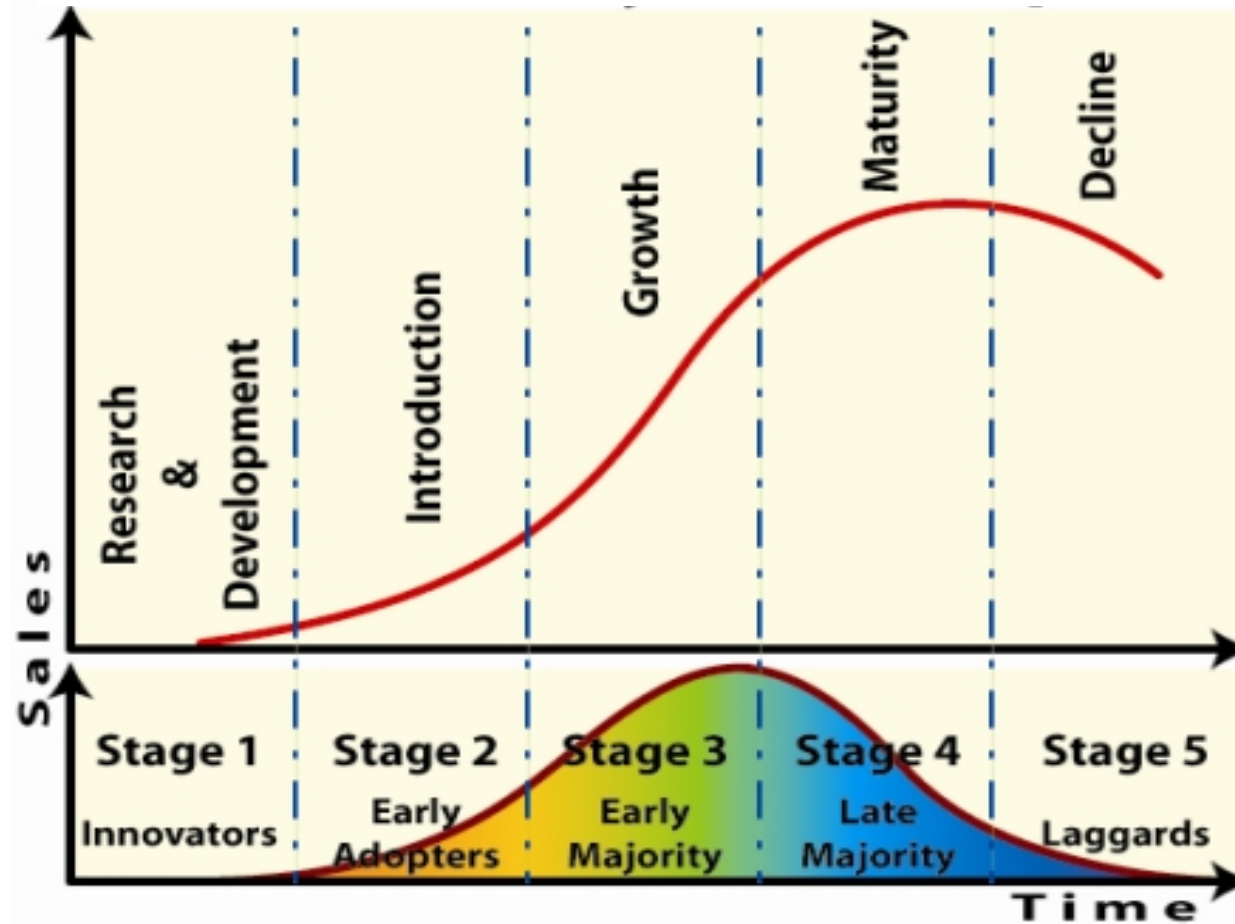
The Gartner Hype Cycle

Hype Cycle of Emerging Technology



Source: Gartner Group

Product Lifecycle and Adoption



Three Phases of Technology Adoption

Phase	Definition/Examples
Technology assessment	• Evaluation of results of scientific testing
	• Efficacy
	• Cost benefit analysis
	• Specification of the target population
Technology deployment	• Putting technology into practice
	• Development of new work routines
	• Integration with existing technologies and routines
Technology monitoring	• Post application monitoring
	• Evaluation of outcomes
	• Detection of anomalies

Technology Adoption in Healthcare

the NHS approach

- Manage the implementation and systems integration issues.
- Identify where additional changes to clinical pathways and services are required.
- Unlock the full benefits of the technologies

Innovation in Industry

causes of failure: cultural infrastructure

- Poor leadership
- Poor organisation
- Poor communication
- Poor empowerment
- Poor knowledge management

Innovation in Industry

causes of failure: innovation process

- Poor goal definition
- Poor alignment of actions to goals
- Poor participation in teams
- Poor monitoring of results
- Poor communication/access to information

Failure of Innovation in Health Care


where are the health care entrepreneurs?

- Public insurance programs that are oriented to volume of care and not value
- Inadequate information about the quality of care

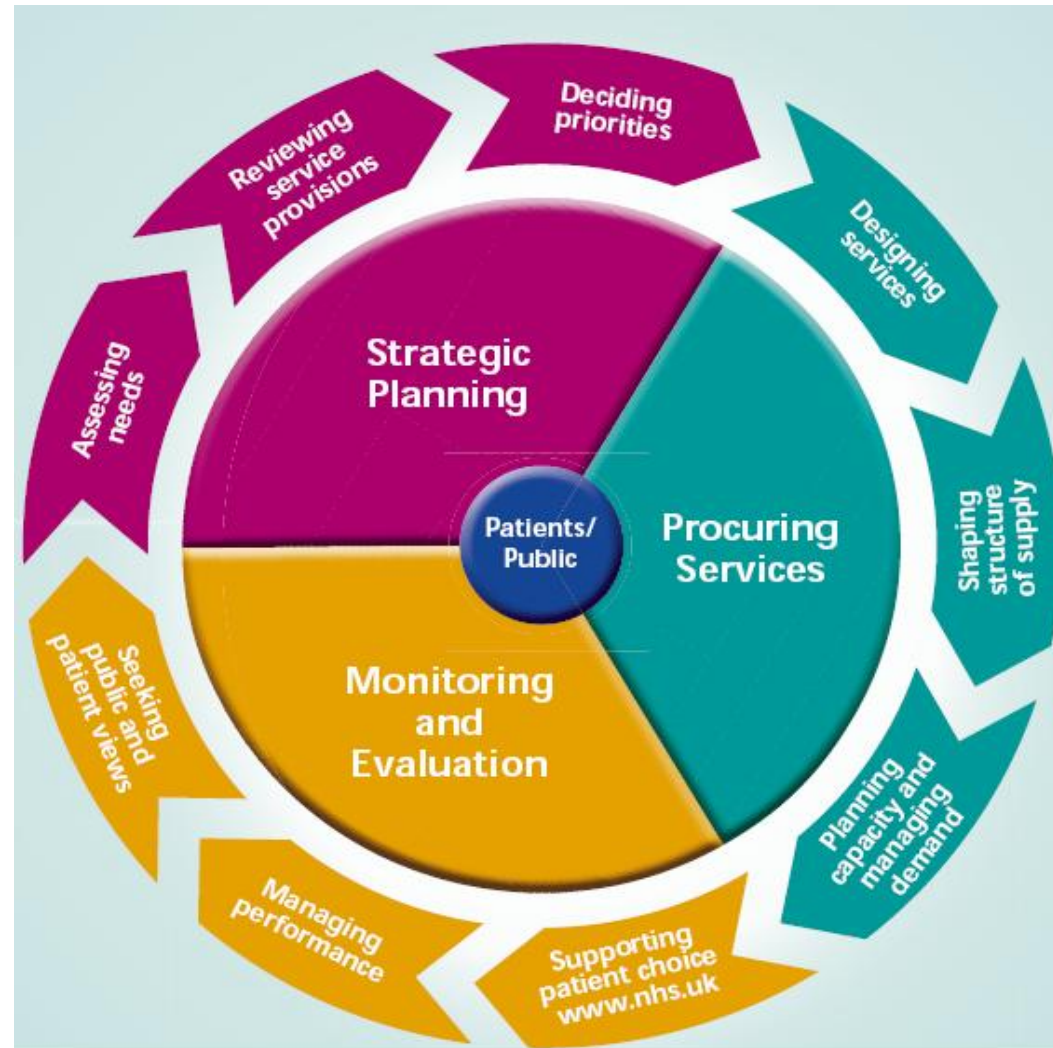
Organisational and Behavioural Barriers to Medical Technology Adoption

- Decision making processes
- Innovation Culture
- Communication
- Prioritisation
- Evidence
- Reimbursement
- Budget silos
- Decommissioning
- Implementation planning

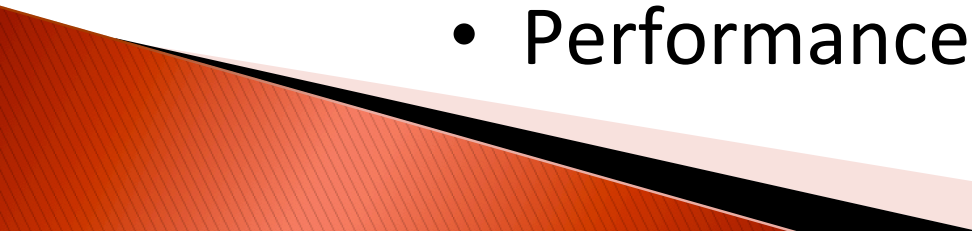
Organisational and Behavioural Barriers to Medical Technology Adoption

- Decision making processes
- Innovation Culture
- Communication
- Prioritisation  **Needs assessment**
- Pathway definition (and deviations)
- Evidence
- Reimbursement
- Decommissioning
- Implementation planning

Prioritisation: The Commissioning Cycle



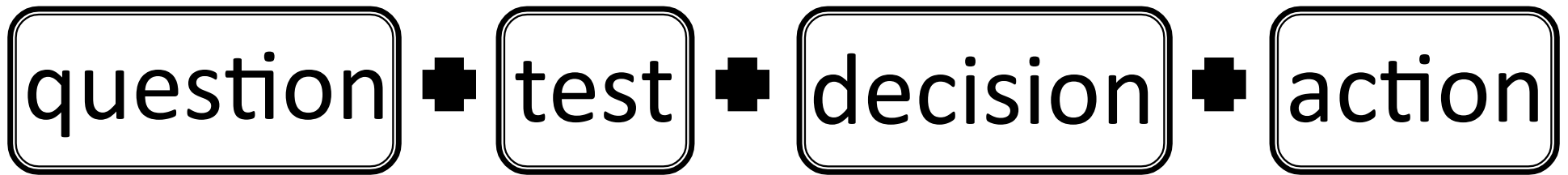
Commissioning/Adopting a New Biomarker or.....making the business case

- Identifying the unmet need
 - Making the case for using a test
 - Impact on clinical decision making
 - Impact on health outcome
 - Economic considerations
 - Implementation plan
 - Performance management
- 

Diagnostic Services

why do doctors order tests?

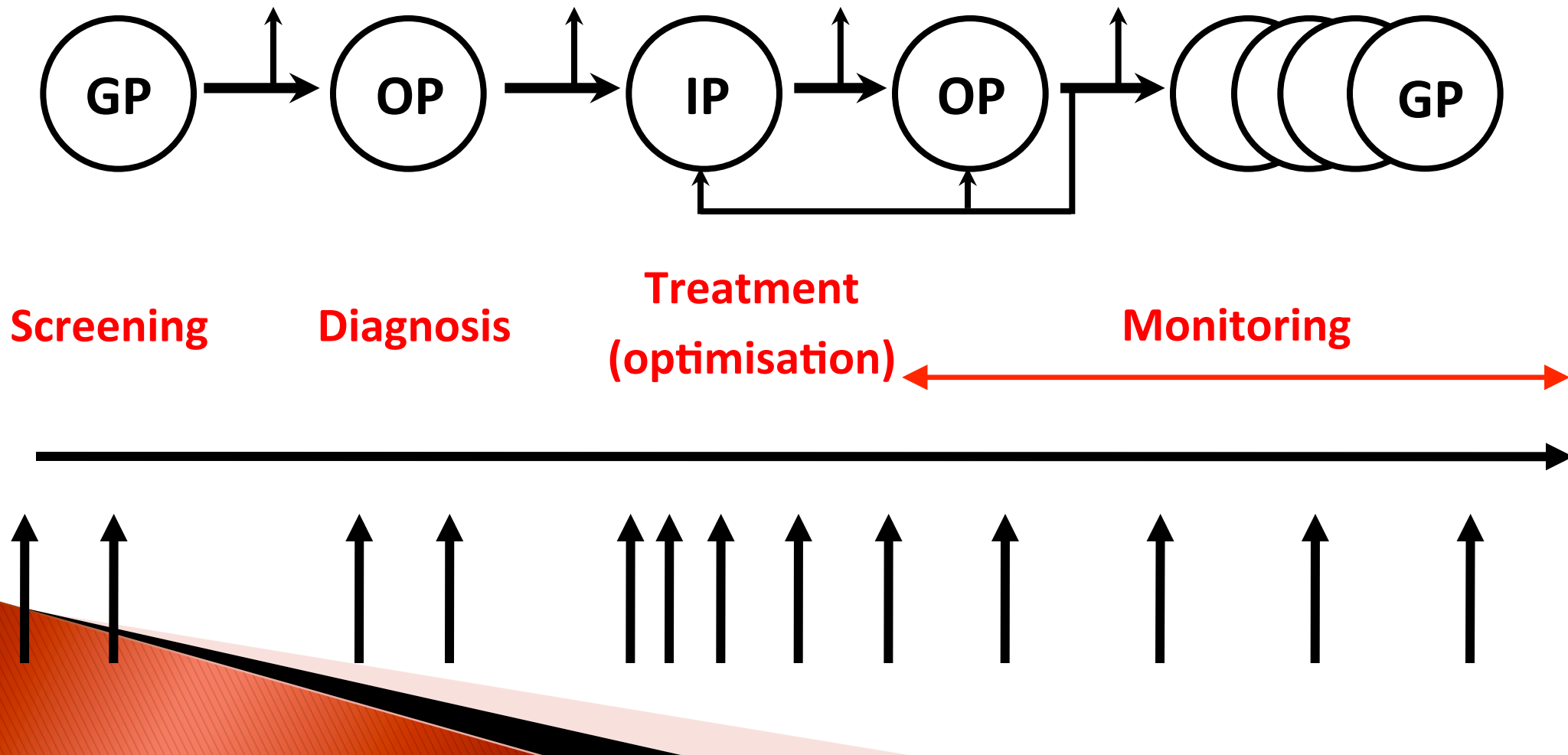
PATIENT



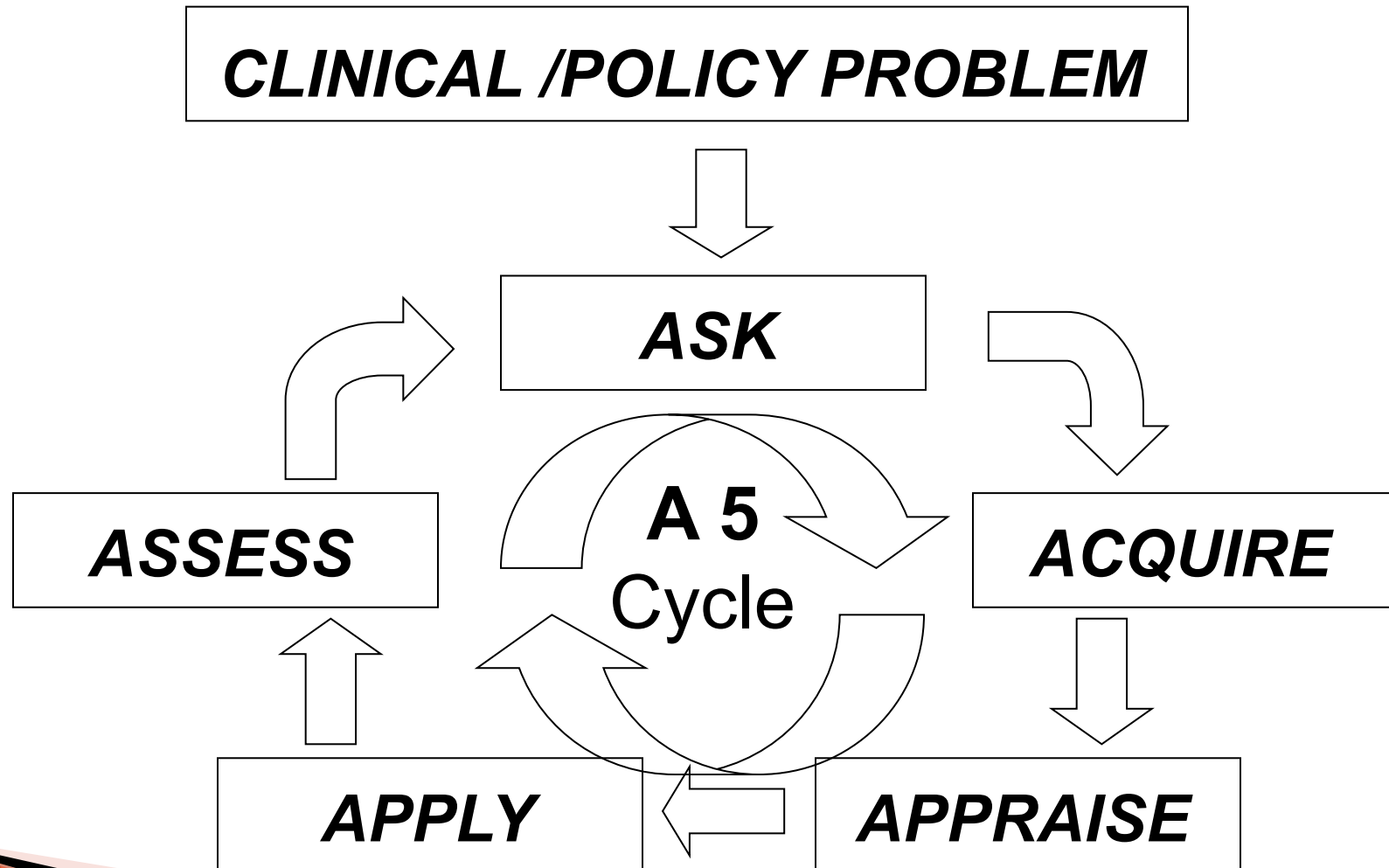
OUTCOME

Diagnostic Services

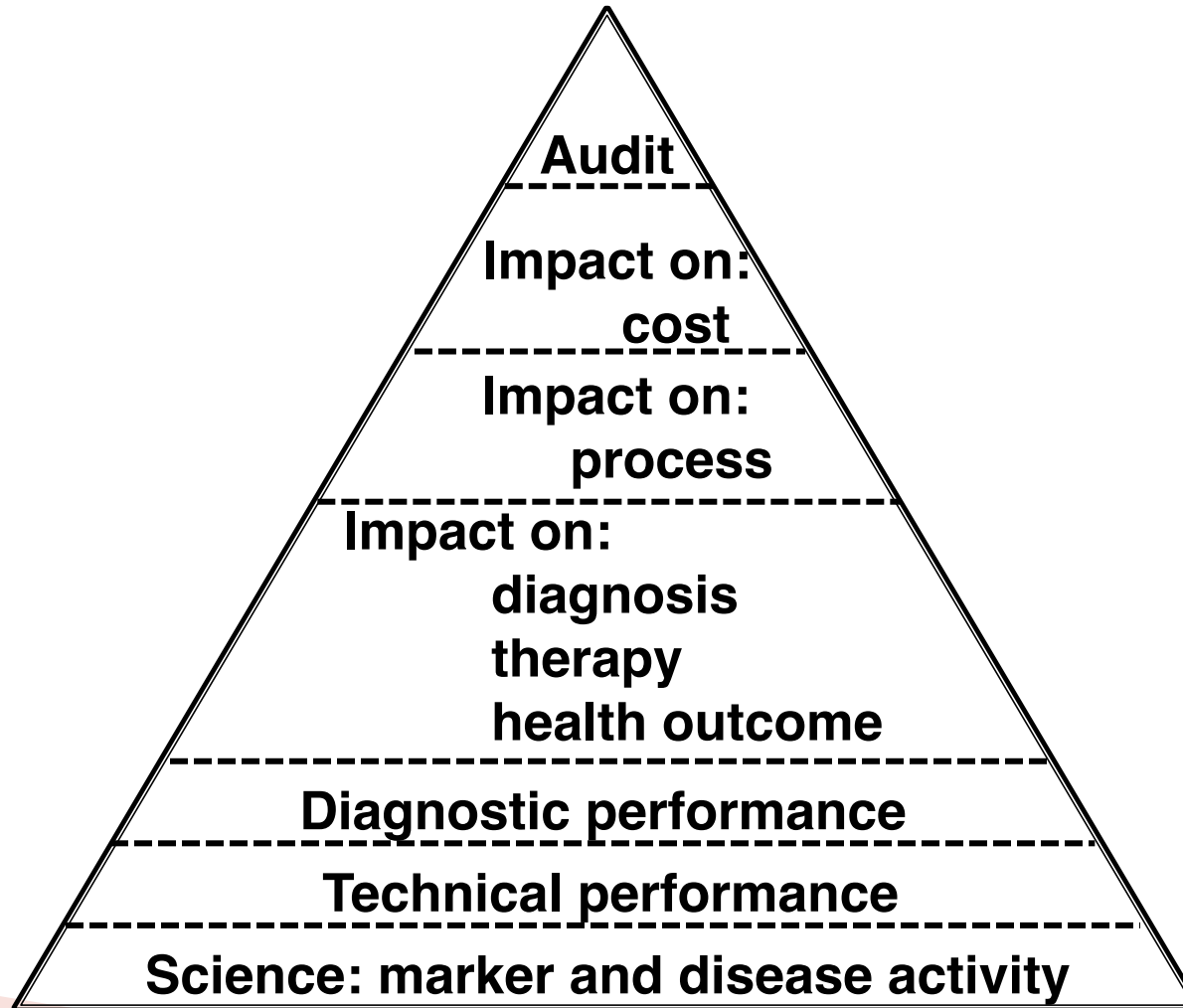
informing decisions across the care pathway



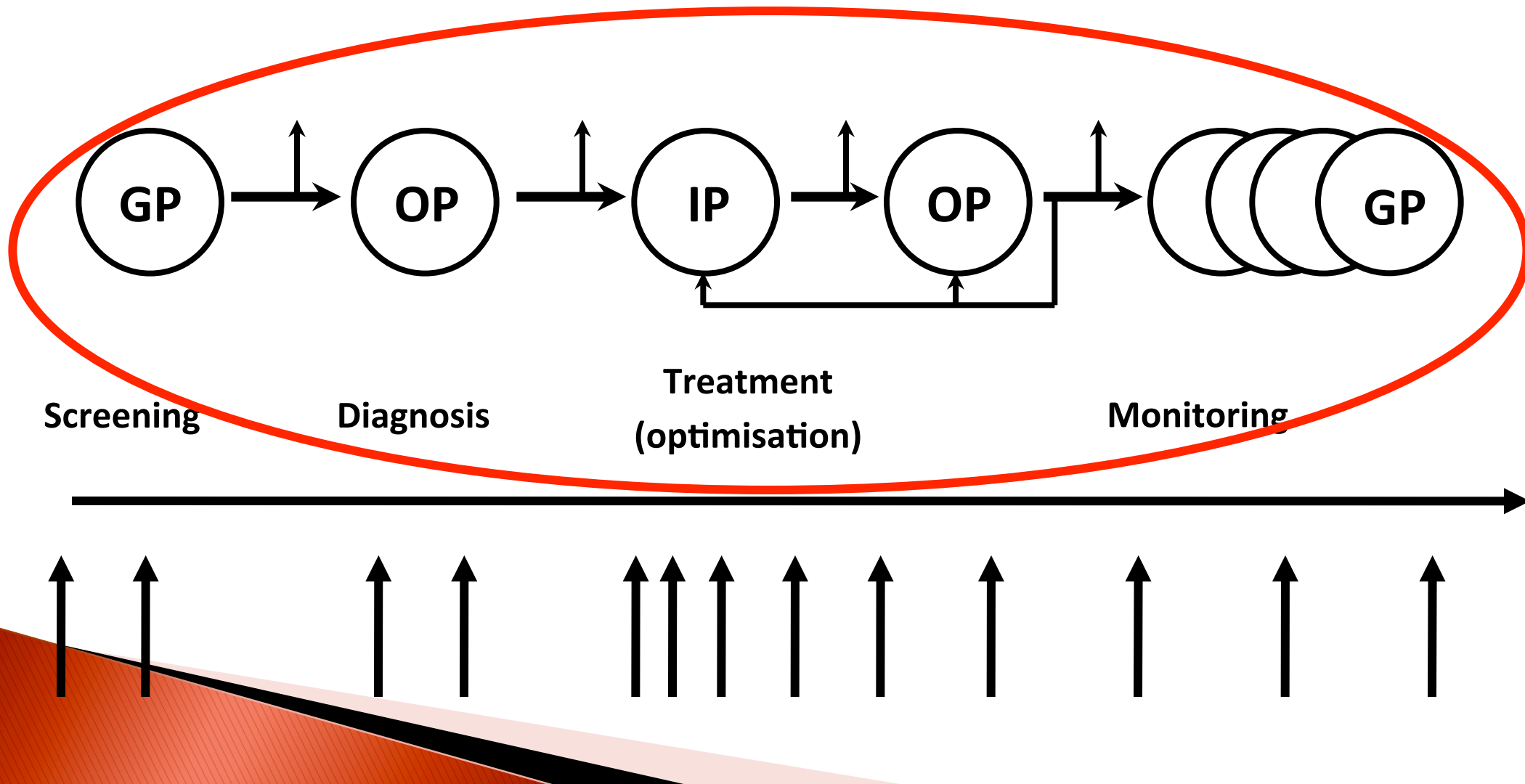
The Evidence Based Laboratory Medicine Cycle



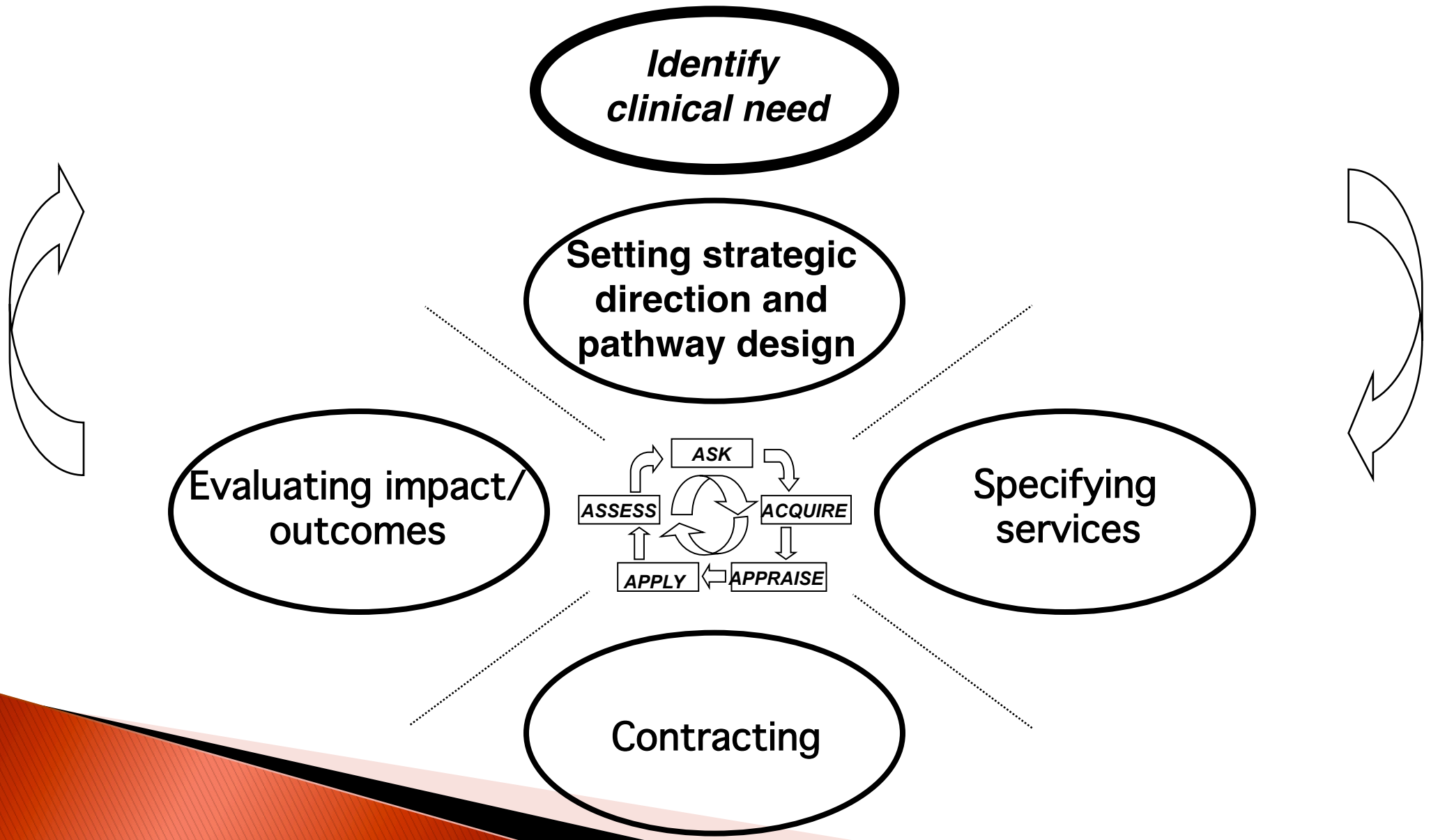
Innovation and Adopting a New Test evidence requirements



Commissioning (Adopting) a New Biomarker focussing on the care pathway



Evidence, Innovation and Adopting Diagnostics




Commissioning (adopting) a New Biomarker

four stages of commissioning

- I assess health care need
 - *and expected outcomes*
- II specify services required
 - *and resource requirement*
- III secure services
 - *and practice change including resource allocations*
- IV monitor and evaluate outcomes
 - *including resource allocations*


Adopting a New Service

the business case questions

- Is the test any good?
 - Why do you want the test?
 - What will you do with the result?
 - What decision will you make?
 - What action will you take?
 - What outcome would you expect?
 - What process and resource change will be required?
- 

Adopting a New Service

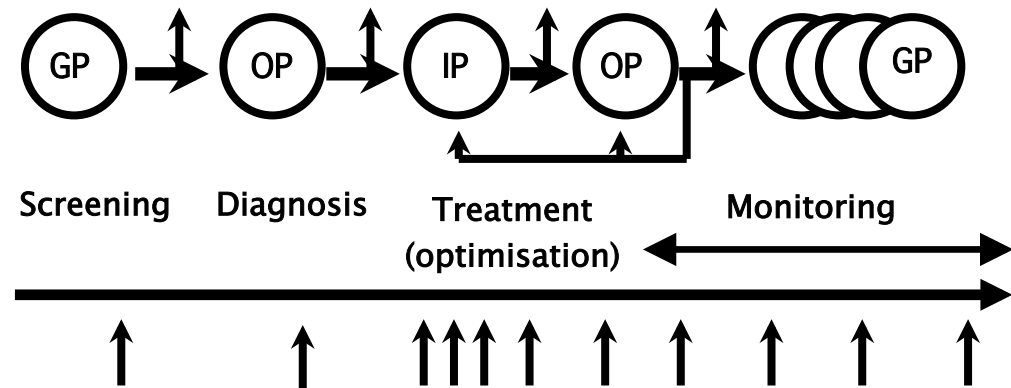
the practical questions

- Research question (clinical need)?
 - Test? *has it been approved?*
 - Turnaround time? *what is the care pathway need?*
 - Decision? *Has this been thought through?*
 - Action? *Is it feasible?*
 - Process change? *Is it achievable?*
 - Resource requirement and disinvestment? *!!!!!!*
 - Outcome expected? *Do we need a pilot? Should we model?*
- 

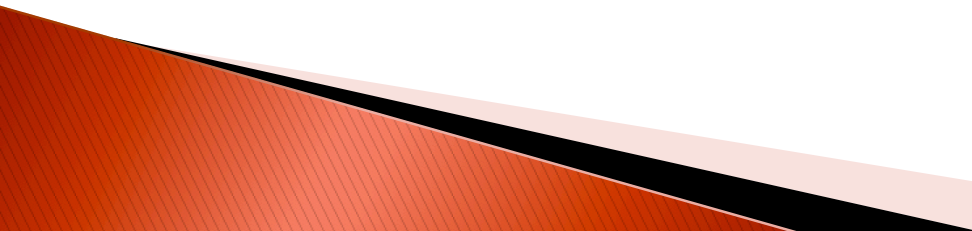
Asking the Right Question

formulating an answerable question (PICO)

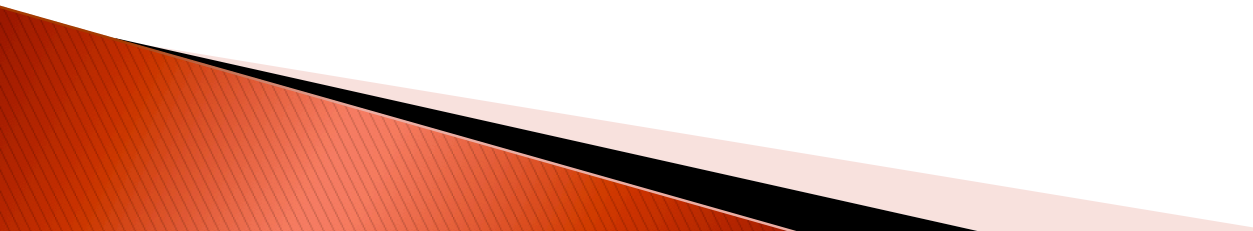
- Population
- Indicator (test, intervention, etc)
- Comparator
- Outcome



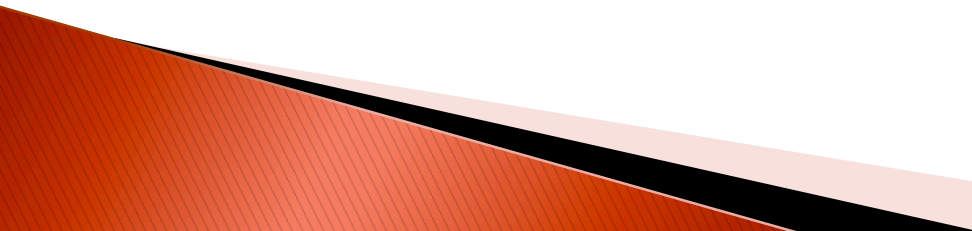
Identifying the Unmet Need diagnostic triage in primary care

- P - breathless patients in primary care
 - I - plasma BNP
 - C - two cardiologists review
 - O - diagnosis of heart failure
- 

Identifying the Unmet Need risk of heart failure with chemotherapy

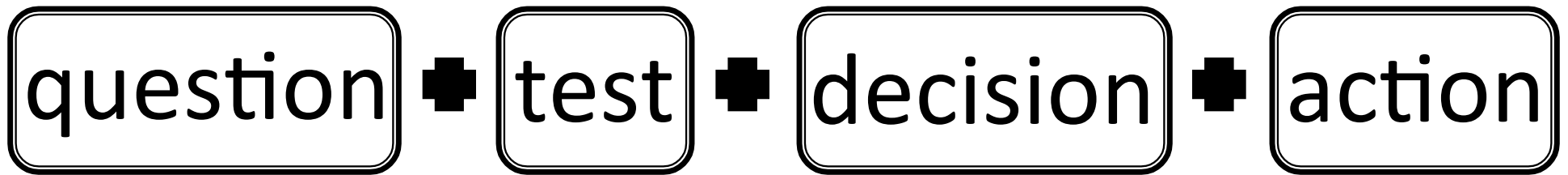
- P - patients on chemotherapy
 - I - plasma BNP
 - C - two cardiologists review
 - O - early detection
- 

Identifying the Unmet Need guide therapy and health outcome

- P - patients with heart failure
 - I - plasma BNP
 - C - current clinical practice
 - O - achieve target BNP value
- 

Adopting a New Biomarker what else do we need to know?

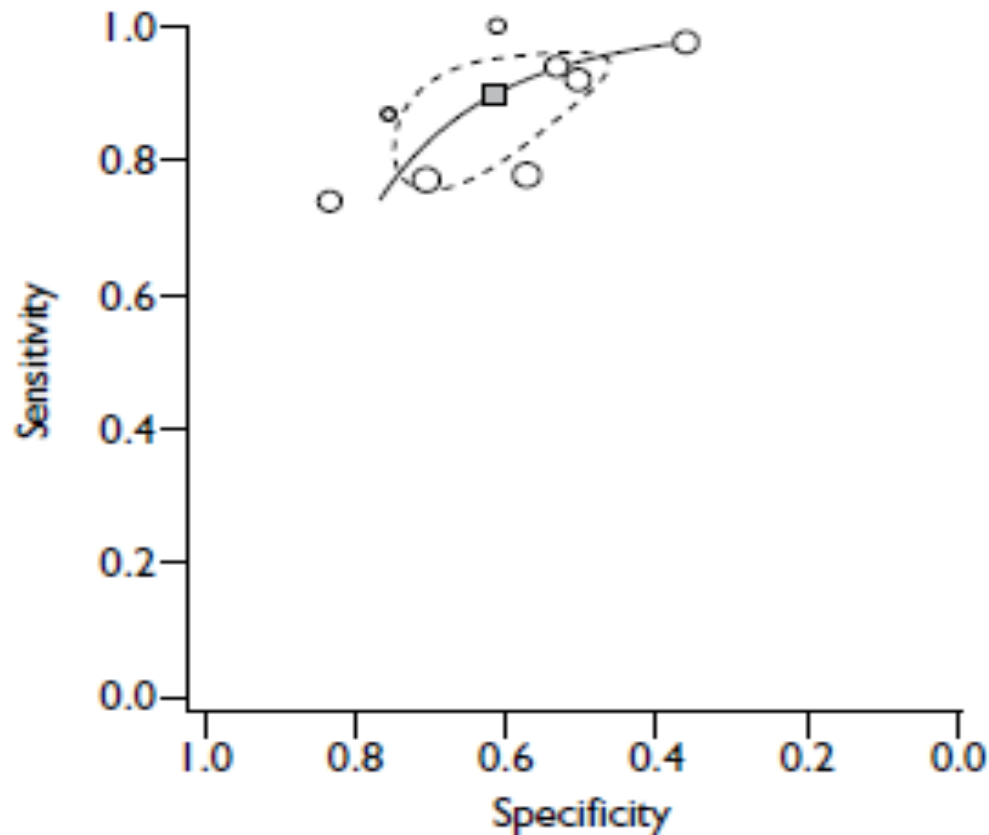
PATIENT



Central laboratory or
point-of-care testing?

OUTCOME

Diagnostic Performance of NT-ProBNP rule out of heart failure in primary care

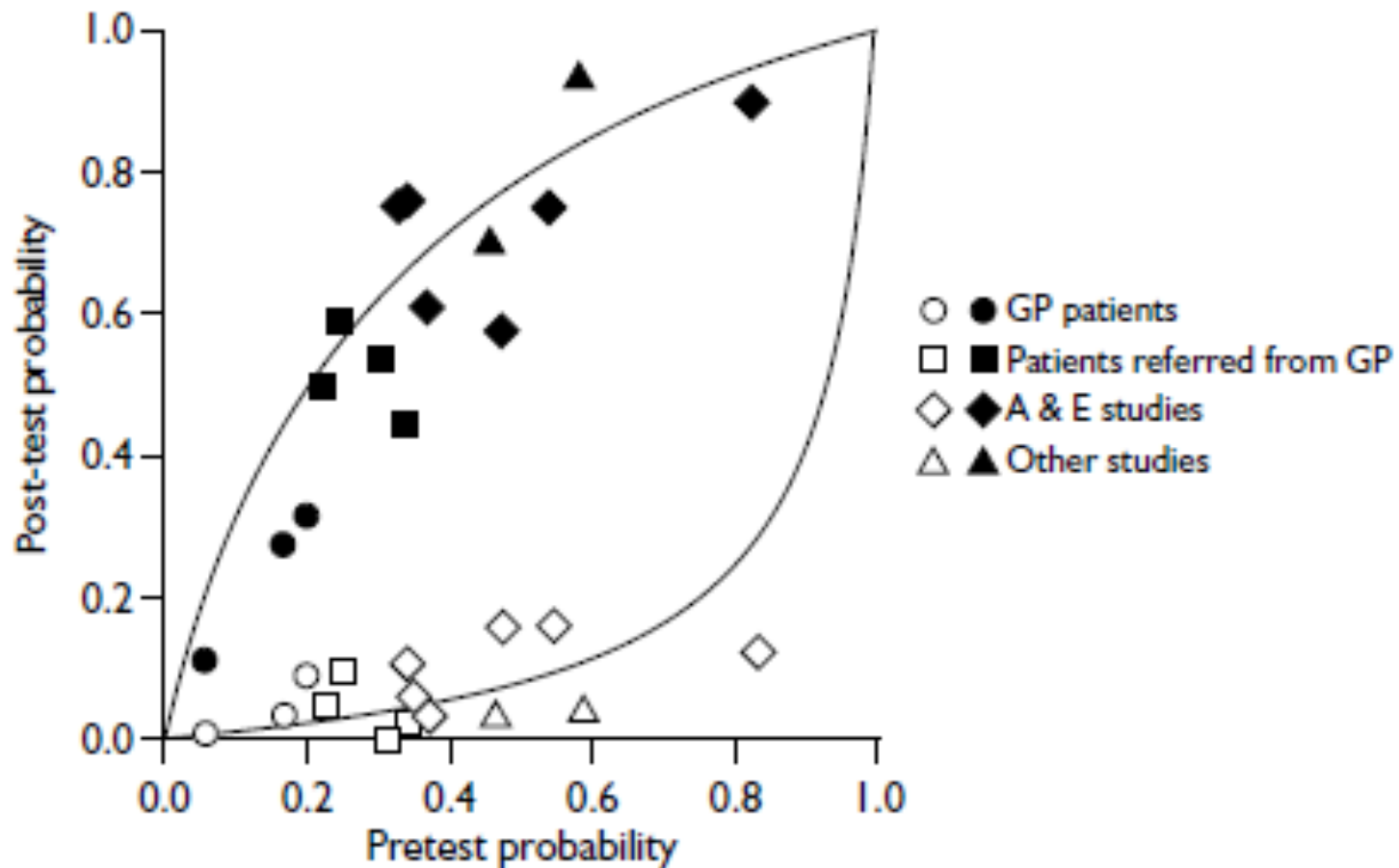


Diagnostic accuracy of NT-proBNP

- Sensitivity 0.90 (95%CI 0.81-0.96)
- Specificity 0.60 (95%CI 0.50-0.70)
- LR+ 2.28 (95%CI 1.82-2.86)
- LR- 0.16 (95%CI 0.09-0.30)

Diagnostic Performance of NT-ProBNP

impact of different settings



Adopting a New Service performance management requirements

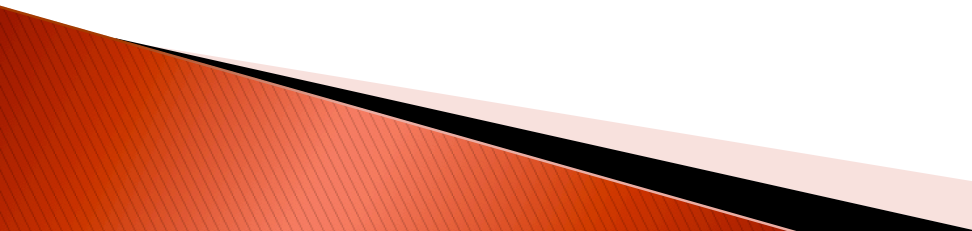
- Background information e.g. disease prevalence
- Test utilisation
- Decision making
- Diagnoses made (disease registry)
- Therapeutic intervention initiated
- Resource utilisation inc. disinvestment
- Clinical outcomes (morbidity, mortality, surrogates)

Negative echo's

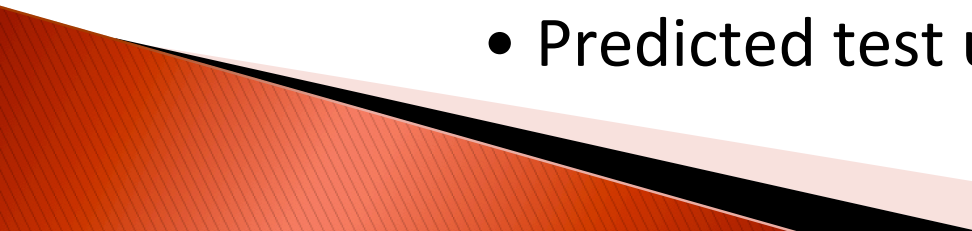
Natriuretic Peptides and Heart Failure

what is Scenario Generator?

Simulation software designed to:

- Model how services of a whole healthcare system are, or might be used, to support care pathways
 - Test / compare scenarios of how that model of the healthcare system might respond to changes in population, health, technology, practice and models of care
 - Show impact of scenarios in terms of throughput, transaction time, cost and staffing
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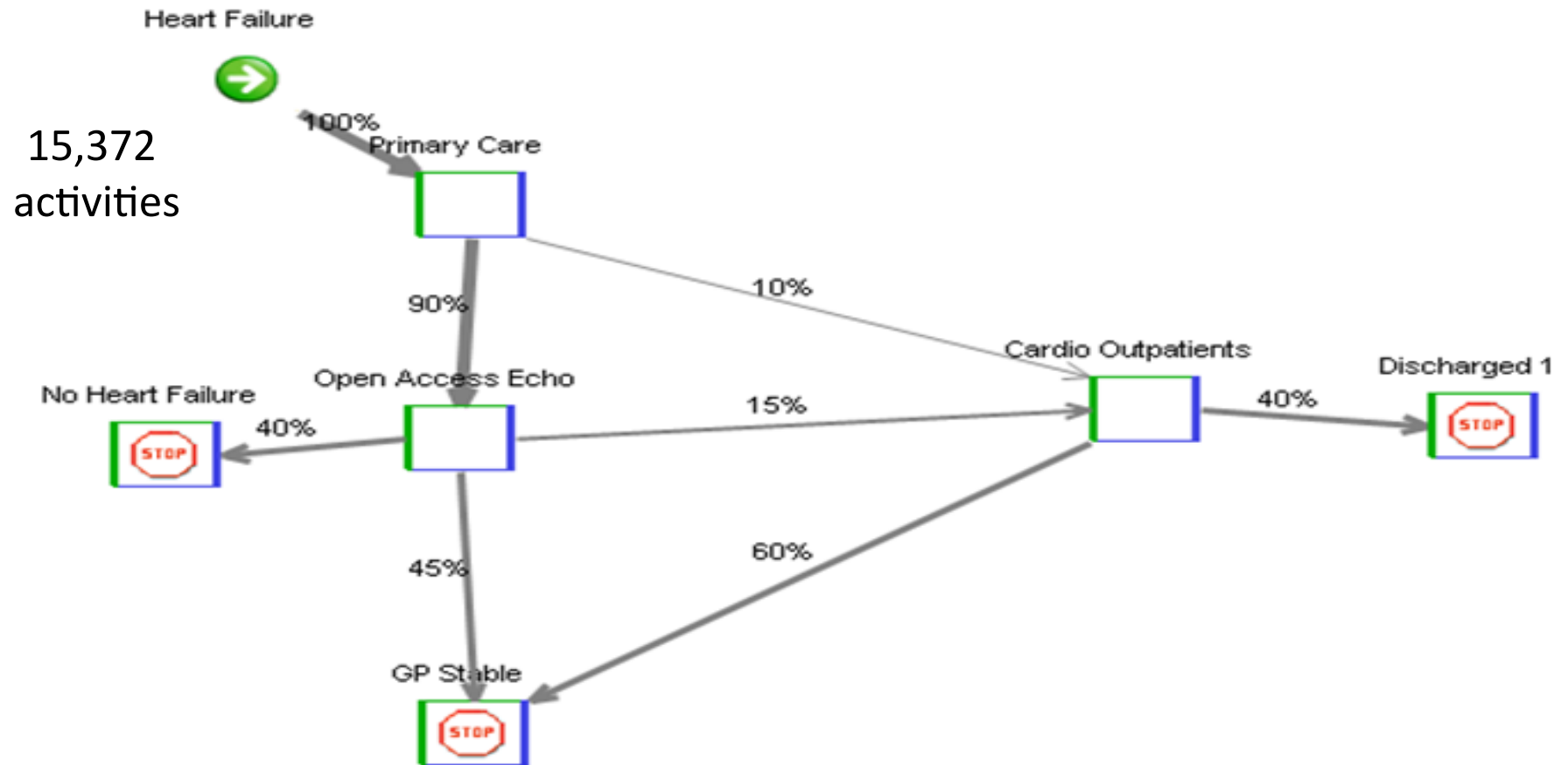
Data Requirements for Modelling commissioning a natriuretic peptide service

- Pathway activities/sequence
 - Workflow referral rates
 - Unit Costs / Tariffs
 - No of years to be simulated
 - Starting population figures and growth
 - Disease prevalence
 - ICD 10 codes
 - Incidence %
 - Predicted test usage
- 

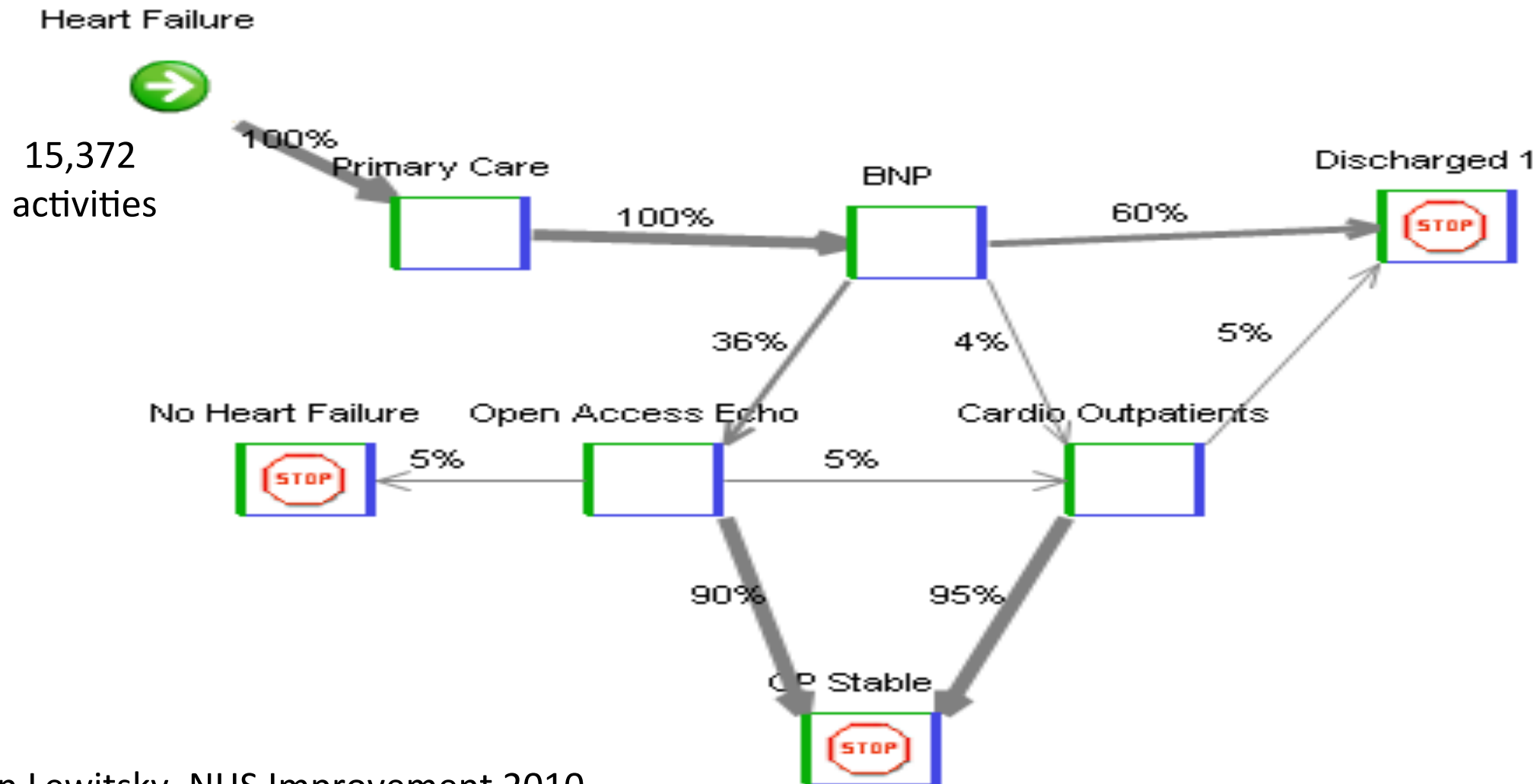
A Natriuretic Peptide Service outline service specification

- BNP or NT-proBNP
- Turnaround time of 24 hours
- POCT option not requested
- Projected workload - 0.24% = 4,831
- 1.0 % = 20,169 ← 15,372
- 3.0 % = 60,507
- Proposal to run service in two laboratories

Heart Failure Diagnostic Pathway prior to access to natriuretic peptide service



Heart Failure Diagnostic Pathway with access to natriuretic peptide service



Simulation Findings

before and after introduction of natriuretic peptide service

Heart Failure Pathway - As Is With Echo

Step	Year 1 Activity	Year 2 Activity	Year 3 Activity	Year 4 Activity	Year 5 Activity	Unit cost	Year 1 Step Cost	Year 2 Step Cost	Year 3 Step Cost	Year 4 Step Cost	Year 5 Step Cost
Heart Failure	15372	15580	15794	16005	16097		£0	£0	£0	£0	£0
Primary Care	15372	15580	15794	16005	16097	£36	£553,392	£560,880	£568,584	£576,180	£579,492
Cardio Outpatients	3611	3711	3734	3767	3767	£215	£776,365	£797,865	£802,810	£809,905	£809,905
GP Stable	8392	8526	8666	8774	8817		£0	£0	£0	£0	£0
Discharged 1	1461	1460	1488	1451	1489		£0	£0	£0	£0	£0
Open Access Echo	13845	14017	14154	14383	14511	£87	£1,204,515	£1,219,479	£1,231,398	£1,251,321	£1,262,457
No Heart Failure	5519	5594	5640	5780	5791	£0	£0	£0	£0	£0	£0
Total	63572	64468	65270	66165	66569		£2,534,272	£2,578,224	£2,602,792	£2,637,406	£2,651,854

BNP Pathway - To Be With Echo

Step	Year 1 Activity	Year 2 Activity	Year 3 Activity	Year 4 Activity	Year 5 Activity	Unit cost	Year 1 Step Cost	Year 2 Step Cost	Year 3 Step Cost	Year 4 Step Cost	Year 5 Step Cost
Heart Failure	15372	15580	15794	16005	16097	£0	£0	£0	£0	£0	£0
Primary Care	15372	15580	15794	16005	16097	£36	£553,392	£560,880	£568,584	£576,180	£579,492
Cardio Outpatients	900	900	994	941	983	£215	£193,500	£193,500	£213,710	£202,315	£211,345
GP Stable	5825	5898	6016	6095	6065	£0	£0	£0	£0	£0	£0
Discharged 1	9260	9394	9480	9627	9734	£0	£0	£0	£0	£0	£0
Open Access Echo	5515	5614	5647	5803	5739	£87	£479,805	£488,418	£491,289	£504,861	£499,293
BNP	15372	15580	15794	16005	16097	£20	£307,440	£311,600	£315,880	£320,100	£321,940
No Heart Failure	287	288	298	283	298	£0	£0	£0	£0	£0	£0
Total	67903	68834	69817	70764	71110		£1,534,137	£1,554,398	£1,589,463	£1,603,456	£1,612,070



Heart Failure - Summary

Heart Failure Model			Year 1 Step Cost	Year 2 Step Cost	Year 3 Step Cost	Year 4 Step Cost	Year 5 Step Cost
As Is Model			£2,534,272	£2,578,224	£2,602,792	£2,637,406	£2,651,854
BNP Model - scenario 1			£1,534,137	£1,554,398	£1,589,463	£1,603,456	£1,612,070
Savings Potential Scenario 1 - Full Year			-£1,000,135	-£1,023,826	-£1,013,329	-£1,033,950	-£1,039,784

A Natriuretic Peptide Service

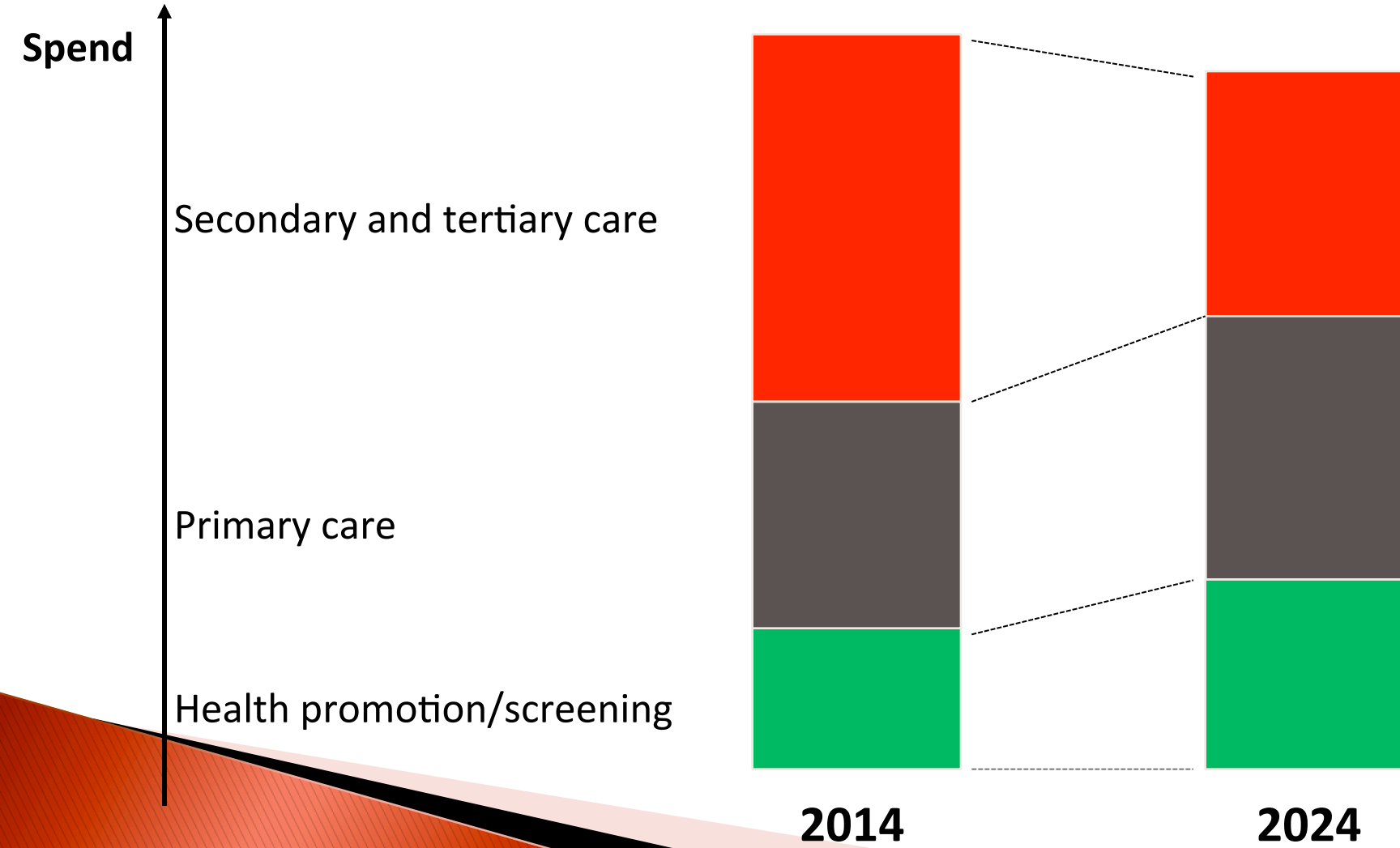
the business case

Screening Diagnosis Prognosis Monitoring

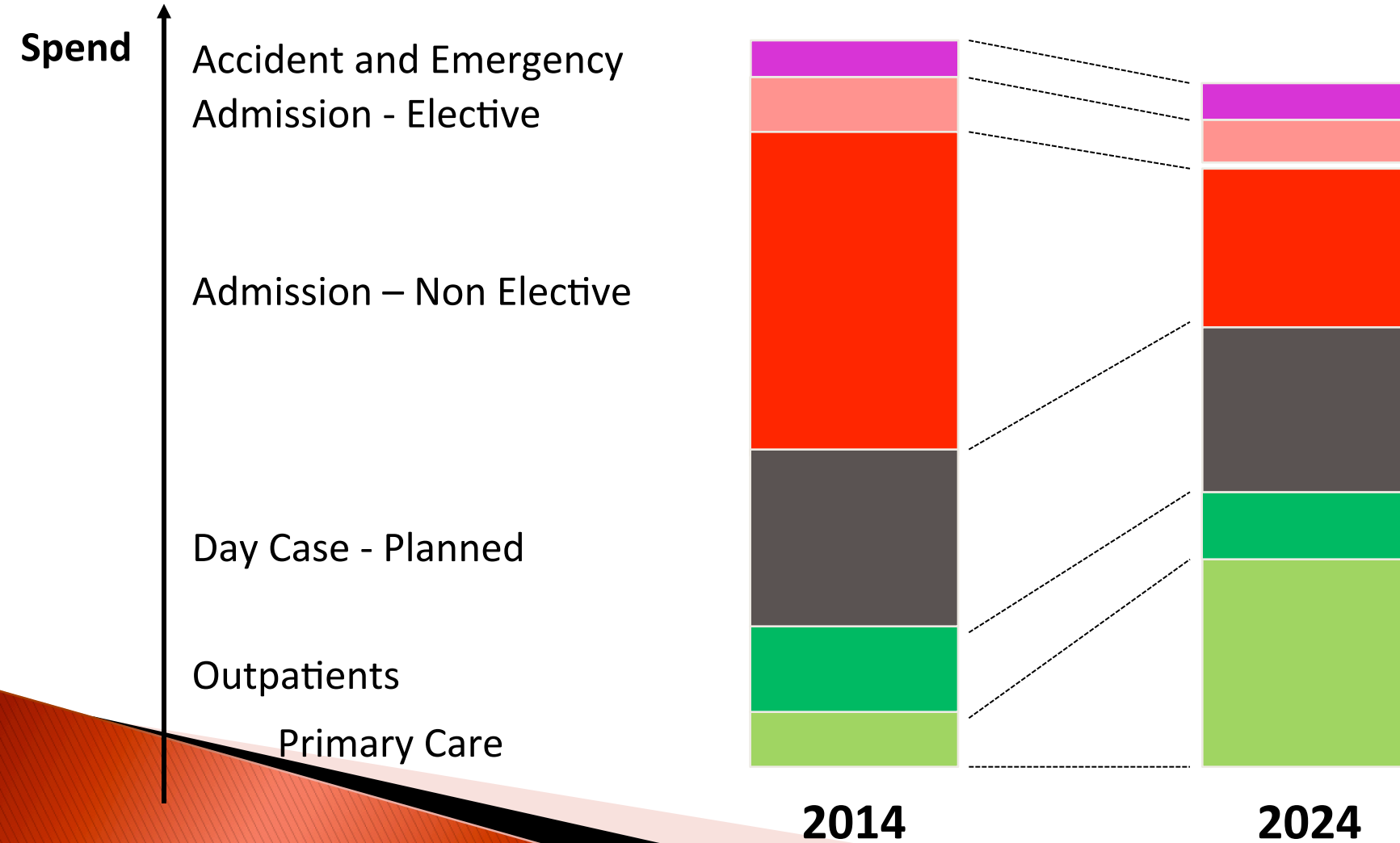
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- Rule out diagnosis of heart failure in primary care
 - Reduce demand for echocardiography
 - Reduce associated cardiology referral
 - Reduce time-to-diagnosis
 - Improve accuracy of diagnosis
 - Provide value-for-money
- 

Resource Utilisation and Financial Flows

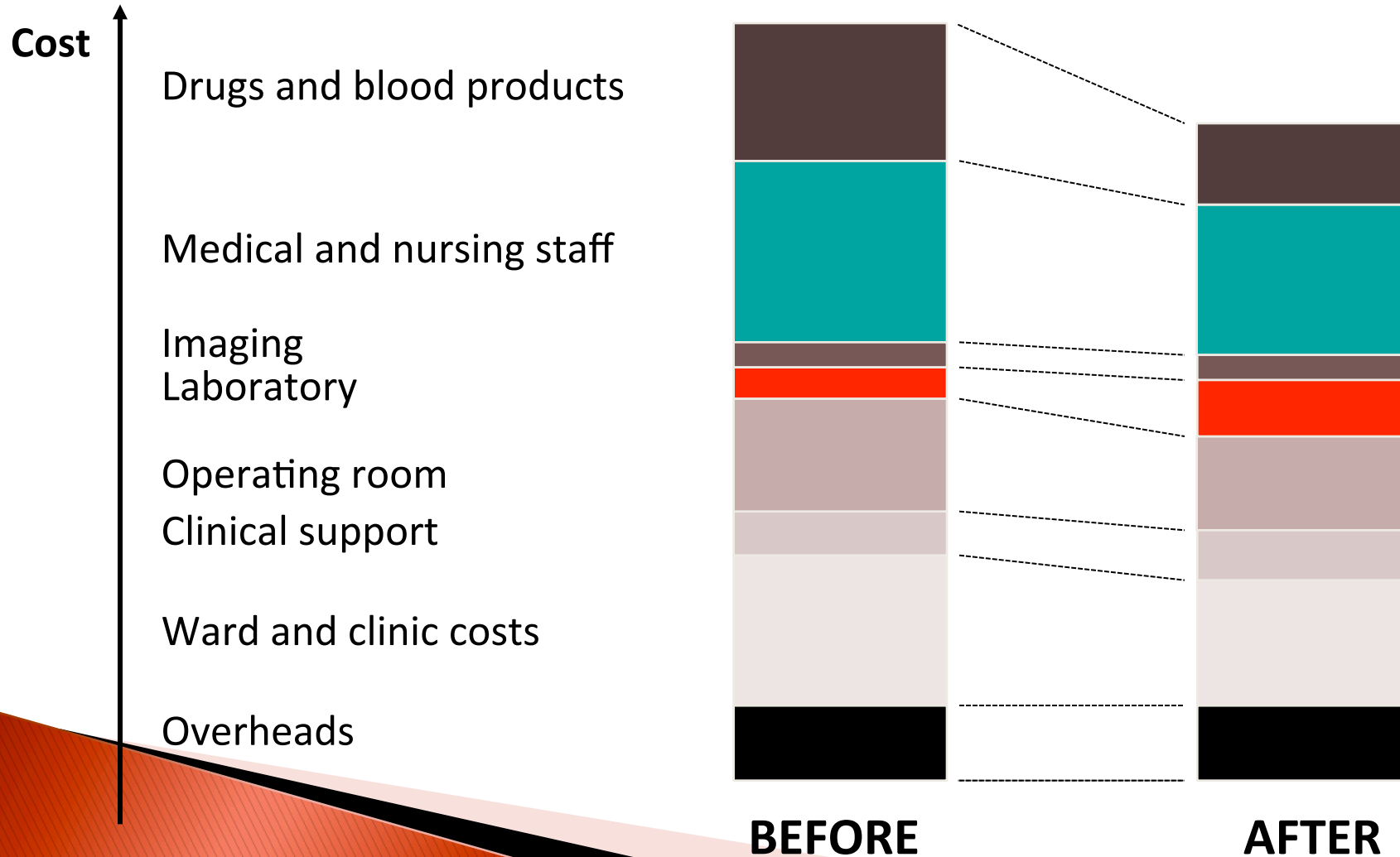
health care policy: the next decade



Resource Utilisation at a Provider Level analysed at a pathway/condition/life level

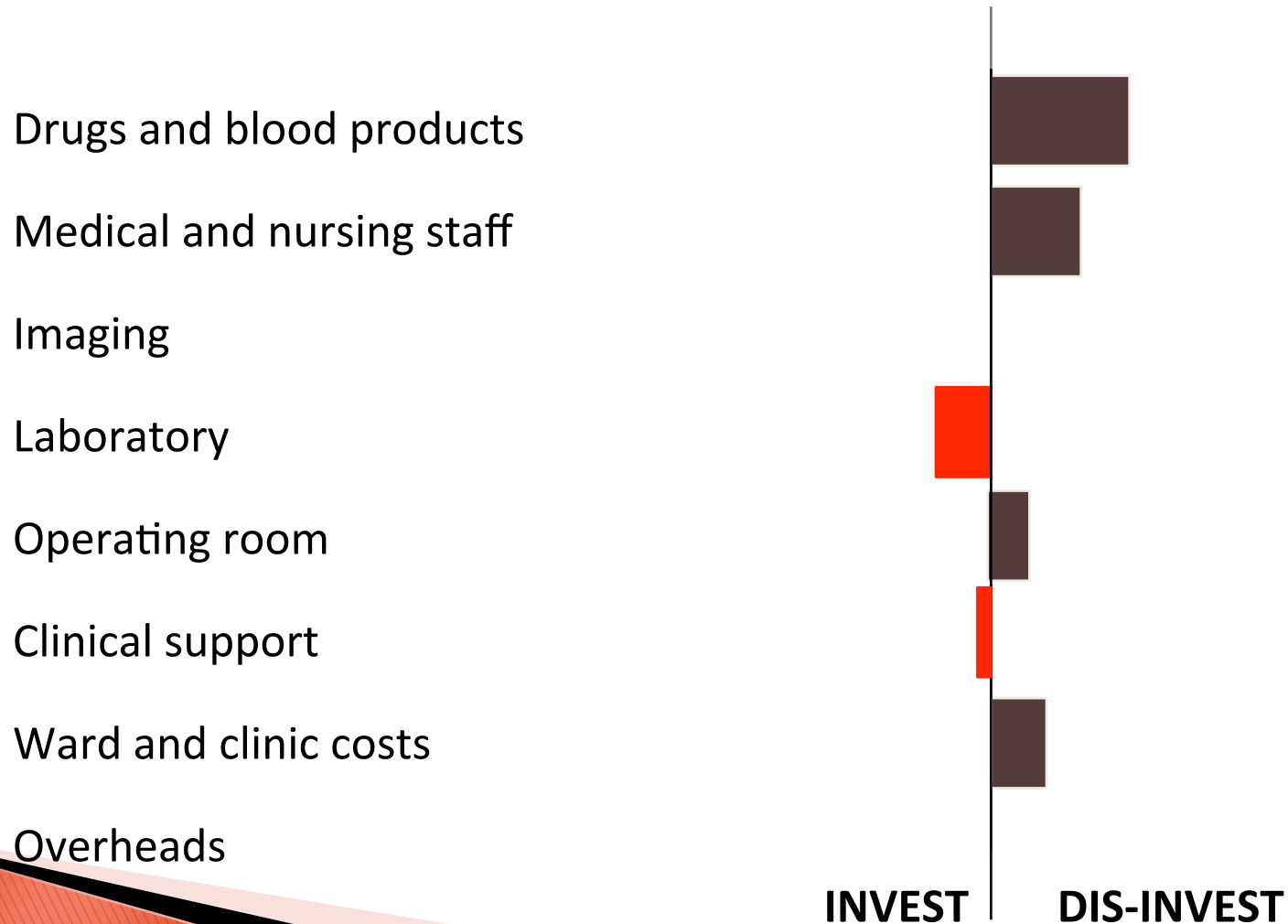


Diagnostic Tests and Resource Utilisation analysed at an episode/procedural level



POCT and Resource Utilisation

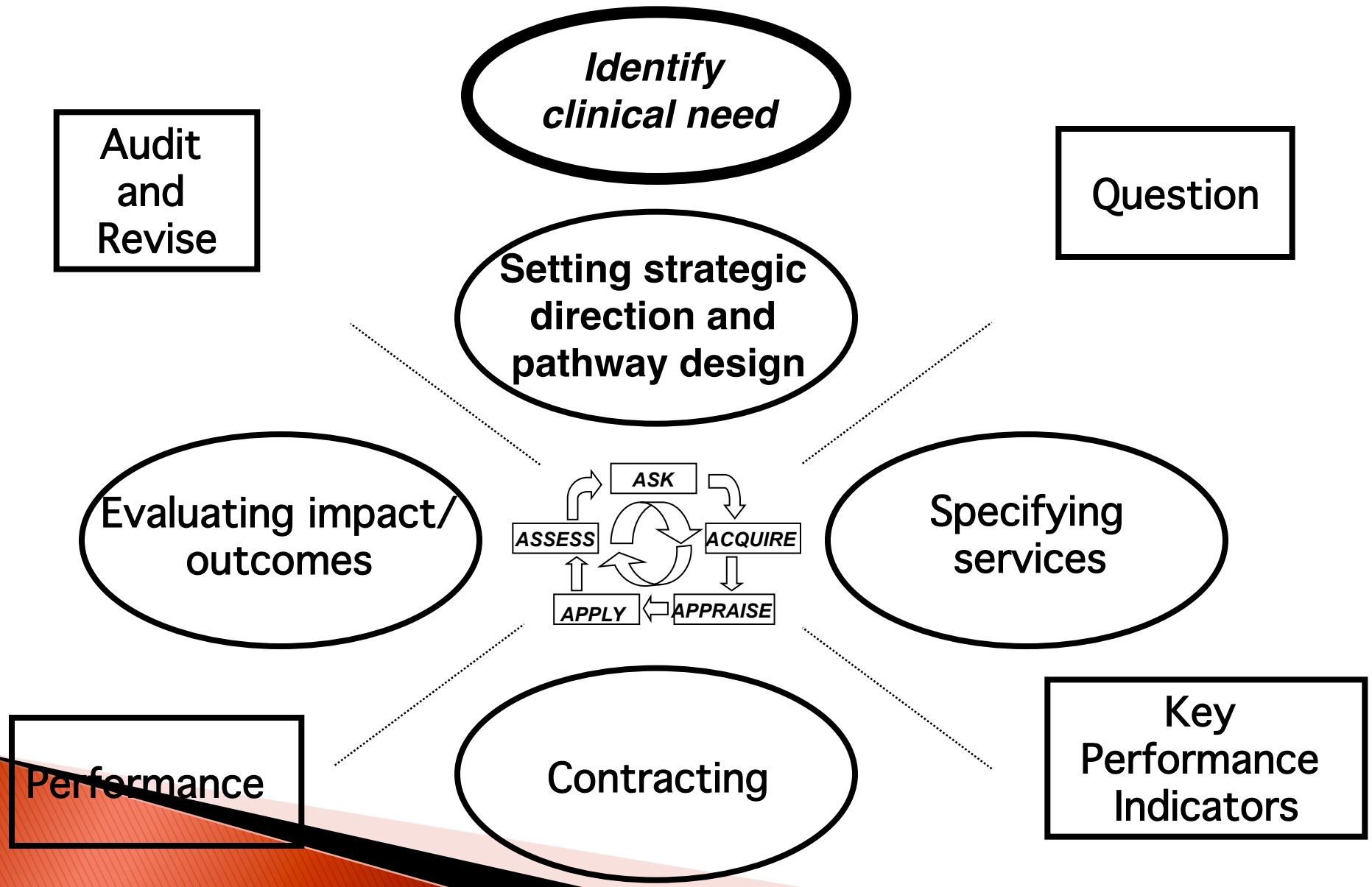
investing and dis-investing



Performance Management of a Service

- Laboratory service
 - - *number of tests performed, turnaround time*
- Clinical application
 - - *test utilisation – normals, abnormals, repeats etc*
- Change of practice
 - - *echo utilisation; how many positives and negatives*
 - - *cardiology referrals*
- Clinical outcomes
 - - *diagnoses made, diagnoses missed*
- Economic outcomes
 - - *change in hospital contracts, disinvestment*

Audit and Adopting New Biomarkers





Thank you!