NHS
Institute for Innovation and Improvement

An Improvement Framework for Commissioners

Delivering Large Scale Measurable Change

START

The Introduction section

This guide is designed to help you 'dip in' to areas where you want to know more. This Introduction section gives you an overview of the guide and some context for how you may use it.

You can either scroll through this section using the arrows on the right or use the interactive index.

The key tools in this phase are highlighted with icons above.

Click **here** to learn how to use this guide

Click on any card to go directly to it

An overview of the improvement framework

Using this interactive guide

The framework is divided into three phases which you progress through to deliver an improvement. These are:

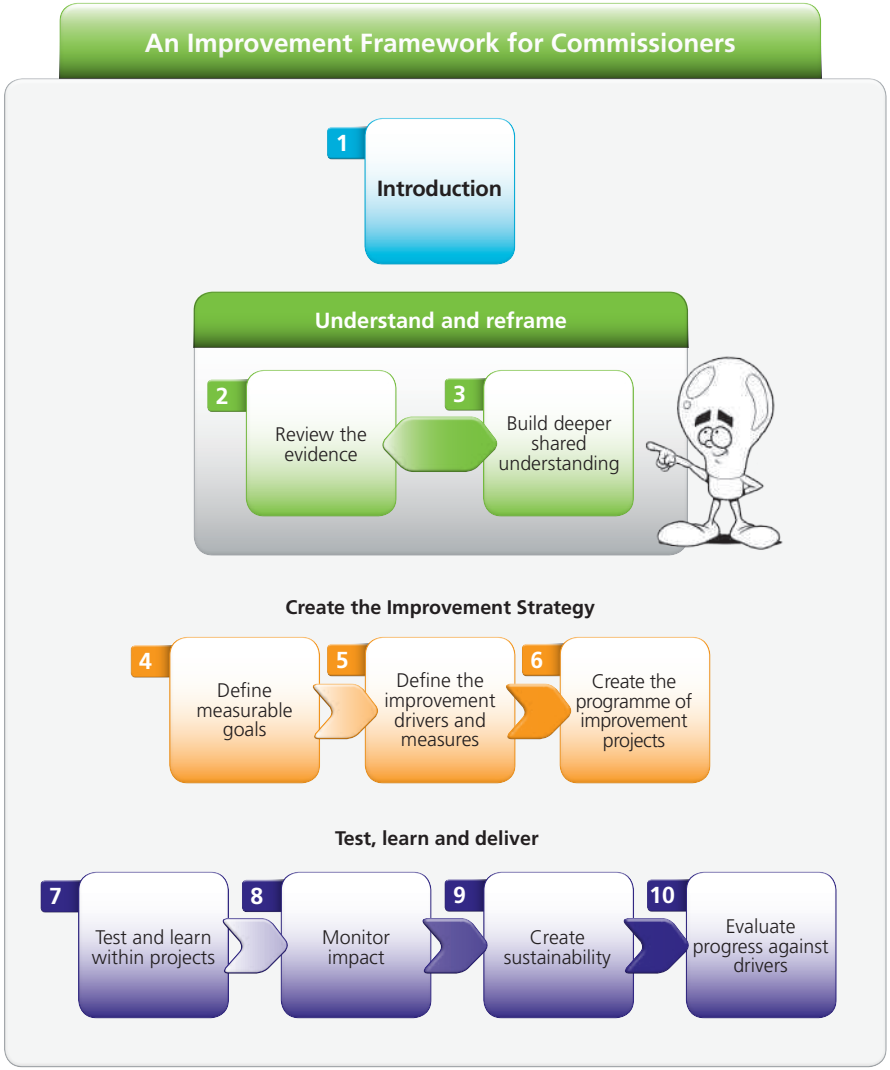
- Understand and reframe
- Create the improvement strategy
- Test, learn and deliver

The buttons along the bottom of the page allow you to navigate around the improvement framework which is shown in the diagram. If you click on one of the buttons you will be taken to an interactive index for that phase. You saw the index for this **Introduction** section when you entered the guide.

Each phase is made up of a number of elements. For example, the **Understand and reframe** phase (highlighted in green) contains two elements, **Review the evidence** and **Build deeper shared understanding** which represent the main activities in this phase. These are labelled as elements '2' and '3' respectively in the diagram.

This guide organises the information on the phases into short 'cards' which give you brief overviews of key concepts and tools. The cards are labelled according to the elements in the phase, so for example **Cards 2.1** and **2.2** have information relevant to Review the evidence (which is labelled as element '2' in the framework above). The cards for each phase are listed in the index.

When you access a card you can scroll forwards (to see additional pages or the next card) or backwards to the previous card using the arrows on the right of each page.



An overview of the improvement framework

Improving healthcare services, delivering better patient outcomes and reducing healthcare expenditure can often feel like daunting tasks as the box referring to rates of childhood obesity shows

Reducing rates of childhood obesity

This guide is intended to help you deal with complex improvement challenges. Consider the complexity of trying to reduce rates of childhood obesity.

- The system you are dealing with includes multiple healthcare services and professionals, all offering unique perspectives on the route to improvement. Some parts of the system, like education, lie outside the NHS family and may not share a common language with you or share common priorities.
- The 'improvement' itself is actually multi-faceted. It may require elements of better weight monitoring, increased dietary education and the provision of healthy food options amongst many other necessary 'improvements'. The simple world where a single change solves your problem starts to look very distant.
- Stakeholders may disagree on what the overall challenge is really all about, with some wanting to focus on children who are already obese whilst others want to target those at risk of reaching unhealthy weights. Others may offer related but tangential goals like targets to increase participation in sports. You may also have competing demands, such as the need to reduce the funding for obesity-related services.
- Your evidence base may not be all that you wish, either because your population does not match the research or simply because the research base doesn't yet exist. Doing nothing is not an option and doing the research is not feasible.
- The true nature of the problem itself may only become clear as you start to tackle it. You may realise late in the day as you start to teach children about healthy eating that the 'real' problem isn't their understanding but social pressures towards a fast-food culture. You may also find new problems arise midway through your improvement such as service closures or worsening trends in the amount of exercise children undertake.
- Finally, you may feel frustrated by the fact that sometimes the improvements you make today, such as dietary advice for new mothers, will only yield results months or years down the line. So you struggle to know if you have done the right thing.

The phases of the improvement framework

This guide is designed to help you unpick complex problems like these and navigate a way to achieving your improvement goals. It will introduce you to some of the concepts that you'll need to understand and offer you tools and techniques to support you in your improvement journey.
Based upon the work with commissioning teams and the body of evidence on improvement methods, the NHS Institute has developed an Improvement Framework for Commissioners that provides a clear process for improvement that you can apply in your everyday approach to making change happen.
The framework is made up of three phases, each of which contains a number of elements as shown below.

Understand and reframe deals with the early stages of improvement work. It represents the need to explore any problem or opportunity from multiple perspectives. In this phase you will create a broad understanding of the system you are trying to improve and begin engaging others to gain their insight and their commitment to the change process.

Understand and reframe

There are two major elements to this phase. These elements may be repeated as you gain more insights.

Review the evidence
This involves understanding the evidence base, gathering insights from local data and utilising benchmarking information. You will also be investigating what is known about good practice or alternative models of provision.

Build deeper shared understanding
Here you will be engaging people who have knowledge about the system and explore their perspectives. Invariably no single person (or group) will see a problem in its entirety and you will need to work with others to understand the problem as a whole. Equally, for large-scale improvement work you can only make change happen with the active participation and agreement of multiple stakeholders. Your twin goals are to understand how others see a problem and engaging them to become part of the solution.

Create the improvement strategy takes your new understanding and begins to unpick and reconstruct it into a rigorous and logical approach to change. It starts with defining measurable goals. These form the basis for an analysis that identifies both the range of improvement areas where you will need to take action and your measurement framework for monitoring progress. Ultimately this process leads to creating a range of mutually reinforcing improvement

Create the improvement strategy

There are three major elements to this phase which occur in sequence.

Define measurable goals
This first element involves developing your sense of a need for improvement into a set of one or more unambiguous, measurable goals. Here you crystallise the rich understanding from the previous phase into your overall improvement goals and identify any 'balancing' goals. The balancing goals are those outside the scope of your improvement work that you do not want to inadvertently jeopardise.

Define the improvement drivers and measures
This second element involves mapping out your change strategy for your overall improvement goals. Here you use 'driver diagrams' to describe the processes and behaviours that you believe need to change in order to achieve your goals. These drivers are also defined in measurable terms to create a framework for measuring progress.

Create the programme of improvement projects
This final element in the phase converts your knowledge of what needs to change into a programme of clearly defined projects addressing the full range of drivers. The scope of these projects may span the spectrum from relatively simple provider-led changes within a single service to more complicated commissioner-led procurement of new services.

Test, learn and deliver will occupy the majority of your time in your improvement efforts. Here you will undertake your projects and apply measurement techniques to monitor progress. Small scale testing approaches will be used to minimise the risks of failure as changes are tested in your local context and more formal statistical techniques will be used to evaluate your overall project outcomes. You will also take action to ensure the sustainability of the changes that you implement and, at a programme level, use your measurement framework to assess your progress towards your overall improvement goals.

Test, learn and deliver

There are four major elements to this phase. The first three operate at the project level while the final element takes a broader perspective on your improvement efforts.

Test and learn within projects
This project based learning and change approach involves undertaking pragmatic, small-scale tests of change using multiple PDSA (plan, do, study, act) cycles to minimise the risks of failure. Here you will deal with the 'messiness' of local implementation, learning what works best within the context of your local system.

Monitor impact
At a project level you will need to assess whether each project is delivering the desired results, taking account of the variation present in your delivered outcomes. This will involve using 'Statistical Process Control' (or SPC) techniques and the creation of run or control charts.

Create sustainability
Delivering acceptable project outcomes in the short term does not guarantee long-term success as old behaviours and processes start to reassert themselves. Here you will ensure that you have applied sustainability principles to your projects.

Evaluate progress against drivers
As a final step in your improvement journey you need to assess whether the sum of the parts (ie your projects) adds up to the successful achievement of your overall improvement goals. This is achieved by using your measurement framework as a gauge of progress. Here you will also put in place arrangements for the ongoing monitoring of performance.

Outcomes

Each phase in the improvement framework builds upon the previous phase. The outcomes you will achieve in completing the phases are shown below.

In completing the 'understand and reframe' phase you will:

1. Investigate a broad range of information that describes the improvement opportunity and its context.
2. Explore a wide range of views on the improvement opportunity to create a foundation for action planning.
3. Engage with stakeholders and subject matter experts in the improvement process.

In completing this phase you will:

1. Create a broad agreement on what the improvement effort is trying to achieve
2. Provide clarity on the measurable definitions of your goals
3. Develop an agreed map of the improvement areas ('drivers') requiring action
4. Create a measurement framework to monitor progress
5. Design a programme of improvement projects

In completing this phase you will:

1. Implement a range of projects using a small-scale testing approach to change that minimises the risks of failure
2. Monitor progress at a project level
3. Create the conditions for the sustainability of the changes you have implemented
4. Monitor progress at an improvement driver level using your measurement framework
5. Deliver your overall improvement goals

An overview of the key tools

This guide is designed to build up your understanding of how to apply the improvement framework.

This sheet introduces you to the key tools and techniques that can be used in each step of the framework. Each tool is represented by an icon that you will see used later in the guide.

The guide is separated into three main parts based upon the three phases of the framework. In each part there is a mixture of guidance on how to apply particular tools and techniques, case studies and supporting theories or concepts.

To gain most value from this guide we recommend that you use the improvement framework to guide you through your improvement work. This means applying the learning sequentially through each phase to your improvement topic and using the key tools and techniques introduced on this sheet.

It is impossible to cover everything about improvement in a single guide; where relevant we have signposted other sources. There are a range of additional NHS Institute guides that can be used alongside this framework, all of which are available from the NHS Institute website (**www.institute.nhs.uk**).

If you have questions about this framework or the tools and techniques described in this guide please contact the NHS Institute at **commissioning@institute.nhs.uk**

1 An Improvement Framework for Commissioners

Decide to apply the improvement framework for commissioners

To deliver a successful improvement you need to select and apply an appropriate methodology. The boxes below show how the improvement framework for commissioners can be followed using a range of simple tools and techniques.

2 Understand and Reframe

Review the evidence

The improvement framework must begin with gathering information that describes the starting point for your improvement journey. In Card 2.1 the five major information components are introduced that will shape your search for information (supported by a case study example in Card 2.2).

3 Understand and Reframe

Build deeper shared understanding

Here you are introduced to the 'the lens of profound knowledge' (Card 3.1) developed by W Edwards Deming. The elements of systems thinking, psychology, the theory of knowledge and understanding variation are used as the basis for a group exercise described in Card 3.2. This exercise supports a group to fully explore an improvement opportunity from multiple perspectives and contributes to identifying a range of improvement goals.

4 Create the improvement strategy

Define measurable goals

Rigour is added to the insight derived in the previous element as you begin to define and categorise your improvement goals into overall improvement goals, subsidiary goals and balancing measures. Card 4.1 describes this process and the key questions that need to be answered when creating 'operational definitions' (ie measurable definitions) of your goals (with more detail in Card 4.3). Cards 4.2 and 4.4 give examples of goals and operational definitions.

5 Create the improvement strategy

Define the improvement drivers and measures

Taking each overall improvement goal you will use 'driver diagrams' to determine the improvements required to achieve your goal. When defined in measurable terms these will also become your measurement framework for monitoring progress. Card 5.1 introduces 'driver diagrams' and Card 5.2 describes how to create one as part of a group exercise; additional guidance on how to create and use driver diagrams is given in Cards 5.3 to 5.5.

6 Create the improvement strategy

Create the programme of improvement projects

With a structured picture of the improvement requirements developed through your driver diagram, you will now create the improvement projects. Card 6.1 introduces three NHS Institute tools to support this process. *Thinking Differently* provides a range of techniques for creatively identifying potential projects and helping you and your team escape the 'mental valleys' described by Edward De Bono. *Prioritise Commissioning Opportunities* outlines a process for prioritising potential projects using clear criteria based upon 'importance' and 'do-ability'. *Project Delivery for Commissioners* completes the picture by describing a practical approach to project management.

7 Test, learn and deliver

Test and learn within projects

As you move on to delivering your projects Card 7.1 outlines the benefit in taking a small-scale testing approach to change. Card 7.2 describes the approach and how to undertake effective PDSA (plan, do, study, act) change cycles.

8 Test, learn and deliver

Monitor impact

When you are ready for wider implementation it is time to measure the overall impact of your projects. Card 8.1 introduces a method for measuring impact using statistical process control techniques and control charts to analyse the variation in your measures. Since it is only a brief introduction two separate detailed publications are also included with this guide.

9 Test, learn and deliver

Create sustainability

Running throughout your approach to project implementation is the need to embed your changes. Card 9.1 gives an overview of the key points in the NHS Institute Sustainability Guide, comparing the NHS Sustainability Model to the components of this improvement framework.

10 Test, learn and deliver

Evaluate progress against drivers

At the end of your improvement journey you will use your measurement framework to assess whether improvements are having the desired impact on your overall improvement goals and balancing measures. Card 10.1 describes how the measurement framework is used and highlights some of the potential remedies if progress is inadequate.

Acknowledgements

This guide was created by the NHS Institute for Innovation and Improvement. It draws upon an extensive history of work in the area of quality improvement by pioneers like Walter Shewhart, W Edwards Deming and Joseph Juran amongst countless others who have contributed to this field.

We are particularly indebted to Robert C Lloyd PhD (Executive Director Improvement, Institute for Healthcare Improvement) for his support in introducing us to many of the concepts outlined in this guide. More in-depth explanations of the concepts and other useful supporting ideas can be found in his book Quality Health Care: A Guide to Developing and Using Indicators. We are also indebted to Paul Plsek for his advice on how to bring together the concepts of improvement science and large-scale change based upon his work with the NHS Institute Academy for Large Scale Change.

Grateful thanks also go to the PCTs and SHAs who have supported the NHS Institute in piloting some of the approaches outlined in this guide.

- NHS Bristol
- NHS Calderdale
- NHS Derby City
- NHS Hull
- NHS Medway
- NHS Oldham
- NHS South Central
- NHS South East Coast
- NHS South of Tyne and Wear
- NHS South Staffordshire
- NHS Tower Hamlets

The practical examples described in this guide are either based upon work undertaken by these organisations (with some details altered for illustrative purposes) or hypothetical examples used to describe a technique or approach.

Comments and ideas for further development of this guide are welcome. Please send comments to commissioning@institute.nhs.uk

If you wish to be added to our mailing list to receive updates to this guide please also email us with your contact details.

Revisions to the guide and updates will be made available via the NHS Institute website www.institute.nhs.uk/commissioning

Card 1.1 Introduction

The role of measurement in improvement work

Improvement work starts when someone becomes dissatisfied with the current performance of a process or system and resolves to do something about it. This could be locally driven or nationally mandated through targets or good practice expectations.

Typical examples include:

- recognition of a common recurring theme in complaints
- poor performance against one of the Vital Sign indicators
- a productivity requirement to reduce length of stay
- publication of a national good practice guide
- a local area agreement target
- feedback from GPs that a service 'isn't working well'.

In each case the degree to which the improvement goal is clearly described and the depth of the local evidence base supporting the need for change will vary.

The improvement framework introduced here is grounded in the need for 'measurement'. In any improvement work the aim is to move from the current situation to a new, better situation. You can only truly say that you have reached a better situation if you have defined and measured what you mean by 'better'. Measurement is an integral part of the change process.

The act of measurement goes beyond merely supplying proof of a change. It should give meaning to the concept of 'quality'.

As figure 1.1 shows, an expressed desire to improve 'quality' can often mask different interpretations of what is meant by quality.

Remember: measurement is an integral part of the improvement journey but it is not the journey itself.

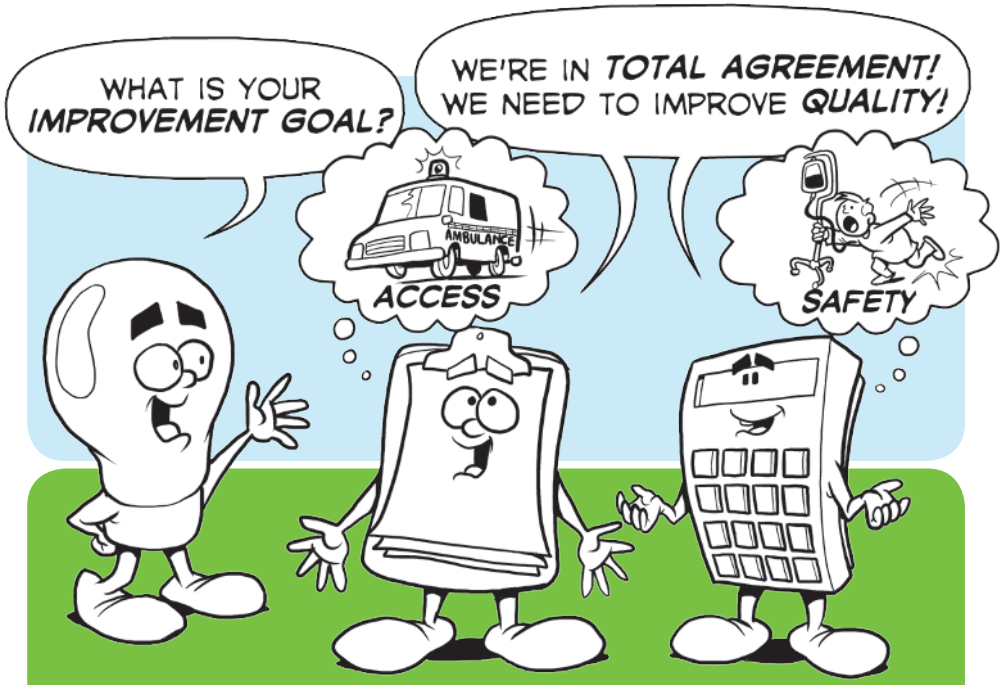


Figure 1.1a: 'Quality' can be interpreted differently unless it is clearly defined

As a conversation moves closer to a measurable definition of quality the 'true' (ie shared) meaning becomes clearer and the actual improvement goals emerge.

Card 1.3 provides an additional perspective on how your perception of 'measurement' will influence your attitude to data and evidence.

Card 4.1 explores how to make your quality improvement goals measurable.

Card 1.2 Introduction

Mental models of change

To begin the improvement journey you need to be aware of your own beliefs about how change occurs.

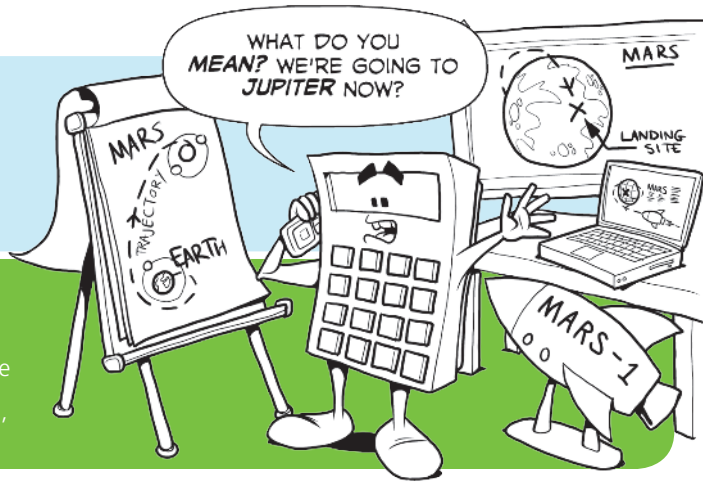


Figure 1.2a: Improvement in a social context can be more complicated than 'rocket science'

Two paradigms (or mental models) exist that determine how many of us might think about change.

- **Logical:** We approach improvement goals as if they were 'rocket science'. The problems might be difficult and detailed but ultimately they succumb to a rigorous, logical approach where data, evidence and planning are enough to make the change process happen.
- **Social:** We view most improvement goals as existing in a social or political context. Change is determined by who is motivated enough to do things differently and concepts like power, influence and values become important. Like the cartoon shows, we might be able to build the rocket using our logical approach but convincing others where it should go is another matter.

Ultimately the success of the overall 'mission' is determined by an ability to handle both paradigms, as each has elements of truth. The improvement framework is designed to marry together both approaches. The logic (and measurement) of the framework provides a backbone for a range of activities that seek to engage others in the change process.

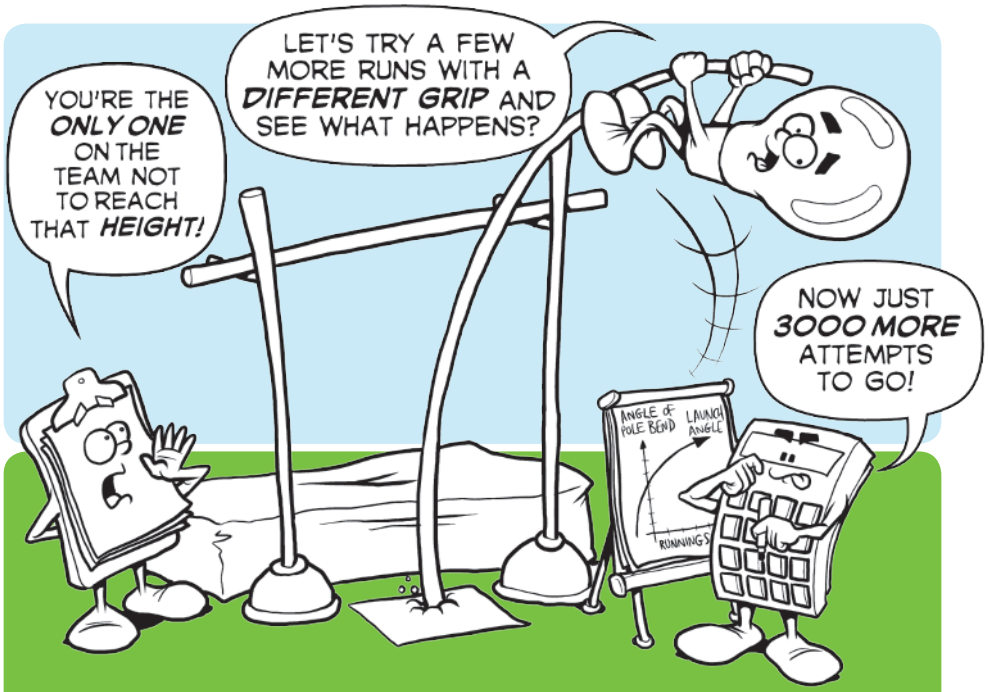


Figure 1.3a: The research, judgement and improvement mindsets

Card 1.3 Introduction

Measurement mindsets

Your approach or mindset about measurement will heavily influence how you view numbers and evidence in your improvement work.

Solberg, Mosser and McDonald described **Three Faces of Performance Measurement** that represent very different perspectives on the role of measurement. These are described on the next page.

Reference: L Solberg, G Mosser and S McDonald (1997) The Three Faces of Performance Measurement: Improvement, Accountability and Research, Journal on Quality Improvement, 23 (3): 135 - 147.

1

The research approach

Here the goal is typically to create new understanding that has a wide application. This approach tends towards the use of large data samples, efforts to minimise or account for variation and a focus on a fixed hypothesis to prove or disprove.

2

The judgement (or accountability) approach

In judgement mode we don't tend to have a hypothesis but instead focus on some form of target (e.g. the 98% A&E standard or by comparison to others). We also don't try and explain variation and instead concentrate on creating robust measures that expose variation in aggregate comparative performance. The focus here is on creating a case for improvement rather than supporting the improvement itself.

3

The improvement approach

The emphasis here is on multiple, flexible hypotheses and rapid testing. It involves working with the local situation rather than trying to form an evidence base for extrapolating the findings to other situations or showing how performance differs from other situations. The data samples are smaller and more emphasis is placed on time-based measurements, accepting that variation occurs and the importance of understanding that variation.

All too often measurement is dominated by one approach. This creates the risk that people use the same approach regardless of whether it suits the objective:

- People stuck in 'research' mode grip tightly to statistical tests and large samples and when they try to do improvement they can become paralysed by the lack of 'statistical significance' in their data. They inappropriately apply research level tests to improvement level actions. **Card 8.1** introduces an alternative form of statistical analysis that is appropriate in an improvement context.
- When people get stuck in 'judgment' mode they can lose sight of the simple truth that performance can vary over time, often in quite random ways. Poor performance today might become excellent performance tomorrow without anyone actually doing anything. Worse still, they might over-react to today's performance and instigate changes that are unwarranted or unhelpful. **Card 8.1** explores this link between the type of variation observed and the appropriate change strategy.

Some of the differences between the types of thinking are shown in Table 1.3b (taken from the paper by Solberg et al).

Table 2 Characteristics of Measurement for Improvement, Accountability and Research

	Improvement	Accountability	Research
Who?			
Audience (Customers)	Medical Group	Purchasers	Science community
	Quality Improvement Team	Payers	General Public
	Providers and Staff	Patients/ members	Users (clinicians)
	Administrators	Medical Groups	
Why?			
Purpose	Understanding of: a. process b. customers	Comparison Basis for choice Reassurance	New knowledge, without regard for its applicability
	Motivation and focus	Spur for change	
	Baseline		
	Evaluation of change		

	Improvement	Accountability	Research
What?			
Scope	Specific to an individual medical site and process	Specific to an individual medical group and process	Universal (though often limited generalisability)
Measures	Few	Very few	Many
	Easy to collect	Complex collection	Complex collection
	Approximate	Precise and valid	Very precise and valid
Time Period	Short, current	Long, past	Long, past
Confounders	Consider but rarely measure	Describe and try to measure	Measure or control
How?			
Measurers	Internal and at least involved in the selection measures	External	External and usually prefer to control both process and collection
Sample Size	Small	Large	Large
Collection Process	Simple and requires minimal time, cost and expertise Usually repeated	Complex and requires moderate effort and cost	Extremely complex and expensive May be planned for several repeats
Need for confidentiality	Very high (Organisation and people)	None for objects of comparison – the goal is exposure	High, especially for the individual subjects

Figure 1.3b: Taken from Solberg et al

Understand and Reframe

Index: To support the understand and reframe phase the following material is provided.

The key tools in this phase are highlighted with icons above.

Click **here** to access the quick reference page

Click on any card to go directly to it

Quick Reference Guide

Understand and reframe deals with the early stages of improvement work. It represents the need to explore any problem or opportunity from multiple perspectives. In this phase you will create a broad understanding of the system you are trying to improve and begin engaging others to gain their insight and their commitment to the change process.

Element 2

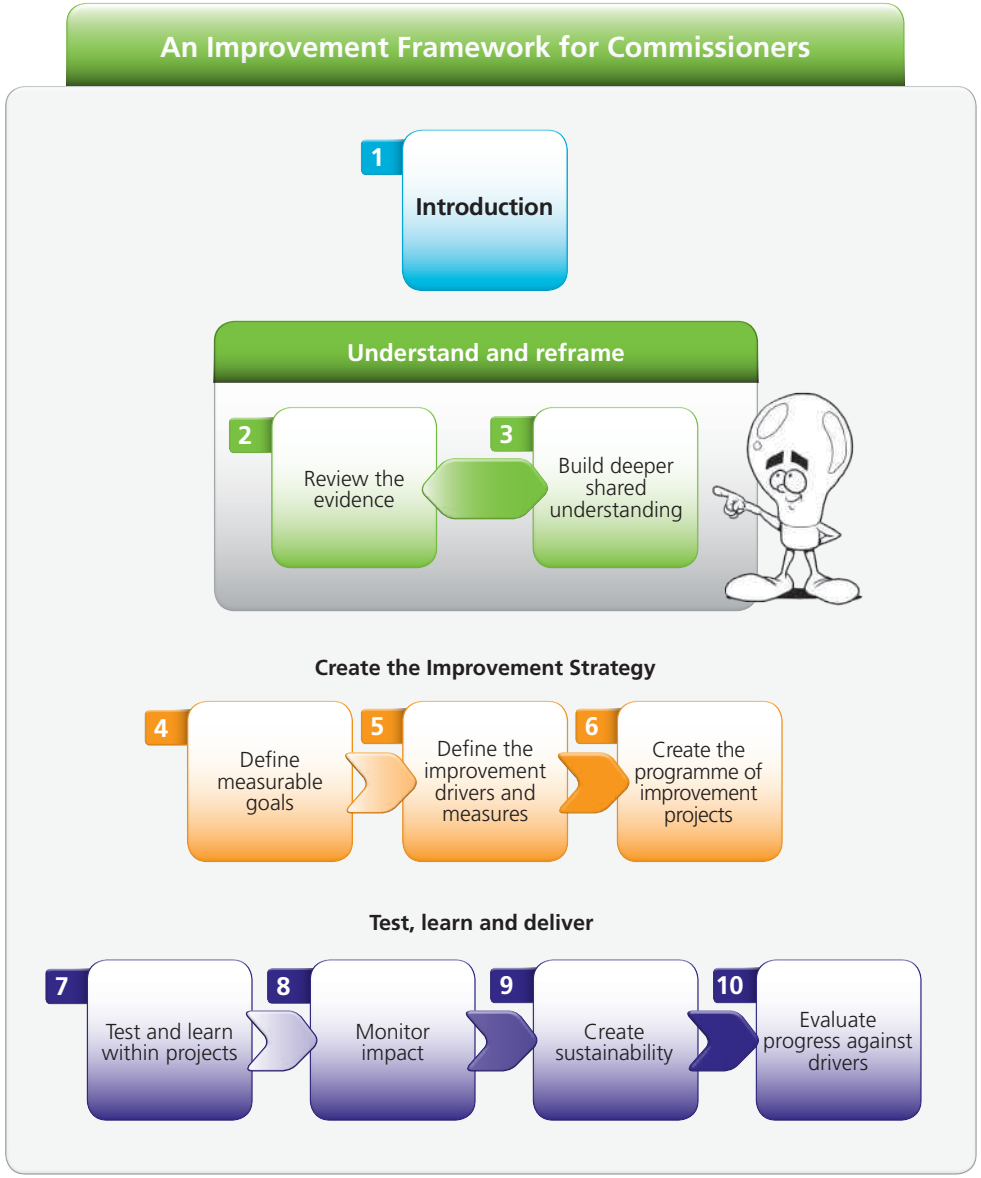
Review the evidence

This involves understanding the evidence base, gathering insights from local data and utilising benchmarking information. You will also be investigating what is known about good practice or alternative models of provision.

Element 3

Build deeper shared understanding

Here you will be engaging people who have knowledge about the system and explore their perspectives. Invariably no single person (or group) will see a problem in its entirety and you will need to work with others to understand the problem as a whole. Equally, for large-scale improvement work you can only make change happen with the active participation and agreement of multiple stakeholders. Your twin goals are to understand how others see a problem and engaging them to become part of the solution.



In completing the 'understand and reframe' phase you will:

1 Investigate a broad range of information that describes the improvement opportunity and its context.

2 Explore a wide range of views on the improvement opportunity to create a foundation for action planning.

3 Engage with stakeholders and subject matter experts in the improvement process.

Card 2.1 Review the evidence

How to review the evidence

Improvement work starts when someone becomes dissatisfied with the current performance of a process or system and resolves to do something about it. This could be locally driven or nationally mandated through targets or good practice expectations.

Before seeking to make improvements it is important that you understand your starting point and your ultimate destination. A good initial strategy is to gather data from around us. Sometimes there are vast quantities of pertinent data that describe the situation and the opportunities to improve in great detail. On other occasions you may have to make do with what data you can find or begin collecting new data to aid understanding.

To **review the evidence** there are five components to consider.

Figure 2.1a: The five components to consider when you review the evidence

Hint: You should address each component but the amount of evidence you gather is a matter for judgement. An example is given in **Card 2.2**.

The purpose of all of these actions is to create a broad picture of:

- the current performance and variability in the system
- the case for change
- the factors driving poor performance
- the local context
- the gap between the current state and the desirable future state.

> *Errors using inadequate data are much less than those using no data at all.*
>
> **Charles Babbage**

The NHS Institute website (**www.institute.nhs.uk**) has a section on *Quality and Service Improvement Tools*. These tools will help you identify the type of data and analysis you require in particular situations (eg when addressing waiting time or capacity issues).

The areas covered in figure 2.1a are not exhaustive but they illustrate how you might start mapping out the territory you are dealing with.

As you move on to **building deeper shared understanding** you will undoubtedly uncover more questions and may need to return to review the evidence with others.

> *If you do not know how to ask the right question, you discover nothing.*
>
> **W Edwards Deming**

There are three practical aspects to keep in mind when reviewing the evidence:

- as you engage others and learn more, you may develop new theories or perspectives that prompt you to look at more evidence.
- reviewing the evidence is not the improvement journey itself: don't allow a search for data to become a substitute for change.
- you will need to be aware of the effects of variation and how to take this into account when judging the current performance of your system (see **Cards 8.1** and **8.2**).

Card 2.2 Review the evidence

Reviewing the evidence on teenage pregnancy

The type of evidence you need to review when starting an improvement effort will depend upon the topic and your understanding of the key issues.

If your goal was to reduce teenage pregnancy rates you might start with the following:

1 Gathering and analysing the locally available data

- How do pregnancy rates vary according to groupings like age, locality, ethnic group or area deprivation index as this might influence the pattern of interventions you undertake?
- What are the access rates like for local pregnancy advice services and is there any mismatch between capacity and potential demand?
- How have pregnancy rates varied over time and are there any patterns within the variation?

2 Capturing new data to understand the issues

- Should you do an audit to assess the effectiveness of pregnancy advice services?
- Should you run a focus group to find out teenage attitudes to becoming pregnant?

3 Learning from external comparisons through performance benchmarking

- Is there a national data source showing comparative pregnancy rates so you can see how different yours are – or see who has the problem cracked?
- Is there any national data on service provision levels or other commissioning guidance?

4 Accessing 'good practice' evidence to compare to local services

- Does NICE have anything to say on reducing teenage pregnancy?
- Is there a national strategy or service framework that might apply?
- Can you find any publications about innovative or 'best practice' ways to tackle this issue like social marketing approaches?
- What local pathway maps or service models exist?

5 Collating information on the local context

- What is your current PCT strategy on teenage pregnancy and how does this compare to what the local authority is doing?
- Are there any third sector groups active in the patch and what are they doing?
- Who else locally has major contact with teenagers – in education, youth groups or in sexual health services?
- Are there any clinicians with an interest in this area like a local GP, a paediatrician or a gynaecologist?
- Are there any other sources of local analysis that might be helpful such as the Joint Strategic Needs Assessment (JSNA), service reviews or audit reports?

Figure 2.2a

> *Experts often possess more data than judgment.*
>
> **Colin Powell**

Card 3.1 Build deeper shared understanding

Building deeper shared understanding through the use of the 'lens of profound knowledge'

Alongside the data driven activities of ***review the evidence***, you need to draw upon the knowledge and experience of local stakeholders (eg clinicians, patients, the public or other managers).

This process to ***build deeper shared understanding*** also provides the opportunity to engage them in supporting the next steps in your improvement journey.

The benefits of engaging people who understand the system that you are trying to change has been long recognised and features heavily in the advice of experts like W Edwards Deming, Walter Shewhart and Joseph Juran.

Deming in his book 'The New Economics' introduced the world to what he called 'the lens of profound knowledge'. Despite its rather grandiose title this 'lens' is a useful starting point for improvement work.

Reference: W. Edwards Deming (1994) The New Economics: For industry, government, education (2nd edition), The MIT press, Massachusetts

Deming believed that we need a "map of theory by which to understand the organisations that we work in". Deming's map has four areas of knowledge that combine together to create a lens through which we can view organisations and shape improvement work.

These areas are shown in figure 3.1a below.

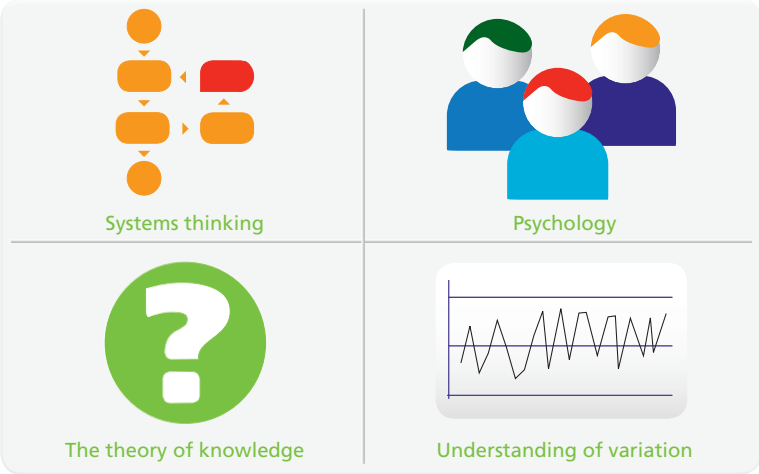
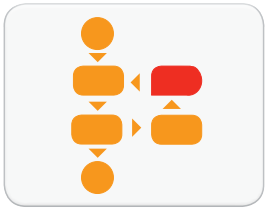
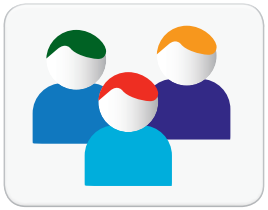


Figure 3.1a: The elements of Deming's 'lens of profound knowledge'



Systems thinking

An exploration of the wider 'system' that your improvement effort needs to consider, including the processes and components and the linkages between them.

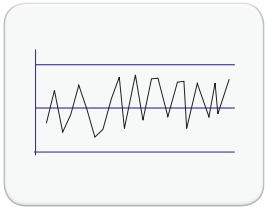


Psychology

Awareness of the psychology of change and how stakeholders may have differing interests and motivations (including staff, patients and the public).

The theory of knowledge

A differentiation between 'theory' and 'fact' (thus encouraging further exploration or testing).



Understanding of variation

An appreciation of importance of variation and impact of different types of variation on your change strategy.

In the figure 3.1b these four areas are introduced via a brief case study so that you can see how they might form a foundation for building deeper shared understanding.

> *Rational behaviour requires theory. Reactive behaviour requires only reflex action.*
>
> **W Edwards Deming**

Applying the 'lens of profound knowledge' to the goal of reducing slot unavailability in the Choose and Book (C&B) system

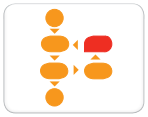
A PCT-led group used different areas of the lens to gain a wider understanding of the issue of high levels of slot unavailability on the Choose and Book (C&B) system.

The group was led by the PCT C&B lead and included a PCT analyst, outpatient staff, a specialty manager from an acute service and primary care administration staff. During their first meeting the group spent an hour using the lens to explore their different perspectives on the problem.

The way in which the group used the 'lens' is shown in figure 3.1b.

> *True genius resides in the capacity for evaluation of uncertain, hazardous and conflicting information.*
>
> **Winston Churchill**

Figure 3.1b: The results of a C&B discussion using the 'lens of profound knowledge' (note: This is a summarised version of the discussion given for illustrative purposes only)



Systems thinking

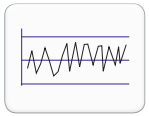
Starting with the **system** perspective the team explored the different processes that make up the C&B system. This included discussion of the process for a referral and the impact of a telephone advice line (TAL) service. It also touched upon the processes in place at the local acute trust for managing capacity. The group also identified the wide range of people involved in C&B from GPs and administration staff to consultants and medical secretaries. The data provided by the C&B lead prompted a helpful discussion on the systems in place for producing C&B statistics, revealing that the providers and commissioners didn't share a common view of slot availability data.

Psychology

Moving onto the role of **psychology** the group discussed the lack of GP motivation to participate in C&B, with GPs potentially seeing it as a further burden on already limited consultation periods. Patient attitudes were also explored and it was noted that some patients 'just want to be told' where to go while others wanted to make a more informed decision. When discussing the motivation to improve slot unavailability the group discussed the conflicting pressures on the acute service, which needed to limit slot polling periods as part of their efforts to achieve the 18-week target. They also recognised the challenges in managing consultant adherence to policies on annual leave notification.

Psychology

Moving onto the role of **psychology** the group discussed the lack of GP motivation to participate in C&B, with GPs potentially seeing it as a further burden on already limited consultation periods. Patient attitudes were also explored and it was noted that some patients 'just want to be told' where to go while others wanted to make a more informed decision. When discussing the motivation to improve slot unavailability the group discussed the conflicting pressures on the acute service, which needed to limit slot polling periods as part of their efforts to achieve the 18-week target. They also recognised the challenges in managing consultant adherence to policies on annual leave notification.



Understanding of variation

The group's knowledge about **variation** had already started to emerge in the discussion about patient attitudes to C&B. The group went on to explore whether different C&B issues existed in different providers or specialties, noting that locally the dermatology service seemed to have a very unique set of challenges. They also discussed how slot availability varied over time and whether it tended to be worse in the summer due to more restricted availability of consultant staff due to leave arrangements.

> *...it depends where you're at with the challenge that you're facing. Ours was very diagnostic, so the lens has been really useful in terms of giving us that approach to break into it.*
>
> **Pilot Site**

This case study beautifully illustrates the power of using the 'lens' to help a group explore the intricacies of an improvement opportunity. For example:

- the cumulative effects of a range of processes within the system such as referral pathways and capacity management arrangements can be considered. Other related systems (like IT) can also be explored
- the subtle psychological blockages to change can be brought to the fore, such as the potential resistance to change by GPs or the differing viewpoints of patients
- the granularity of large problems can be discussed, such as the group's awareness that dermatology had 'a unique set of challenges'
- unsubstantiated theories can be challenged and plans made for testing them (eg the various views relating to the GP use of the software).

As when reviewing the evidence, the lens facilitates a broad understanding so that you can begin to understand the full complexity of the challenge you face without becoming prematurely focused upon a single issue or solution.

It also helps you to identify where your team's knowledge level is inadequate and may require additional data or viewpoints.

The process for using the lens of profound knowledge is explained in **card 3.2**.

> *Delivering (High Quality Care for All) across the NHS will require co-ordinated, complex action, driven from every part of the system, starting with every clinical team, and leading to fundamental change.*
>
> **Department of Health, NHS Operating Framework 2010/11**

> *The Lens could be applied to look at anything at all.*
>
> **Pilot Site**

Card 3.2 Build deeper shared understanding

How to build deeper shared understanding using the 'lens of profound knowledge'

The 'lens' offers a simple but powerful process to help a group develop a shared understanding of an improvement opportunity, which can be used to support the improvement planning process.

The improvement leader or facilitator should follow these steps:

Stage One

1

Gather a mixed group of stakeholders who have knowledge of your topic area. This may include subject matter experts, data analysts, public health professionals, clinical staff and commissioners. It helps to have diverse perspectives on the issue at hand to share understanding. Since the process of using the 'lens' also helps to build commitment to the change process, it is advisable to try and also include people who you hope will lead aspects of the improvement activity.

> *Knowledge is of two kinds: we know a subject ourselves, or we know where we can find information upon it.*
>
> **Dr Samuel Johnson**

Stage Two

2

Describe the 'lens' to the group so that they get the concept. An outline script is given in figure 3.2b. Tell them you're going to look at the problem, whatever it is, from a number of different angles and give them a series of questions to think about in each quadrant (see figure 3.2a).

Stage Four

4

Start the group discussion on the 'system' quadrant. This is usually the easiest quadrant to start with as groups are comfortable listing services and processes. Take notes on the sheet as comments are made. You will find that people start offering views or theories that relate to other quadrants. For example:

- "service X doesn't have enough capacity" might need to go on the 'knowledge' sheet
- "the clinicians in service Y aren't interested in changing the pathway" could go on the 'psychology' sheet
- "we have a different mix of services in the north and a different client group" could go on the 'variation' sheet.

Stage Three

3

Provide them with flipcharts and pens to capture their views. Four pieces of flipchart paper arranged side-by-side on a wall works well. These should be headed to match the quadrants shown in figure 3.2a. For groups of up to ten people it is possible to work as a single group. For larger groups, it becomes difficult for each individual to get enough 'air time' so it is best to split the group and compare outputs at the end of the process.

Stage Five

5

Ensure viewpoints are captured in summary form on the sheets. If you find that one of the sheets is not being used then draw attention to it by referring to some of the comments already made or using the questions shown in the figure. For example:

- "we've talked a lot about service X, what do you think would get the clinicians there interested in making some improvements? Let's put some ideas under psychology"
- "we've talked a lot about service X and its capacity, are there any busy or slack periods for the service or perhaps some patient groups that take up more resources? Let's put some thoughts under variation."

Stage Six

6

Allow 30 to 45 minutes to complete the 'lens'. The purpose is to have a debate and develop a shared understanding.

> *"It helps unlock a lot of knowledge within the organisation. There's a lot of stuff in people's heads... it's allowed us to focus on the problem rather than one another."*
>
> **Pilot Site**

One of the biggest benefits of using these types of tools and techniques is reflection: allowing time for people to stop and actually look at something in a planned way in terms of allowing time to do it rather than dealing with firefighting or plugging a system because it's not working very well. Allowing the time to think and process all the issues and how they might be solved is actually really useful.

Pilot Site

Stage Eight 8

Inform the group you will be using the outputs to inform your next area of discussion – creating the driver diagram (see **Card 5.2**).

Stage Seven 7

At the end, quickly review the overall outputs. What struck people as the major points that they need to consider? What theories from the 'knowledge' sheet do they need to test out? Are there other people who should have been in the room whose views are needed to have a well-rounded picture?

Figure 3.2a is a simple grid used to prompt discussion in teams using the lens. The questions are generic and should be used as a starting point or prompts to ensure a broad discussion. These can be tailored slightly to better suit the particular topic area.

Profound Knowledge

Appreciation for a System

- What services currently exist?
- How do they interact to create a healthcare system?
- Who are the local stakeholders?
- Where are the bottlenecks?
- Where is care below expectations or coordination of care poor?
- What are the socio-economic factors affecting outcomes?

Psychology

- What will different stakeholders want to achieve in this area?
- Who has power and influence and they are interested in this topic?
- What motivates the patient and public behaviour?
- What resistance or support for change is likely?

Theory of knowledge

- What national evidence exists for good practice?
- What ideas for change exist locally and what are the theories behind them?
- What do you think are causing the local problems?
- What untested assumptions do you have about how things currently work?

Understanding variation

- Do different patient groups (e.g. ethnic groups, diagnostic groups) have different needs?
- Are services different by locality?
- What do we know about trends in outcomes or processes and performance over time?
- Do we have any data to distinguish common cause and special cause variation (see **Card 8.1**)?

Figure 3.2a: Typical questions when applying the lens of profound knowledge

Using the lens in a workshop setting not only helps to gather useful information from participants, it also facilitates group engagement.

> *The most interesting information comes from children, for they tell all they know and then stop.*
>
> **Mark Twain**

- Like a brainstorming process it allows views to be freely aired and captured while preventing the group from becoming overly focused on a single issue.
- In encourages participation from all members of the group as it explicitly recognises that each member will bring different experiences and perspectives.
- It acts as a sharing and teaching experience as group members help others to understand their role, their services and the issues they face as another part of the system.
- It helps each group member to recognise that a successful improvement is reliant upon multiple coordinated improvements across the system.

> *The key tool at the start was the lens because it enabled you to take a step back, appreciate what was going on and look at things from a different perspective. That allows more people to engage rather than just someone from contracting, or someone from finance or someone form information. It allows people to talk to clinicians or people who are involved in planning, etc with more of an open dialogue as opposed to getting lost in quite a lot of jargon.*
>
> **Pilot Site**

> *Its helped to go through a process with people because not everyone in each health economy, and that includes the PCT, will be in the same place around understanding; so its useful to start with the lens and then move forward.*
>
> **Pilot Site**

A suggested outline script to use when describing the 'lens'

It is helpful to use examples when discussing the four quadrants. Here we have used 'reducing teenage pregnancy rates' but you can substitute your own examples.

- 'The lens is a great way for a mixed group like this to share our understanding of an improvement opportunity. The four quadrants represent ways to help us look at the issue from different angles.'
- 'The 'system' sheet is where we capture our understanding of the bits and pieces that make up the system we are interested in. For example, in tackling teenage pregnancy rates we have various services and sectors involved (eg the NHS, education and third sector providers). There might also be some key processes that we think are especially important (such as booking arrangements for advice services). Our system might also be wider than we think. For example, the media might be part of the system we want to consider since they have a big impact on local behaviours. There might be other important systems like financial arrangements (eg DES arrangements or local authority funding issues) or IT systems (for capturing information) that impact upon this issue and how we tackle it.'
- 'The psychology sheet is where we capture our knowledge about the behaviours, values and motivations that are relevant to this improvement area. For example, when we think about teenage pregnancies we need to consider the viewpoints of teenagers themselves. Are pregnancies occurring through ignorance, social pressures or perhaps for secondary reasons (such as a route into housing)? If we want to make changes we need to consider this also from the perspective of other stakeholders. What will motivate GPs to give more advice? Do some clinicians see teenage pregnancy as "not my problem"? How about for the PCT? Is it a priority?'
- 'The variation sheet is where we seek to understand the granularity in the issues we are discussing. For example, teenage pregnancy rates might be different across different social or ethnic groupings – so we might address the problem differently in these groups. Rates might vary across the patch, from North to South, potentially because of different patterns of services. We might also see some time based variation. Are rates getting better or worse? Do we see any peaks in pregnancies (perhaps after the Christmas and New Year period)?'
- 'Finally, the knowledge sheet is where we separate fact from conjecture. In our discussions we will all offer views. Some of these will have evidence to back them up (eg pregnancy rates are higher in the north). Some of these will simply be opinions (eg teenagers around here don't know how to access contraception) without figures to back them up. We'll use this sheet to challenge where we hear an opinion instead of a fact and potentially consider how we will test it out. We'll also use this sheet to capture what we know about good (or evidence-based) practice.'
- 'As we go through completing these sheets for our issue we need to keep in mind that there is no "right answer" to this. We all come with different knowledge and perspectives so let's focus on capturing everything so we get the big picture. Sometimes comments might go on more than one sheet (eg if someone says "Some GPs are only interested in money" is this a theory to go on the knowledge sheet, is it psychology or is it an example of variation?). It doesn't matter, the main thing here is to get down the perspectives that this group thinks are important.'

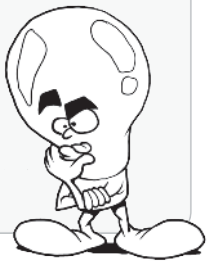


Figure 3.2b:
Suggested outline script when describing the lens

Card 3.3 Build deeper shared understanding

Other approaches to developing a shared understanding

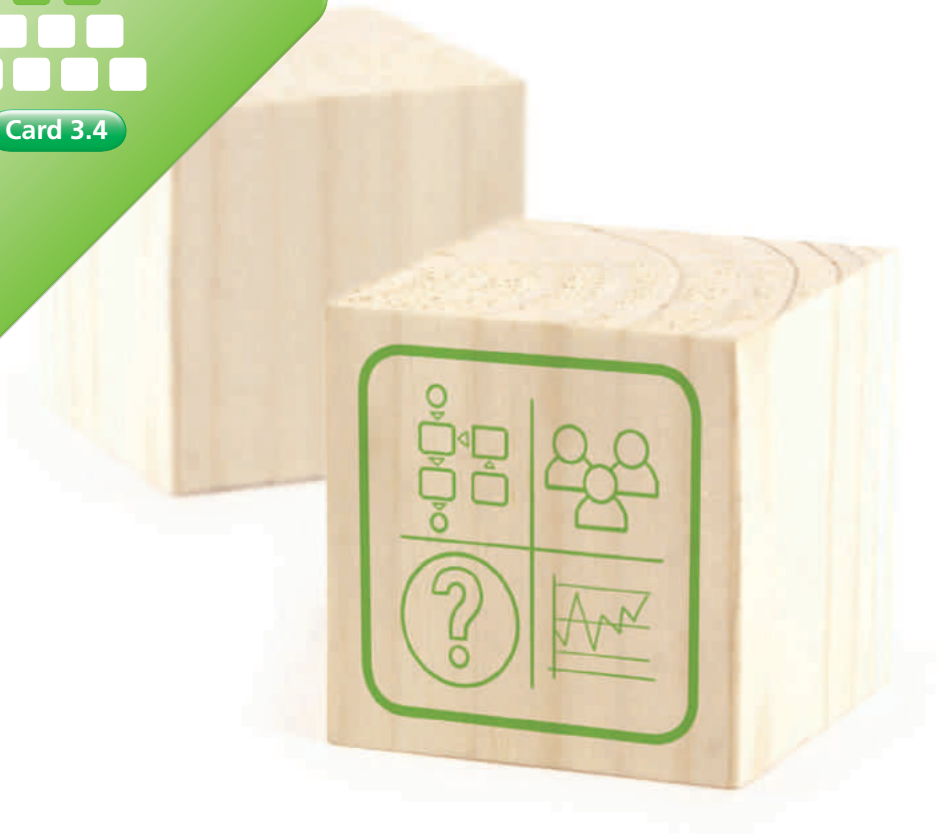
The lens of profound knowledge (see **Cards 3.1** and **3.2**) offers a simple but powerful process to help a group develop a shared understanding.

Other tools and techniques not covered in this guide can also be used in this phase. For example:

- The NHS Institute approach to Experienced Based Design offers a step-by-step process for understanding the need for improvement from a patient perspective.

- The theory behind engagement and the creation of a movement for change is described in the NHS Institute publication *The Power of One, the Power of Many.*

Both are available from the NHS Institute website www.institiute.nhs.uk



Card 3.4 Build deeper shared understanding

A model of large scale change

Large scale change typically refers to those changes that involve multiple elements of a system, a change in mindsets or a wide breadth of change (eg involving a large geographic spread or high numbers of people).

Typical commissioning challenges such as reducing childhood obesity, teenage pregnancies or alcohol-related admissions meet all of these criteria. In each case:

- the 'system' involved is broad (and not just restricted to the NHS)
- the changes will probably involve altering beliefs and behaviours (among clinical staff and the public)
- there will be changes that potentially impact upon thousands of people in hundreds of settings.

Based upon a review of the literature on large scale change and the work of the NHS Institute **Academy for Large Scale Change** the following model has been developed.

Emerging model of LSC

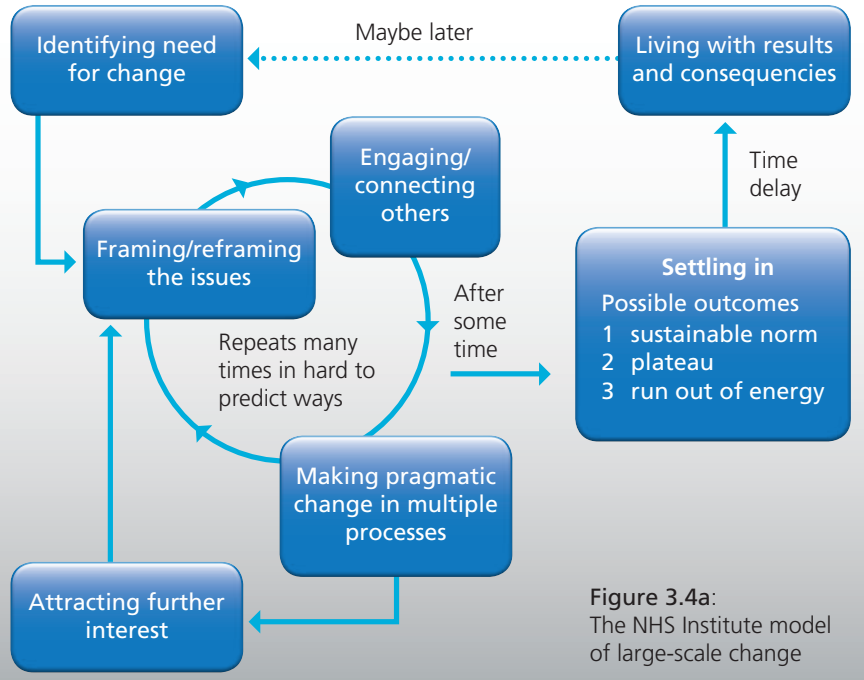


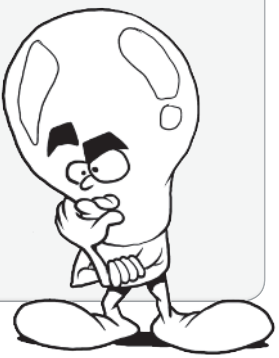
Figure 3.4a: The NHS Institute model of large-scale change

The loop portrays how, for a change effort to be successful, it has to succeed in attracting new people to 'the cause'. For example, attempts to reduce alcohol-related admissions may have some success with health-only interventions (eg alcohol advice services) but they will falter or plateaux without additional support and active participation of other stakeholders like the police.

Commissioners have to be skilled at drawing in stakeholders who can be as diverse as foundation trusts, third sector organisations, the police or even the public or the media.

One of the key elements of learning from the **Academy for Large-scale Change** has been to highlight the importance of 'framing' an improvement goal in ways that speak to different audiences. For example, if you want to convince a director in an acute trust of the importance of reducing alcohol-related admissions which argument would you use?

- The potential cost savings from reduced admissions
- The potential for reduced risks for staff from abuse or assault
- The statistics describing the impact this problem has on a wide group of people and their families
- The story of one patient and how his admission effected his life
- The story of how alcohol may be touching their life
- The legacy they would leave by 'solving' this problem



All of these approaches have the potential to make a connection, but your goals need to be described in language that others will hear. This is not about making false statements or hiding the truth but recognising what is important to others and what will help align them with your goal.

Large scale change is about:

- articulating a vision of something much better than the status quo
- focusing on some key themes
- tapping into and mobilising the imagination and energy of a large number of diverse stakeholders
- creating concrete, mutually reinforcing change in multiple processes and systems
- continually refreshing the story and attracting new, active supporters
- monitoring progress and adapting as you go
- maintaining and refreshing your own energy over the long haul.

These threads need to be maintained throughout the improvement process and can be initiated through the use of approaches like the lens of profound knowledge. They are also consistent with the tools and techniques introduced throughout this guide.

Details of the learning from the Academy for Large Scale Change are due to be published by the NHS Institute and will be made available through the NHS Institute website.

Create the improvement strategy

Index: To support this create the improvement strategy phase the following material is provided

The key tools in this phase are highlighted with icons above.

Click **here** to access the quick reference page

Click on any card to go directly to it

The key tools in this phase are highlighted with icons above.

Quick Reference Guide

Create the improvement strategy takes your new understanding and begins to unpick and reconstruct it into a rigorous and logical approach to change. It starts with defining measurable goals. These form the basis for an analysis that identifies both the range of improvement areas where you will need to take action and your measurement framework for monitoring progress. Ultimately this process leads to creating a range of mutually reinforcing improvement projects that you can implement.

Element 4

Define measurable goals

This first element involves developing your sense of a need for improvement into a set of one or more unambiguous, measurable goals. Here you crystallise the rich understanding from the previous phase into your overall improvement goals and identify any 'balancing' goals. The balancing goals are those outside the scope of your improvement work that you do not want to inadvertently jeopardise.

Element 5

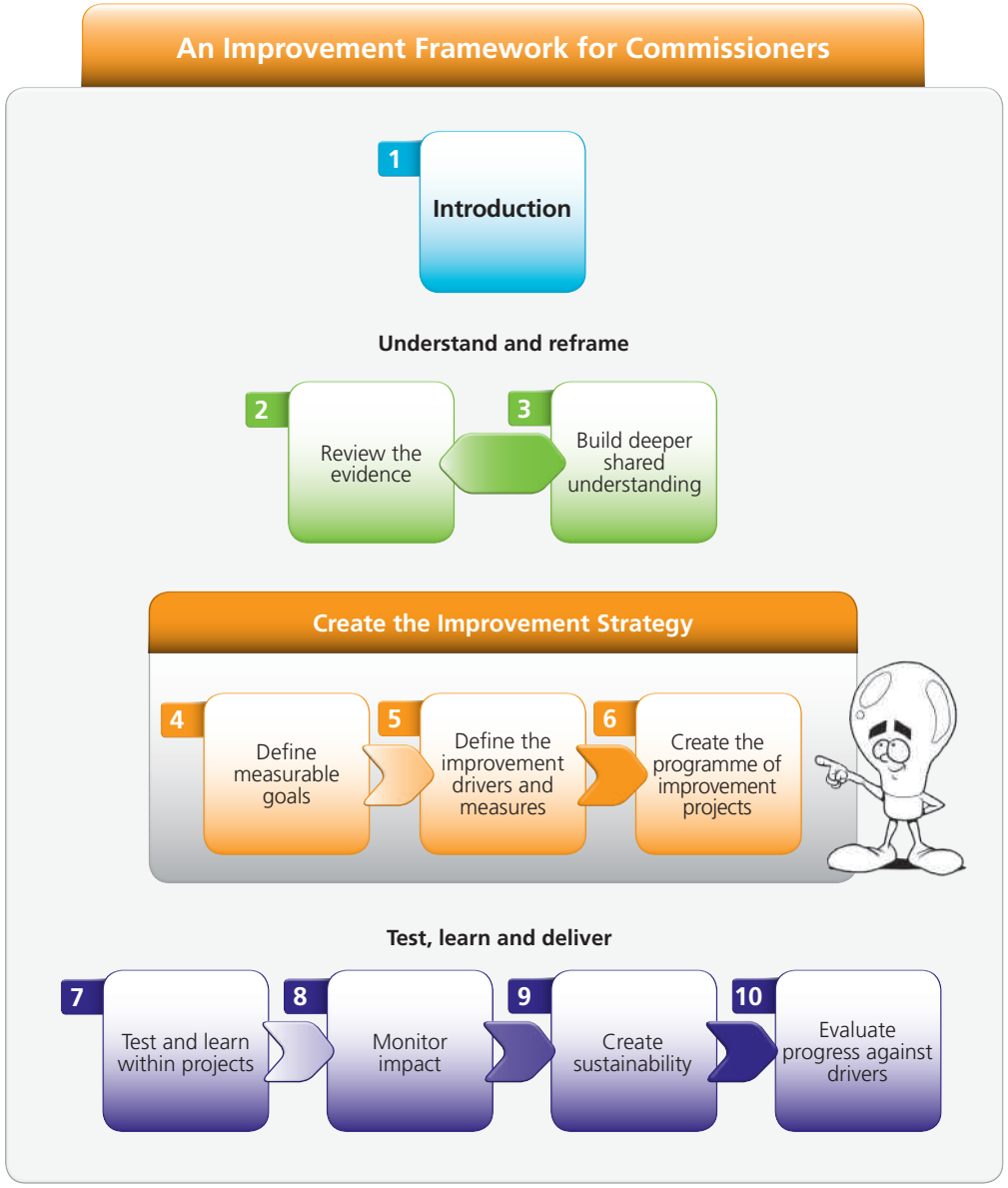
Define the improvement drivers and measures

This second element involves mapping out your change strategy for your overall improvement goals. Here you use 'driver diagrams' to describe the processes and behaviours that you believe need to change in order to achieve your goals. These drivers are also defined in measurable terms to create a framework for measuring progress.

Element 6

Create the programme of improvement projects

This final element in the phase converts your knowledge of what needs to change into a programme of clearly defined projects addressing the full range of drivers. The scope of these projects may span the spectrum from relatively simple provider-led changes within a single service to more complicated commissioner-led procurement of new services.



In completing the 'create the improvement strategy' phase you will:

1 Create a broad agreement on what the improvement effort is trying to achieve

2 Provide clarity on the measurable definitions of your goals

3 Develop an agreed map of the improvement areas ('drivers') requiring action

4 Create a measurement framework to monitor progress

5 Design a programme of improvement projects

Card 4.1 Define measurable goals

How to define measurable goals

The activities in the previous phase will have given you a rich understanding of your 'problem' or improvement opportunity. You now need to convert this understanding into a well-defined set of goals for your further improvement efforts.

Defining measurable goals can be thought of as a filtering process as shown in figure 4.1a. Feeding into the top of the filter is the catalyst for the improvement work (which could be as basic as a feeling that 'things could be better' or as specific as a Local Area Agreement target). Joining the catalyst are the data and viewpoints explored in the previous phase.

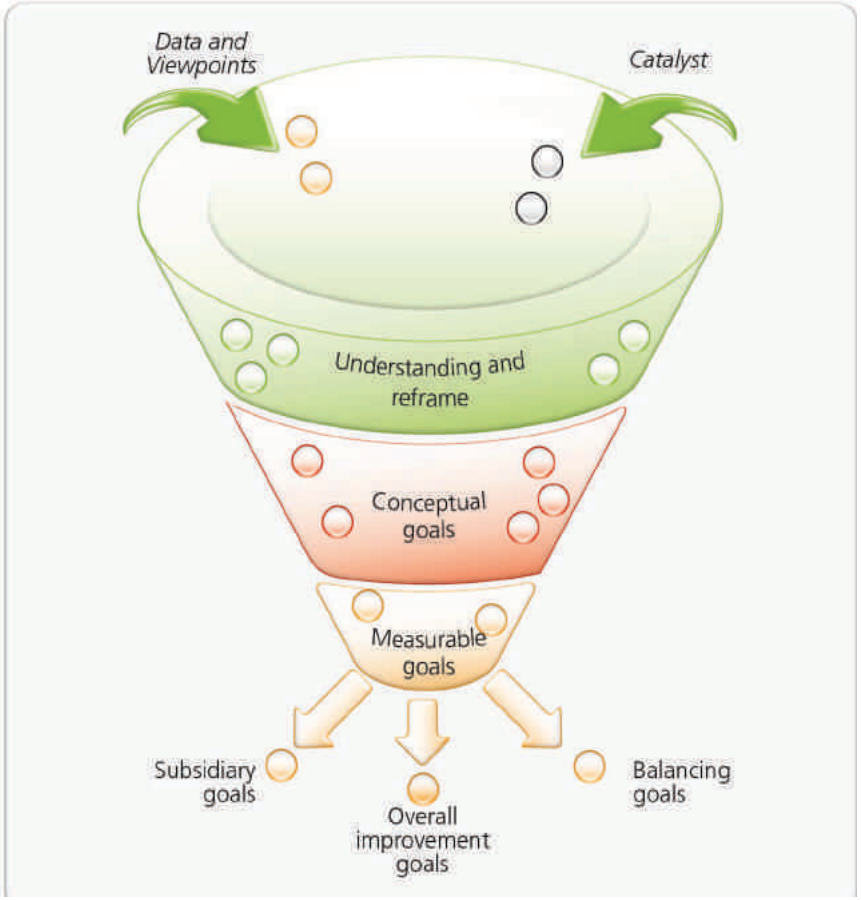


Figure 4.1a: The filtering process for improvement goals

Mixing these together in the earlier phase will have already started the process of reframing what you and your team believe to be the major improvement opportunities.
The filtering process then adds clarity.

- At the first stage of filtering, take your ideas and begin creating 'conceptual' goals. For example, you might identify a need to improve 'safety' or 'accessibility' but will not have defined exactly what these concepts mean or how they will be measured.
- At the next stage of filtering you take these general concepts and restate them in measurable terms (see **Cards 4.2** and **4.3**). In some instances (eg where you have an externally imposed target) your goals will have already been defined measurably.
- At the final filtering stage you separate out your goals into 'overall improvement goals', 'subsidiary goals' and 'balancing goals' (defined on the following page). Each type of goal will be treated differently in the rest of this phase.

> *When it comes to indicator selection, there are more options than most people realize.*
>
> **Dr Robert C Lloyd in Quality Health Care – A guide to developing and using indicators**

Overall improvement goals	These are the main focus of your improvement effort. They are the goals that you wish to actively work towards and which form the focus for the rest of the improvement framework.
Subsidiary goals	These are simply sub-component goals of a larger overall improvement goal. For example, if your overall improvement goal is to reduce teenage pregnancy rates you may identify an important component of this as the need to increase access to contraceptive advice services. This would be a subsidiary goal as it is a step on the way to your ultimate goal but not the whole answer by itself.
Balancing goals (or measures)	These represent separate objectives that are usually outside the direct scope of your improvement effort but which your improvement activities may potentially affect (either positively or negatively). For example, in reducing teenage pregnancy rates you may want to ensure that teenagers do not become less satisfied with services or that service costs do not increase. In your work you would not actively do anything about these goals except to monitor them and ensure that your actions do not have any adverse effects. Since you primarily just monitor these goals they are often simply referred to as balancing measures.

Figure 4.1b: Different types of goals

Balancing goals (and measures) are further discussed in **Card 4.4.**

Moving from a conceptual goal to a clearly measurable goal involves creating an 'operational definition'. Operational definitions rely on stating your goal in such a way that you answer the following questions:

- What is the scale of improvement?
- When is the improvement intended to happen by?
- Are key terms describing the improvement defined without any ambiguity?
- What is the scope of the improvement?
- What are the constraints on how the improvement is undertaken?
- How will the improvement be measured?

These questions are explained in more detail in **Card 4.3** and a worked example is given in **Card 4.2**. Once clearly defined, you can sort your goals into the different types defined in figure 4.1b ready for **defining the improvement drivers and measures**.

Hint: Measurable overall improvement goals are sometimes referred to as 'aim statements'.

Card 4.2 Define measurable goals

Is a ‘reduction in falls by 20% by 2012’ a clear enough goal?

Consider the following goal ‘a reduction in falls by 20% by 2012’. How measurable and unambiguous is it?

Card 4.1 introduced a series of questions that you can apply to any of your goals to identify the weaknesses in your definition. Below they are applied to this ‘goal’.

What is the scale of improvement?

The scale here is represented by the 20% figure. But is it clear what this 20% reduction relates to? The simple statement tells us nothing about the baseline that we intend to improve against.

It also does not indicate if we are referring to the absolute number of falls or some form of falls rate (eg falls per 1000 occupied bed days). These two measures are very different. We could easily reduce the absolute number of falls by 20% if we stopped all hospital admissions. A rate requires a different tactic.

When is the improvement intended to happen by?

Again, the timeframe appears in the statement but what does ‘by 2012’ really mean? Should our falls need to have dropped by 20 per cent as measured on 1 January 2012 or do we have until 31 December 2012? Is it a rate (or absolute figure) based upon measurements from a single week or over an entire year?

Depending on how this timeframe is expressed we could have drastically different timescales for our improvement work. A lack of clarity here may also mean that different stakeholders have different expectations of us.

Are key terms defined without ambiguity?

We may think this is clear. Surely a 'fall' is pretty unambiguous? However, look at the figure below.

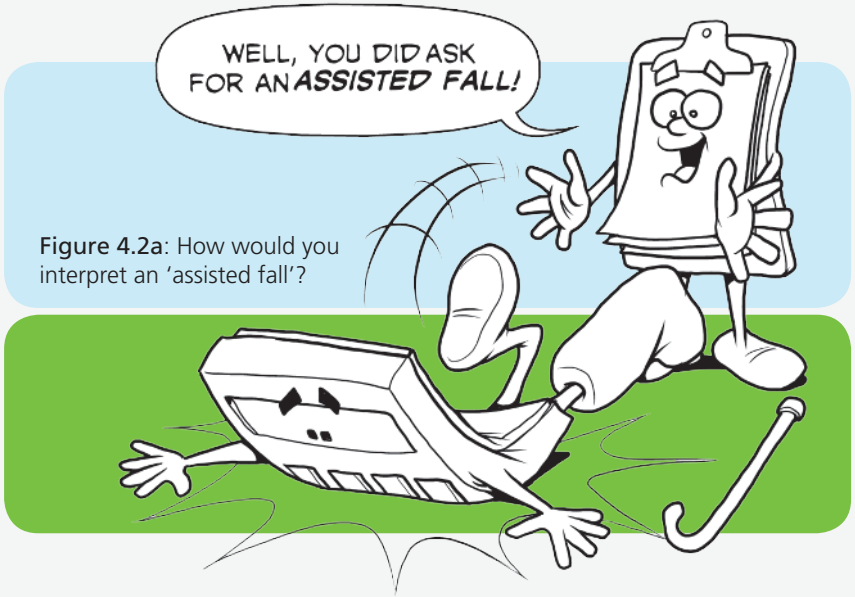


Figure 4.2a: How would you interpret an 'assisted fall'?

Dr Robert Lloyd in his book Quality Healthcare eloquently describes the confusion over what constitutes a 'fall' noting that in healthcare we sometimes recognise categories (equally poorly defined) such as 'a partial fall' and even an 'assisted fall' (the latter being when a healthcare worker lowers a falling patient to the ground).

We may even choose to include falls amongst staff and visitors and outside of hospital. We may choose to narrowly define a 'fall' as an incident resulting in admission for a fractured hip.

This unhelpful ambiguity exists in many places. A 'week' may sometimes be (creatively) defined as 'seven working days'. An 'on time' train can actually be ten minutes late.

What is the scope of the improvement?

If a PCT was to address this goal to 'reduce falls' is it clear which patient group this would apply to? Is it falls in hospital or falls anywhere? If it is hospital based, should it include patients who are the responsibility of other PCTs? If it is PCT population based, should it include patients who fall in other hospitals around the country or just in the local Foundation Trust? Equally, the PCT may only be interested in falls in the elderly, falls that result in injuries or even just in falls that occur on a select number of wards that are piloting the 'Safe Footing' scheme.

The scope is important since it represents the boundaries of the system we are trying to change and helps determine the type of improvements we undertake.

What are the constraints on how the improvement is undertaken?

If we define this goal in terms of absolute numbers of falls we could achieve it by barring admissions to hospital. Undoubtedly such a radical approach would be unacceptable and so represents a 'constraint' on our solution.

This may be so self evident that we don't need to list it as a constraint but other constraints may be less obvious. We might need to ensure that any solutions we come up with comply with our local Falls Strategy or have to be formally agreed by our Falls Steering Group. Removing confusion by listing constraints helps to give a goal more meaning.

How will the improvement be measured?

All of the preceding points indicate that the goal (as stated) is not currently measurable. Even with all of these concerns addressed, to create a true operational definition we need to be clear on how the data will be collected. Who will do this? What data collection process will they use? What data manipulation or statistical analysis is required in order to properly measure the goal?

Creating clear operational definitions of goals helps to ensure that you can clearly communicate your goals to others and measure achievement. Also keep in mind that the more clearly you define your goals in measurable terms, the less opportunity others will have for arguing with you over your baseline position or whether you have achieved your goal.

Figure 4.2b: Presenting data can be an intimidating experience

Figure 4.2b above is (unfortunately) not an uncommon experience when presenting data to others. Having a clear operational definition will go some way to making a discussion of data less of an ordeal.

Card 4.3 Define measurable goals

How to create an operational definition

Creating an operational definition requires you to answer a number of straightforward questions.

What is the scale of the improvement?

- What is your baseline position?
- What is your intended end position?
- Are you dealing with an absolute change, a percentage change or a rate change?

When is the improvement intended to happen by?

- What is the time period over which you will be collecting data to prove you have reached a new performance level?
- Do you intend to be at the new performance level at the start of the period, the end, or measure the average level of performance over a period?

Are all key terms defined without ambiguity?

- Have you clearly described any concepts (like 'safety') in measurable terms (eg 'reductions in MRSA rates')?
- Do even common words / phrases (like 'falls', 'DNAs' or 'waiting times') have well specified definitions?

What is the scope of the improvement?

- Is your improvement work limited to a specific patient group, geographical area, process or organisation?

What are the constraints on how the improvement is undertaken?

- Does the improvement have to take place within any governance, leadership or strategic constraints?
- Are there any solutions that are mandated (eg a central requirement for a particular service model) or forbidden (eg closure of a service)?
- Are there any other goals (or balancing measures) that must not be adversely affected in achieving this goal?

How will the improvement be measured?

- Who will collect and analyse the data?
- What data collection process will they use?
- What data manipulation or statistical analysis is required in order to properly measure the goal?

We don't focus on real tangible improvements so people do lots of work and then when you say to them 'what have you achieved?', they can't tell you – they don't know where they started from and they're not sure where it was they were trying to get to.

Pilot Site

The operational definitions tool is fairly straight forward but it disciplines your thinking.

Pilot Site

The operational definitions tool has been most useful because it really helped us focus on measuring for improvement. We were collecting loads of data through contracts, through performance, through achieving the targets, there were tonnes of people in the PCT that had data on some aspect of orthopaedics, but it didn't give us a view of how we were doing across the pathway, we were measuring processes within pathways. Through the operational definitions we started thinking about measures that would tell us how the pathway was doing rather than the components of it.

Pilot Site

Hint: Statistical analysis of the data will be discussed in the test, learn and deliver phase

The operational definition would help us... by saying who we mean by workforce, what do we mean by training courses and we can add... where do we get the info from, where's it collected, who collects it... I think that will really strengthen us this year.

Pilot Site

An operational definition of a goal really focuses your efforts on what you need to do and what really matters.

Pilot Site

Its allowing us to think about 'it is something we want to measure' and allowing us to build it into specifications for the future.

Pilot Site

Card 4.4 Define measurable goals

Examples of balancing goals

Balancing goals are frequently mentioned in the context of 'balanced scorecards', popularised by Robert Kaplan and David Norton (see their 1996 book, *The Balanced Scorecared: strategy into action*).

These scorecards were originally invented to help businesses understand that the financial bottom line is dependent upon a range of factors. However the principle, that you should not let improvement in one area come at the expense of deterioration in another, is already well embedded in the NHS way of thinking (if not always in practice).

Examples of balancing goals in healthcare include:

- Improving an outcome measure (overall improvement goal) but not at the expense of increased costs per admission (balancing goal)
- Improving A&E waiting times (overall improvement goal) but not at the expense of increased emergency admissions (balancing goal)
- Improving the efficiency of health visiting services (overall improvement goal) but not at the expense of decreased patient satisfaction with the continuity of care (balancing goal)

Balancing goals tend to emerge naturally when teams come together to discuss improvement opportunities. For example, a PCT Choose and Book lead brought together a team to address the goal of 'reducing slot unavailability on the Choose and Book system' and used the 'lens of profound knowledge' (see **Card 3.1**) to promote discussion.

The team soon realised that in solving the problem they had to be wary of creating unintended knock-on effects. They therefore defined some balancing goals. This included patient satisfaction with the Choose and Book service and achievement of the 18-week referral to treatment target. The latter goal was seen as particularly important since they recognised that some potential solutions to slot unavailability such as increasing the period allowed for patient booking (ie polling times) could adversely affect achievement of the 18-week goal.

Card 5.1 Define the improvement drivers and measures

How to define the improvement drivers and measures - an introduction to driver diagrams

Defining the improvement drivers and measures involves taking each of your overall improvement goals and creating what is known as a 'driver diagram'.

A driver diagram is a simplified model of the complexity of an improvement effort that breaks down an overall improvement goal into a range of subsidiary improvement areas referred to as 'drivers'. The process for doing this is described in **Card 5.2**.

Driver diagrams are most easily explained through a simple example. Figure 5.1a shows one created for the goal of 'reducing the amount you spend on petrol' (taken from the NHS Institute Pathway Improvement Toolkit).

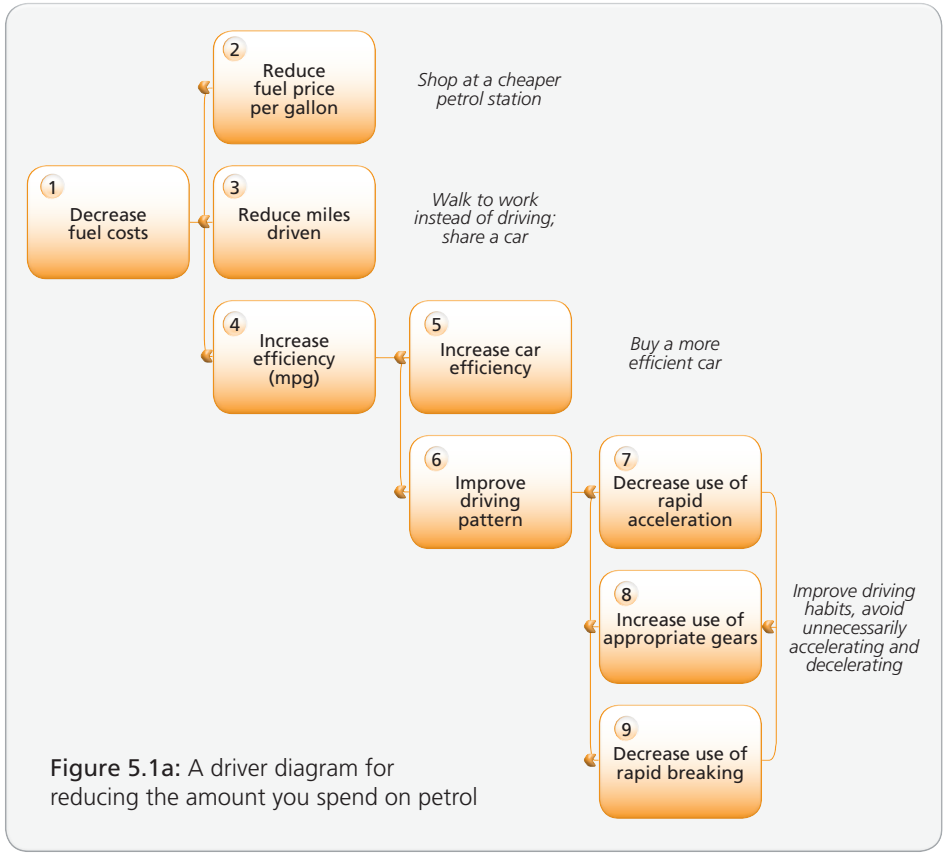


Figure 5.1a: A driver diagram for reducing the amount you spend on petrol

I've used driver diagrams – they've been really, really effective. We will have used a number of the Institute's techniques, but the driver diagram is the one that sticks in my mind the most in terms of being a really practical tool that's really simple.

Pilot Site

The main features of the driver diagram are:

- **On the left is the overall improvement goal.** Currently this is not written with a full operational definition but it easily could be (eg 'reduce your monthly petrol bill from an average of £100 per month to consistently under £80 per month as measured by your outgoings for the first six months of next year').
- **Immediately to the right of the overall improvement goal are the set of 'primary drivers'.** These are the improvement areas that will have a direct impact upon the overall improvement goal. For example, if you can find cheaper petrol, drive less and increase your fuel efficiency your fuel costs will be directly affected.
- **To the right of the primary drivers are the 'secondary drivers'.** In this case only the secondary drivers that relate to one of the primary drivers (ie increased efficiency) have been shown. These secondary drivers are improvement areas that have a direct impact upon the primary driver they are linked to. You can increase your fuel efficiency either by mechanical means (improving the car) or by your actions (how you drive it).
- **Further to the right the same logic is repeated, this time to create 'tertiary drivers'.** Improving your driving pattern is directly influenced by your use of rapid acceleration or deceleration and your appropriate choice of gears. The driver diagram could go down to even more levels of drivers but often it is enough to limit a diagram to secondary or tertiary drivers.

It enables us to move from a concept or an idea into starting to execute a programme and delivery very quickly. That has been a major difference to the way we work...

Pilot Site

- **Attached to some of the drivers is the ultimate reason for creating the driver diagram: the actions that you can take.** You could get cheaper fuel by shopping around. You can act to improve your driving patterns. You could even buy a new car or use your current car less.

Driver diagrams can be easily constructed as a group exercise (see **Card 5.2**) and there are a few additional concepts to be grasped beyond the basics described in the example above (see **Card 5.3**).

What this has enabled us to do is apply a logic ...which means that you follow a logical path within your programme or projects...

Pilot Site

Measurement without a roadmap and a context for action is a fruitless journey.

Dr Robert C Lloyd in Quality Health Care – A guide to developing and using indicators

We did a bit of an exercise with some stakeholders with the 'lens' and that allowed us to get a few thoughts on paper and then from that we came up with a driver diagram which gave us a list of initiatives... I think that's a good tool.

Pilot Site

Driver diagrams also facilitate taking a measurable approach to improvement.

Look at the drivers that are listed in figure 5.1a. They are themselves improvement goals (in this case subsidiary goals) and virtually all of them can be measured (ie given operational definitions).

- The overall improvement goal is certainly measurable as you can collect receipts at the petrol station.
- All the primary drivers are also measurable; you can record the fuel price per gallon, your mileage and even your miles per gallon.
- Where one of your drivers is not directly measurable (eg an 'improved driving pattern') you can choose to fully define it by the next level of measurable drivers associated with it (ie choose to define 'driving pattern' solely in terms of the use of acceleration, deceleration and gears).

The driver diagram becomes not only a logical model for describing the different components of your improvement effort but it also becomes a map against which you can measure progress.

We looked at a huge area like musculoskeletal conditions and it was really difficult to think where to start in terms of a work programme. Where do you start with something so big – it was like an elephant! Doing the driver diagram around that programme area allowed us to focus on an aim statement, allowed us to develop an aim statement which gave us a focus and allowed us to chunk the work up.

Pilot Site

The important thing to remember is that driver diagrams are an aid to understanding the components of an overall improvement effort.

Hint: Think about using your driver diagrams to communicate your improvement strategy to others.

- They are a tool rather than a complete map or model.
- They provide the dual benefits of helping you and your team understand the improvements you need to make whilst creating a framework for measuring progress.
- Their development provides another way for further engaging others in the improvement process.
- Their content should reflect the richness of your conversations in the **understand and reframe** phase and thus 'psychology' based drivers should also be represented (ie where a key driver is the need to change behaviours in staff or patients).

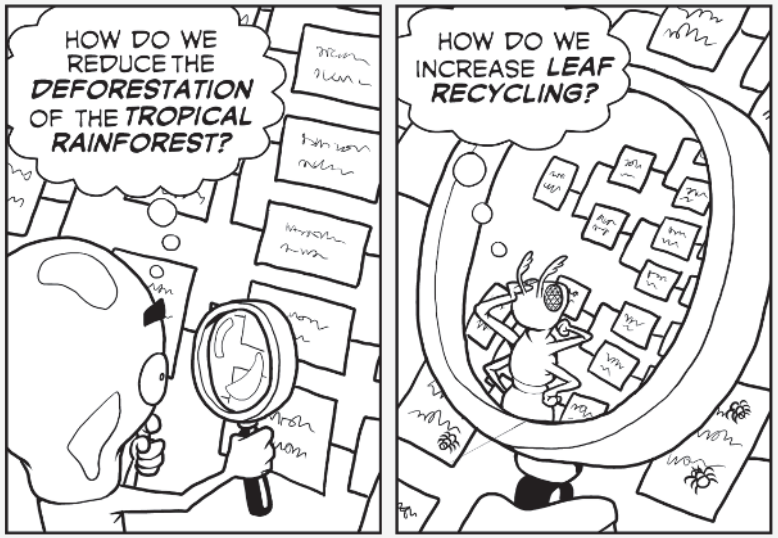


Figure 5.1b: Driver diagrams can be used at any level within an improvement initiative

> *It took us a few times to get it refined, we changed it six times; it was an intuitive process. But it really is the backbone of our strategy. We're now hanging project measures on to it.*
>
> **Pilot Site**

Driver diagrams are also a very scalable tool.

The level of detail that you choose to work at is up to you. Stop when it ceases to be helpful and you feel that you can begin creating improvement projects that clearly address your drivers.

Card 5.2 Define the improvement drivers and measures

How to create a driver diagram

A driver diagram is a simplified model of the complexity of an improvement effort that breaks down an overall improvement goal into a range of subsidiary improvement areas referred to as 'drivers'.

Creating a driver diagram as a group exercise is a powerful way to ensure that actions are targeted in the right areas and gain widespread commitment to the changes that need to happen in an improvement effort.

To create a driver diagram the improvement leader or facilitator can follow these steps:

Stage One 1

Gather a mixed group of stakeholders who have knowledge of your topic area. This group should ideally include those individuals who were involved in any earlier discussions on the 'lens of profound knowledge' (see **Card 3.2**). This would typically include subject matter experts, data analysts, public health professionals, clinical staff, commissioners and anyone else involved in the topic area (including provider representatives). Share with the group the outputs of the 'lens' exercise.

Stage Two 2

Agree on an overall improvement aim. Driver diagrams need to have a clear starting point, based upon a single overall improvement goal. The goal can be defined either at the end of the 'lens' exercise or as a precursor to creating the driver diagram (see **Card 4.1**).

There's always pressure to respond to things quickly and start jumping to conclusions rather than thinking about the individual parts of what the problem is and what aspects of it do you need to tackle.

Pilot Site

Stage Three

3

Ask the group to brainstorm all the drivers that they believe are important in this improvement effort. You can describe 'drivers' as 'those things that the group believes we need to improve in order to reach our overall improvement goal'. Usually it is easiest to get people to individually list ideas on sticky notes before sharing them and then repeat this as a group exercise after the next step. When guiding the group on how to describe their drivers it is helpful to give two warnings:

- Sometimes people identify solutions rather than improvement areas (eg 'we need a community based admission avoidance team' instead of 'we need to improve community based admission avoidance interventions'). Therefore it helps to remind the group to focus on areas for improvement instead of solutions. Starting each driver with 'we need to improve...' helps.
- Equally, it helps to remind the group to be as specific as possible in the drivers they identify. Saying 'we need to improve quality' cries out for an operational definition.

Stage Four

4

Using a piece of flipchart paper, get the group to cluster their suggested drivers. Use this as an opportunity to identify duplicate ideas, instances where people have written solutions rather than improvement areas or any unclear drivers requiring better definitions. See if the suggestions spark ideas for other missing drivers.

Stage Five

5

Using the clusters ask the group to begin sorting the drivers into primary and secondary drivers. This can sometimes be the hardest part for a group. Remind them of the following:

- There is no right or wrong answer. The driver diagram is a tool so just has to be 'good enough'.
- Primary drivers can be recognised as those drivers that have a direct influence on the overall improvement goal. Secondary drivers have a direct influence only on the primary drivers. So when sorting out the drivers ask: 'What will an improvement in this area achieve?' If the answer is the overall improvement goal then you have a primary driver. Anything else and you have a secondary or lower order driver.

Stage Six

6

Check that you have a 'good enough' driver diagram. Not all of the drivers identified in the brainstorming process deserve a place on the driver diagram. Some will be rejected by the group and some will only represent minor drivers (ie improvements in them would have only minimal impact). If the group has previously completed the 'lens' exercise refer back to the outputs and ask: 'Is there anything we talked about in the lens that we have not considered in our driver diagram?' Typically groups forget to include drivers that relate to the psychology quadrant (ie the need to alter behaviours as well as processes).

> *The tools are allowing us to explore lots of issues and seeing where we need to focus some of our commissioning efforts next. The tools underpin a lot of the work we're doing now...*
>
> **Pilot Site**

> *Personally I've found the initial approaches in terms of trying to find the aim by using Profound Knowledge and Driver Diagrams excellent tools because they're easy to understand and to actually facilitate discussion.*
>
> **Pilot Site**

The next two steps support later elements of the *create the improvement strategy* phase but can be initiated here as part of the driver diagram exercise.

Stage Seven

7

Begin brainstorming projects that will deliver changes in the drivers. The purpose of the driver diagram is to help identify the range of projects required to reach your improvement goal. There are a number of techniques for thinking creatively about potential solutions and these should be applied at this point (see **Card 6.1**).

Stage Eight

8

As project ideas emerge, begin addressing the measurability of the drivers. The driver diagram is both a logic model and a measurement framework. The latter means that each driver needs its own operational definition (ie become measurable), as do the associated projects. Steps 7 and 8 (the creation of the projects and the measurement framework) often need to be undertaken iteratively. As a project is suggested, a discussion of its potential outcomes might throw new light on the measures present in the driver diagram. Equally, a discussion of measures can often prompt ideas for solutions.

> *For the first time all of us sitting in this room are clear about what we want to achieve and the tools have helped us achieve that…*
>
> **Pilot Site**

Card 5.3 Define the improvement drivers and measures

Additional driver diagram concepts

Card 5.1 introduced driver diagrams and used a fuel cost example to explain the basic concepts. To use driver diagrams effectively, it is helpful to understand a few more of the underpinning concepts that apply in an improvement context.

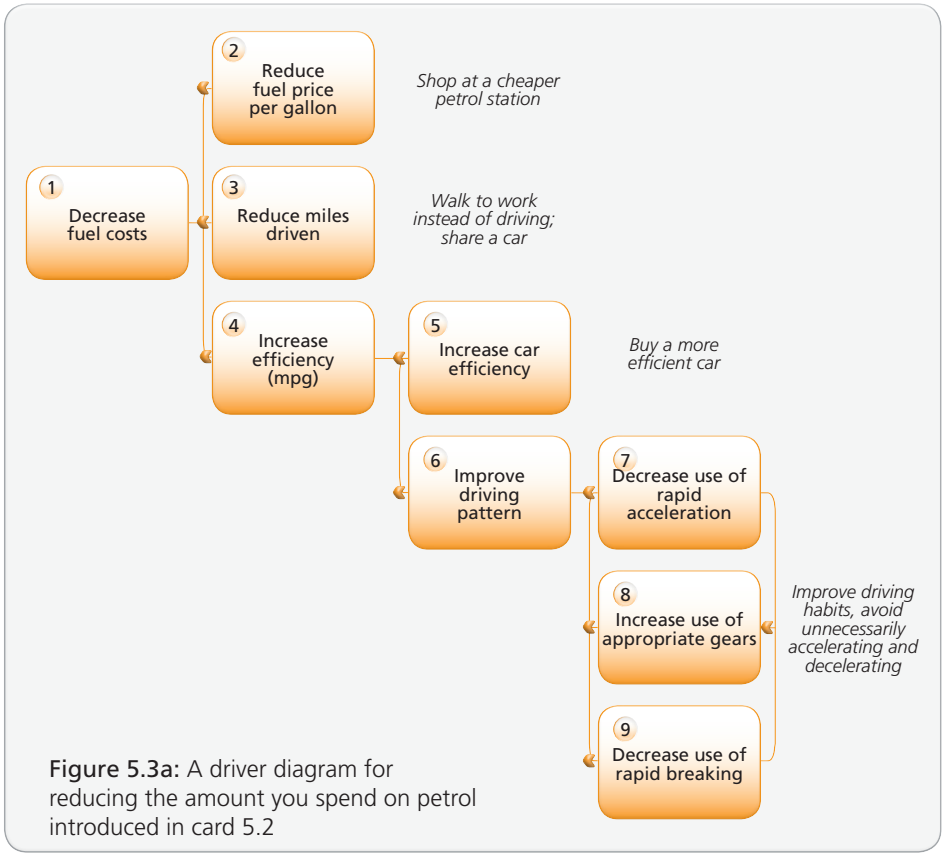
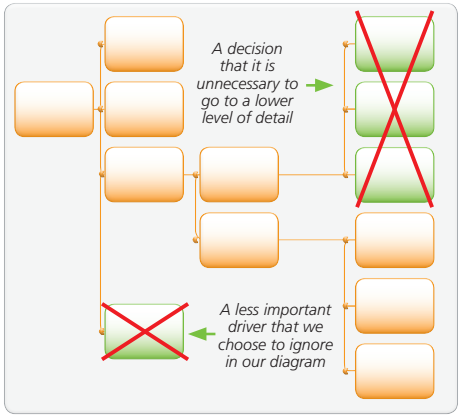


Figure 5.3a: A driver diagram for reducing the amount you spend on petrol introduced in card 5.2

No driver diagram is right, just 'good enough'

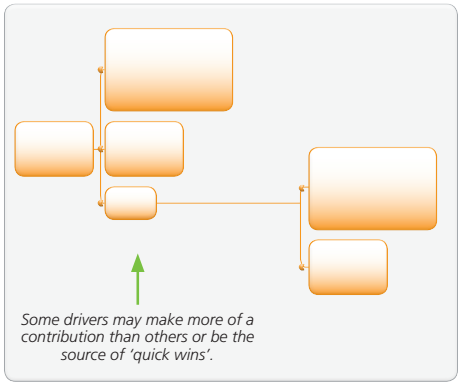


Real-life improvement efforts can be complex. A driver diagram is simply a tool to help describe the logic of an improvement effort in a clear enough way that actions can be taken and progress measured. In creating a driver diagram you will constantly be asking: 'Do I need to improve that?' You will be constantly making choices about what is important to include or exclude from your diagram. In some instances you might choose to make this implicit prioritisation process an explicit team decision (especially where drivers are excluded because you do not have the resources or time to address them).

You will also find that:

- Over time or as you gain more knowledge, your driver diagram changes. For example, in the fuel cost example you might have assumed your poor fuel consumption was all down to your elderly car and belatedly realise that your driving pattern is a much more important culprit.
- You need to make decisions about the right level of detail to go to (eg tertiary versus secondary drivers). In many cases this will be obvious as lower level drivers start to look increasingly like 'projects' rather than drivers.

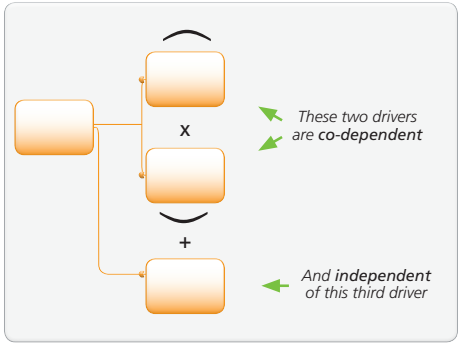
Drivers are not equally weighted



The drivers that you select to appear in a driver diagram should be important enough that you feel you need to work on them. However, this does not mean they are all equally important. In the fuel cost example, you could choose to put effort into all of the primary drivers but decide the biggest impact will come by particularly addressing one of them (eg increasing efficiency).

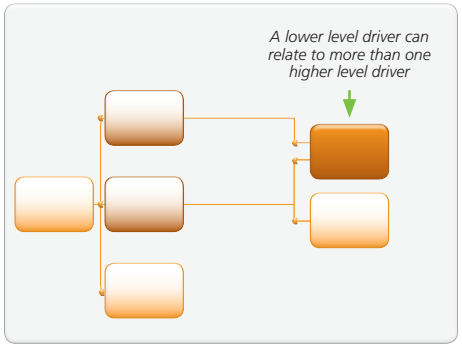
You may also decide that some drivers represent 'quick wins' and so put your initial efforts into them. For example, it might be very easy for you to reduce your mileage by walking to work or car sharing but tackling your efficiency when driving could be more challenging if ultimately more financially rewarding. Prioritisation criteria like 'importance' (impact) versus 'do-ability' can be helpful here.

Drivers may be co-dependent



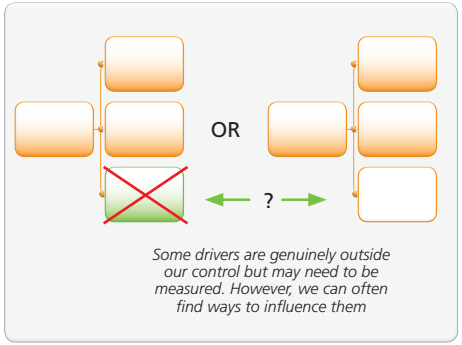
In the fuel cost example, all of the primary drivers had an independent effect on the overall improvement goal. Individually they would each make a difference. However, sometimes drivers can be co-dependent in so far as action is needed on each driver to have the greatest impact. For example, a reduction in teenage pregnancy rates might depend on increased access to contraception and increased teenager willingness to use contraception. Both drivers have to be tackled to achieve the desired result.

Secondary drivers can be linked to more than one primary driver



It is not unusual to have a single secondary driver impact upon more than one primary driver. For example, in a driver diagram for a foundation trust seeking to reduce a financial deficit, two of the primary drivers might be 'increase income from commissioners' and 'reduce bed requirements'. Both of these would be impacted by a secondary driver of 'improved use of high margin day cases'.

Some drivers may potentially be outside of the scope of the improvement



In some situations an improvement team may identify a driver that they have little or no influence over. In the fuel cost example, a secondary driver impacting on 'increased efficiency' may be the road condition (ie rough terrain requires more power and lowers the efficiency). As you have little chance of 'improving road services' you may choose to ignore this as an area for improvement but still choose to keep it in your measurement system (since changes in road surfaces such as during a frosty period will influence whether you achieve your goal).

However, many drivers that you think you cannot influence are actually within your gift to do something about. You cannot change the road surface but if you think a little laterally about 'improving the road surfaces you drive upon' you realise that you do have control over your route (potentially avoiding rough terrain). Similarly commissioners sometimes come up against drivers that are seemingly either unchangeable (eg children's views on healthy eating) or outside of your control (eg the type of education received in schools). However, once again some lateral thinking may lead to options (eg social marketing techniques or attempts to influence the actions of partner organisations).

Card 5.4 Define the improvement drivers and measures

Using driver diagram for tasks rather than goals

One scenario that causes confusion when attempting to use driver diagrams is when an improvement team starts from a position where they know *what* they need to do rather than the *outcome* they want to achieve.

For example you may be tasked with 'implementing assertive outreach services'.

The simplest way to deal with this is to think about the task in slightly different terms. For example, what would it mean if you were to say the goal is to 'implement assertive outreach services *successfully*'? What are the primary drivers that would help you to operationally define this vague goal?

As you start to define 'success' you start to identify some drivers:

- ensuring the service capacity meets local demand
- ensuring treatment protocols are clinically safe and appropriate
- ensuring recruitment of high quality staff
- ensuring a high awareness of the new service and of referral routes
- and so forth...

These goals begin to match the driver diagram approach and can help you identify the tasks you need to accomplish to put these new services in place.

Card 5.5 Define the improvement drivers and measures

Working with multiple overall improvement goals

Driver diagrams represent a logical unpicking of a problem. They should be applied to one overall improvement goal at a time. But what about where multiple overall improvement goals exist?

This is best dealt with by completing individual driver diagrams for each goal and then looking for related issues across the diagrams. An example helps to explain this approach.

If a partnership commissioning group was working on supporting the health and wellbeing needs for local teenagers, it is possible they identify the following two overall improvement goals.

1 To reduce rates of teenage pregnancies.

2 To increase the proportion of teenagers going forward into higher education.

Trying to unpick the improvement drivers behind both of these goals simultaneously would be very difficult as they are both complex issues. It is easiest to treat each goal separately and explore their drivers in isolation.

Following this independent approach you would probably find some commonality between the drivers identified:

- Teenage pregnancy rates may have an 'education' component since some teenagers may be unaware of the full implications of a pregnancy. 'Improving awareness' may therefore appear as a driver related to this goal. However, this specific type of education is unlikely to feature in the driver diagram for higher education.
- Both goals may however be influenced by a driver related to teenagers' aspirations (eg for careers, families, security).
- Both goals may also be predominantly relevant to the same sub-group of teenagers (ie a link may be seen to exist between early pregnancy and lower educational attainment).

By looking across the two sets of drivers and the learning from the ***understand and reframe*** phase it may be possible to see merits in creating joint interventions in some areas that seek to tackle both goals (eg to target 'aspirations' or to reach particular groups of teenagers).

So, by creating *independent* driver diagrams for each goal and then comparing across the driver diagrams it is possible to bring together the learning and insight from both.

Card 6.1 Create the programme of improvement projects

How to create the programme of improvement projects

Creating the programme of improvement projects is based upon the insights gained from the earlier phase and the range of drivers you have identified in your driver diagram.

The process of identifying projects follows three steps:

1 Creatively identifying potential projects

2 Prioritising potential projects to determine which have the best chance of influencing the drivers

3 Developing project plans

Methods exist to support you in each of these steps which are well described in other NHS Institute guides (available at **www.institute.nhs.uk**) and so will not be covered further here.

- The ***Thinking Differently*** guide provides a range of techniques for helping individuals and teams think creatively. Edward De Bono described the way we think by using the metaphor of 'mental valleys' that restrict our creativity and therefore the options open to us. *Thinking Differently* provides techniques for getting out of these valleys and can be used with groups to generate creative ideas for projects. It can also be used in the previous phase to help you see your improvement opportunity from different perspectives.

- The ***Prioritise Commissioning Opportunities*** process (described in the associated guide) supports teams in assessing ideas for projects against 'importance' and 'do-ability' criteria. This allows a long list of projects to be whittled down to those believed to have the most potential for impact.

- The ***Project Delivery for Commissioners*** *guide* provides a step-by-step process for undertaking projects, including key pointers on setting up the project team, defining the project scope, governance arrangements and project planning.

The NHS Institute website (**www.institute.nhs.uk**) also provides a wide range of service improvement tools and techniques that will help you undertake these projects.

> *"Most executives, many scientists, and almost all business school graduates believe that if you analyse data, this will give you new ideas. Unfortunately, this belief is totally wrong. The mind can only see what it is prepared to see."*
>
> **Edward De Bono**

Test, learn and deliver

Index: To support this **test, learn and deliver** phase the following material is provided

Card	Outline of contents
Card 7.1	**Measurement and small scale testing** Outlines the case for small scale testing approaches to change
7 Card 7.2	**How to *test and learn within projects*** How to undertake PDSA (plan, do, study, act) cycles
Card 7.3	**Improving an alcohol advice service using a PDSA cycle** An example of how a PDSA cycle can be applied to improve a service

The key tools in this phase are highlighted with icons above.

Click **here** to access the quick reference page

Card	Outline of contents
8 Card 8.1	**How to *monitor impact*** The role of *special cause and common cause variation* and the use of *control charts* to monitor the impact of changes (including reference to the accompanying NHS Institute guide *An introduction to control charts*)
Card 8.2	**Variation – why traditional methods of analysis and prediction are inadequate** Time-based measurements and the implications for how performance is measured and predicted
9 Card 9.1	**How to *create sustainability*** The NHS Institute *Sustainability Guide* and the *NHS Sustainability Model*
10 Card 10.1	**How to *evaluate progress against drivers*** Using the measurement framework to monitor progress towards the improvement goals

The key tools in this phase are highlighted with icons above.

Quick Reference Guide

Test, learn and deliver will occupy the majority of your time in your improvement efforts. Here you will undertake your projects and apply measurement techniques to monitor progress. Small scale testing approaches will be used to minimise the risks of failure as changes are tested in your local context and more formal statistical techniques will be used to evaluate your overall project outcomes. You will also take action to ensure the sustainability of the changes that you implement and, at a programme level, use your measurement framework to assess your progress towards your overall improvement goals.

Element 7

Test and learn within projects

This project based learning and change approach involves undertaking pragmatic, small-scale tests of change using multiple PDSA (plan, do, study, act) cycles to minimise the risks of failure. Here you will deal with the 'messiness' of local implementation, learning what works best within the context of your local system.

Element 8

Monitor impact

At a project level you will need to assess whether each project is delivering the desired results, taking account of the variation present in your delivered outcomes. This will involve using 'Statistical Process Control' (or SPC) techniques and the creation of *run* or *control* charts.

Element 9

Create sustainability

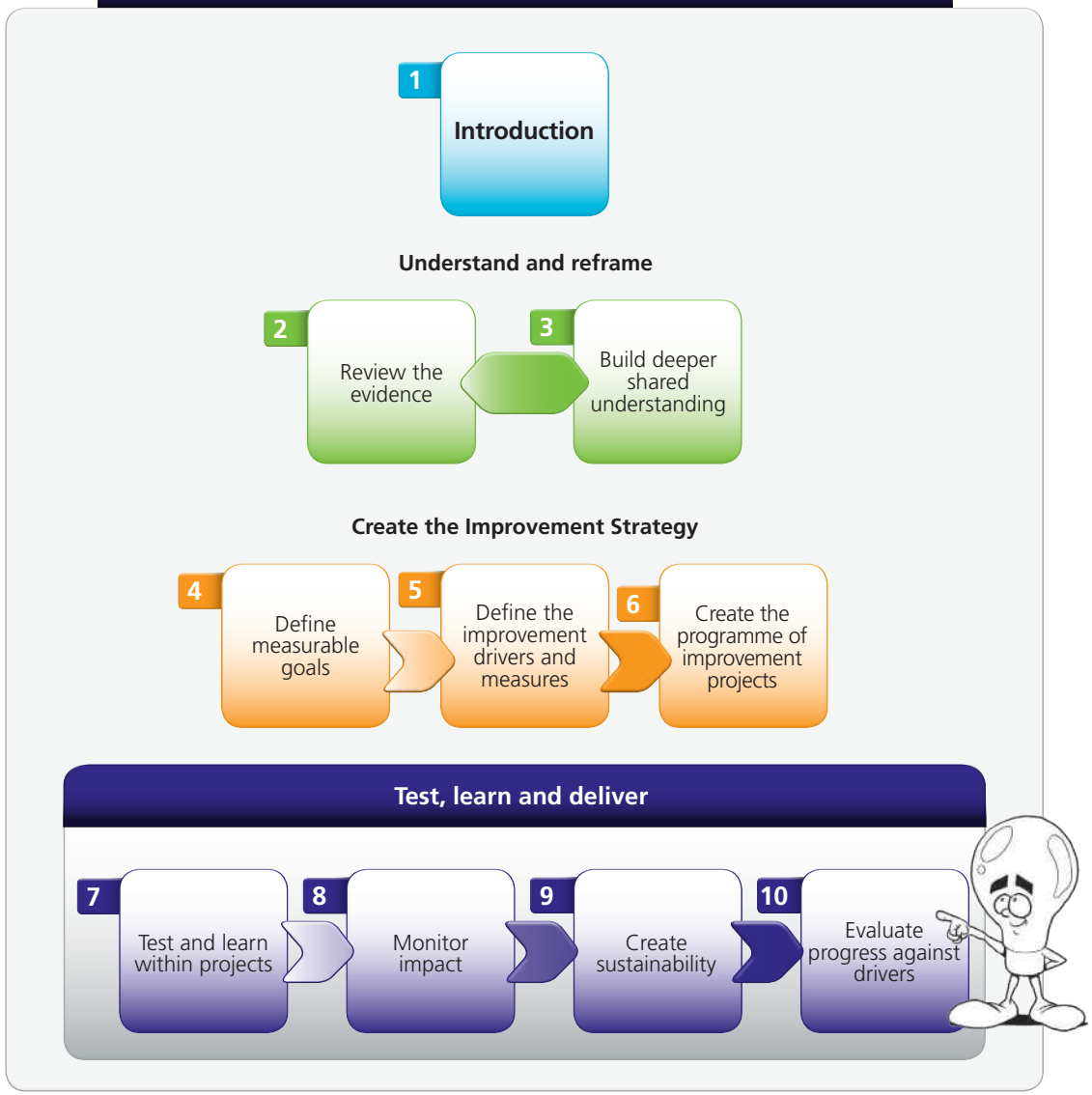
Delivering acceptable project outcomes in the short term does not guarantee long-term success as old behaviours and processes start to reassert themselves. Here you will ensure that you have applied sustainability principles to your projects.

Element 10

Evaluate progress against drivers

As a final step in your improvement journey you need to assess whether the sum of the parts (ie your projects) adds up to the successful achievement of your overall improvement goals. This is achieved by using your measurement framework as a gauge of progress. Here you will also put in place arrangements for the ongoing monitoring of performance.

An Improvement Framework for Commissioners



In completing the 'test, learn and deliver' phase you will:

1 Implement a range of projects using a small scale testing approach to change that minimises the risks of failure

2 Monitor progress at a project level

3 Create the conditions for the sustainability of the changes you have implemented

4 Monitor progress at an improvement driver level using your measurement framework

5 Deliver your overall improvement goals

Card 7.1 Test and learn within projects

Measurement and small scale testing

For most complex challenges, your improvement journey is likely to involve a range of projects created in the previous phase. Each of these will address one or more of your improvement drivers.

To fully assess your progress against each of your overall improvement goals there are five interrelated questions that you will have to answer as you implement your projects (shown in figure 7.1a).

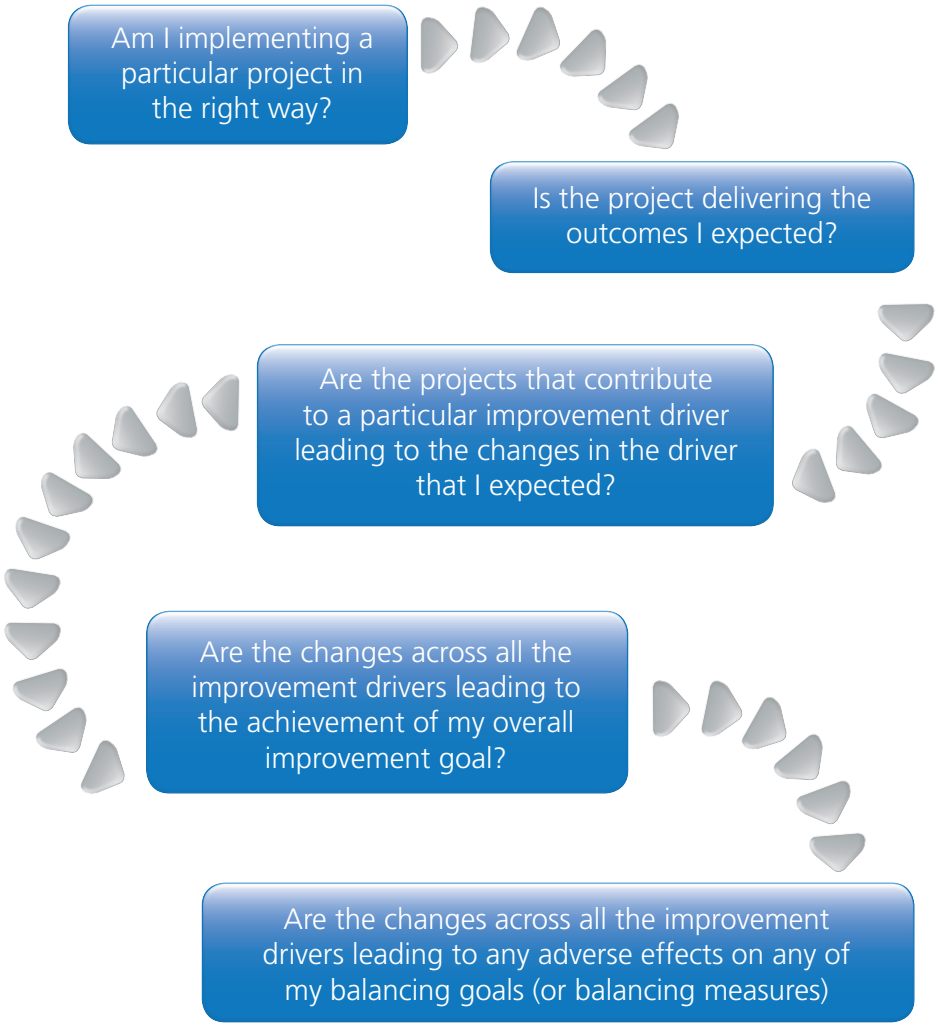


Figure 7.1a: Measurement questions

The first measurement question is focused at the individual project level: 'Am I implementing a particular project in the right way?'

Here your aim is to implement changes in such a way that the risk and impact of failure is minimised. In planning any change this requires you to consider three key factors:

- how confident you are that the change idea will lead to improvement
- the cost of failure
- the extent to which stakeholders in the system welcome the change.

Figure 7.1b shows the three factors integrated within a matrix developed by the Institute for Healthcare Improvement.

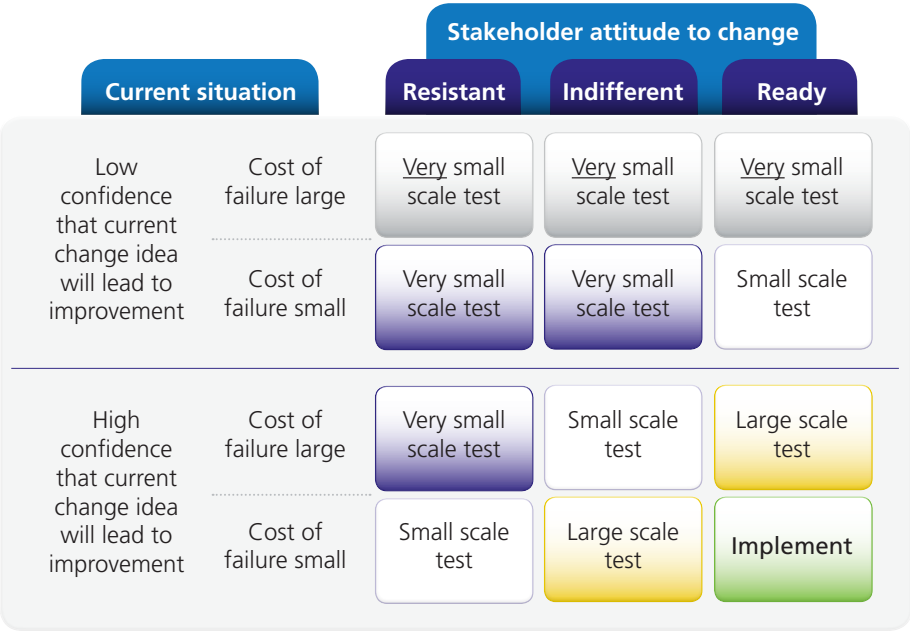


Figure 7.1b: The factors affecting the scale of implementation of a change

In some situations the odds of a successful change are slim.

- You might have very resistant stakeholders who are attached to old ways of working and are yet to be convinced of the merits of the changes you are suggesting.
- There might be a high cost of failure. If you get it wrong it might waste resources, lead to a deterioration in performance or even put patients at risk.
- You might also be uncertain if the change you want to make will lead to the improvement you desire. There may be no research evidence or good practice guidance to show the way, or you may be uncertain if this guidance applies locally.

In these situations, and in most of the situations shown in figure 7.1b, a small scale testing approach is called for, which is described in **Card 7.2**. Small scale testing has many benefits:

- it minimises the impact of failures since the test is 'small scale'
- it can be used to build understanding in order to minimise the risk of subsequent failures in the implementation process
- it is perfectly adaptable to the 'variation' you see in your system (eg tests can be undertaken in different geographical locations, with different demographic groups or with different clinical teams)
- it is generally cheaper to make 100 small mistakes than one very big mistake.

Card 7.2 Test and learn within projects

How to *test and learning within projects*

Testing and learning within projects is focused at the individual project level and is based upon a small scale experimental approach to project implementation.

W Edwards Deming popularised an approach to small scale testing developed by Walter Shewhart. He described this as PDSA (plan, do, study, act) cycles as shown in figure 7.2b.

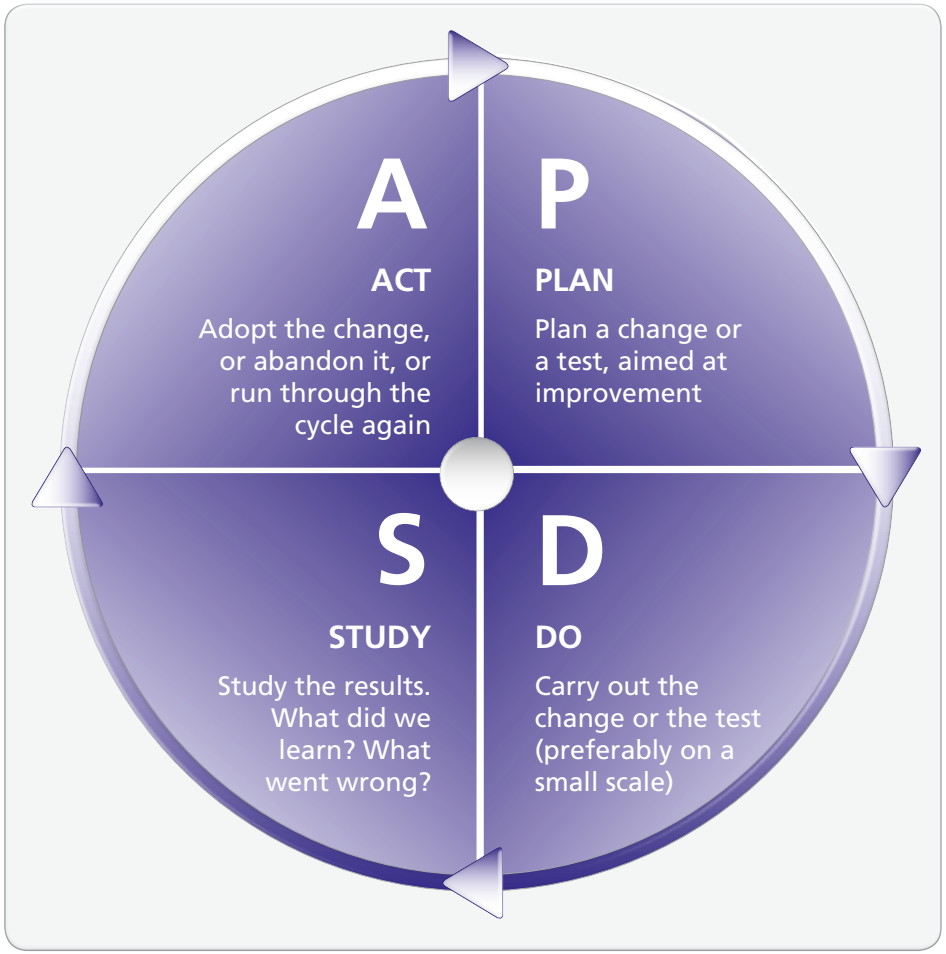


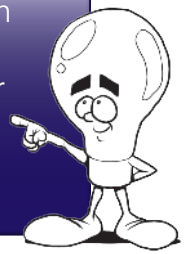
Figure 7.2b: Deming's PDSA cycle

Reference: *W. Edwards Deming (1994) The New Economics: For industry, government, education (2nd edition), The MIT press, Massachusetts*

PDSA cycles can occur in two ways to minimise the risks evident in figure 7.1b (See **Card 7.1**):

- A change can be tested with a small sub-group (eg with a few patients or with only a few staff adopting the change)
- A small change in the process can be applied to the whole population (eg introducing primary care triage in A&E but without yet introducing a full urgent care centre service)

Hint: For examples of PDSA cycles being used in health care settings see *Quality Health Care – A guide to developing and using indicators* by Dr Robert C Lloyd or *Quality Improvement: Practical applications for medical group practice* by Davis Balestracci and Jeanine Barlow



Multiple PDSA cycles can occur sequentially (ie following each other to build knowledge) or in parallel. The latter is likely to be the case where you have multiple improvement projects addressing a single driver. For example, waiting times might be improved through two parallel sets of PDSA cycles, the first improving the referral process and the second improving the match of capacity to demand in the receiving service. Both improvement projects may require multiple PDSA cycles and both contribute to the overall waiting time objective.

To undertake a PDSA cycle it is helpful if you use the checklist shown in figure 7.2c.

PLAN

Plan - design the test
- What is the change you intend to implement? (what will change, who will do it, when will it happend)
- What data will be collected (by whom, how, when)?
- What is your prediction about the outcome? Why?

DO

Do - implement the test, record data and start analysis
- What was actually done in the test (which may differ from the plan)?
- What was observed?
- Were there any unexpected observations or problems?

STUDY

Study - complete analyse of your results and draw conclusions
- What are the results compared to your prediction?
- Why might your results be different from your predictions?
- What have you learned from this test?

ACT

Act - determine what you will now do
- Will you refine your improvement idea and re-test it?
- Will you implement your improvement idea and embed it?
- Will you reject the idea and prepare to test a new one?

Figure 7.2c: A PDSA checklist

Since PDSA cycles are a simple concept to grasp, the questions in figure 7.2c can appear quite basic. However, it is important to note that PDSA cycles still involve rigour and the creation of a hypothesis (ie a prediction of cause and effect). They are not just a 'try it and see' process.

In **Card 3.1** a distinction was drawn between an 'improvement' approach to measurement and a 'research' approach. Each PDSA cycle sits within an ongoing learning process where the hypothesis evolves or changes with the cycles. Each cycle therefore just has to be 'good enough' to inform your next cycle where you have another opportunity to measure the impact of your changes. The samples that you work with are significantly smaller than those typically used in research. You may start with a test that involves just a handful of subjects (eg doctors, patients, notes).

> *PDSA cycles are good – I've used them before and I know that they identify bottlenecks and things that are so obvious.*
>
> **Pilot Site**

If this works as predicted you might expand to a larger group. Success here may lead to further larger tests. This expanding test process is not a search for statistical significance but a steady building of your confidence (based upon a wide range of data) that you are doing the right thing as you implement a change. In **Card 8.1** you will see how statistical tests are used when considering the overall impact of a change project when fully implemented.

> *Rational prediction requires theory and builds knowledge through systematic revision and extension of theory based on comparison of prediction with observation."*
>
> **(pg 102) Deming: The new economics**

PDSA cycles clearly apply to provider level changes and thus commissioners can work with their providers to encourage a small scale testing approach. They can also use PDSA cycles themselves. For example in specifying and procuring a new service there may be PDSA cycles that explicitly test the following:

> *I referred them to the 'plan, do, study, act' cycle and said that you've not done the planning bit, you've gone straight to 'do'.*
>
> **Pilot Site**

- the acceptability of the draft specification with a selection of clinical staff (to identify weaknesses)
- the fitness for purpose of the service proposal by mapping the pathway and treatment options for a small test sample of potential patients
- the impact of a pilot version of the service (initially tested with just a small cohort of patients)
- the ongoing performance of a service based upon the learning from performance metrics or periodic patient surveys (although the time periods for completing these cycles may take up to a year in some cases, going against the spirit of rapid learning cycles).

An example of a PDSA cycle is given in **Card 7.3**.

Card 7.3 Test and learn within projects

An example of a PDSA cycle when improving an alcohol advice service

To understand the notion of working at a small scale, imagine you are involved in a project to improve the effectiveness of an alcohol advice service for young adults (as measured by reductions in binge drinking rates).

Your driver diagram has identified the need for better message reinforcement methods (ie reminders that help people take note of the advice they have been given at the times when they need it). The suggested project is a novel idea to use mobile phone text reminders at peak drinking times that give short healthy-drinking messages.

You however realise that you need to test out whether this approach works. What do you do?

One option would be to leap to a large scale implementation and use the measures created with your driver diagram to monitor the impact. However, this is a new idea and success is far from certain. Also, if you get it wrong you lose an opportunity as the young adults will soon lose interest in your texts. A better option is to use small scale testing.

You could start with just a few young adults and show them the messages you propose to send. Are they the right messages? Is the mix of humour and seriousness enough for them to take notice? Do they think they would have an impact? Is the suggested timing and frequency of the texts helpful?

This first PDSA cycle can be a source of rich learning and new thoughts on how to proceed. Crucially, it is not a full-blown research study. In a PDSA cycle you accept that these are just the views of a small group of people (eg five people). If views varied widely in the group your next cycle might involve doing the same test with more people to explore this variation. If you notice that your group is somehow atypical of the young people you work with (eg slightly older) you might want to try again with a younger group. These are not 'research' level findings, they are just 'good enough' findings since your goal is learning and preparation for your next test.

Eventually you might try a PDSA cycle to try out the texts live. Here you would work with maybe 20 people who have attended your advice service. You might ask similar questions but add to them queries like whether they looked at the texts and whether they influenced behaviours? Again, this is not research level learning but something 'good enough' to lead to the next step which might be a wider test.

Eventually through this process you reach a point where you judge that you have enough knowledge to move to the full-scale implementation. At this point, the impact of full-scale implementation can be measured using the statistical techniques introduced in **Card 8.1**.

Card 8.1 Monitor impact

How to *monitor impact*

When monitoring impact you are interested in whether your widespread implementation of a change (after PDSA cycles) has achieved the desired reults.

Monitoring impact therefore moves onto the next question in figure 7.1a (**Card 7.1**):

- is the project delivering the outcomes I expected?

You are moving from the incremental successes (or failures) of PDSA cycles to consider more macro level outcomes. To properly answer this question you need to return to one of Deming's four areas of profound knowledge, *variation* (see **Cards 3.1**).

In any measurement that exhibits variation, there are two types potentially present.

- Variation due to regular, natural or ordinary causes affecting all outcomes of the process is referred to as *common cause variation*.
- Variation due to irregular or unnatural causes that are not inherent in the process is referred to as *special cause variation*.

Simple examples of these types of variation are described later.

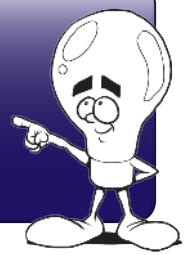
Understanding the types of variation you are observing in a measure will help you in two ways:

Formulating your change strategy

Where your process exhibits only common cause variation you need to alter the process. However, where there is special cause variation you need to understand the cause and mitigate the risks.

Take the example of your journey to work. If you want to reduce your regular travel time down from its usual time (which hovers around the 55-65 minutes range), you need to fundamentally change the process that gets you to work. Perhaps you need a faster car or an alternative route (or to take a train). What you ***don't do*** *is change your route because of the one occasion there was a motorway crash that delayed you for two hours. You know that these crashes are exceptional events. Instead you might come up with a contingency to manage the risk of delays from crashes, such as having alternate routes to hand where you can leave the motorway at earlier junctions.*

Hint: The link between the type of variation and your change strategy is one of the reasons for looking at variation in the **understand and reframe** phase.



Getting confused about the type of variation you observe can lead to problems. Reacting to common cause variation as if it was special cause variation leads to wasted efforts to 'find the cause'. Similarly, reacting to special cause variation as if it was common cause variation leads to excessive tampering with the system. This is discussed in **Card 8.2**.

Measuring whether a change has had a genuine impact on a process or system

Imagine that your 'journey to work' scenario exhibits only common cause variation so you adopt the strategy of fundamentally altering the process by selecting a different route. If your first ten journeys to work all now take about 50 - 60 minutes (down from 55 - 65 minutes), have you done the right thing and should you now adopt this new route permanently? Could this run of shorter than normal journeys just be a fluke and an example of 'noise' in the system?

Where you make a change to a process that exhibits common cause variation, the way you identify if a change has had a demonstrable impact is to see if you have introduced a source of special cause variation. Think of it as a signal that stands out from the background noise that you can now assign a cause to (where the cause is the change you introduced).

The techniques used for identifying special cause variation are covered in a branch of statistics called statistical process control or SPC for short. Despite the anxiety usually brought on by the term 'statistical', SPC is actually pretty simple:

- ***It helps you to look for patterns in your variation that are unlikely to have occurred by chance (ie special cause variation)***. Getting a couple of journeys to work that take 50 minutes may well be within the 'noise' of common cause variation. However, getting ten of them in a row is probably unusual enough to say something has changed significantly (ie your new route is better).
- ***It allows you to make some statements about the predictability of future performance.*** If you don't see any special causes of variation in your 55 to 65 minute journey then you can have some confidence in saying (after some analysis) that your journeys in the future are likely to fall within certain time boundaries (eg unlikely to be any faster than 40 minutes or any longer than 80 minutes). These boundaries are set by the amount of variation seen in the process.

SPC therefore provides a mechanism for:

- separating out common cause and special cause variation
- determining if a change to the underlying process has made a demonstrable difference
- describing the predictability of your system.

The core tool used within SPC is known as a *control chart*. An example of a control chart is given in figure 8.1a.

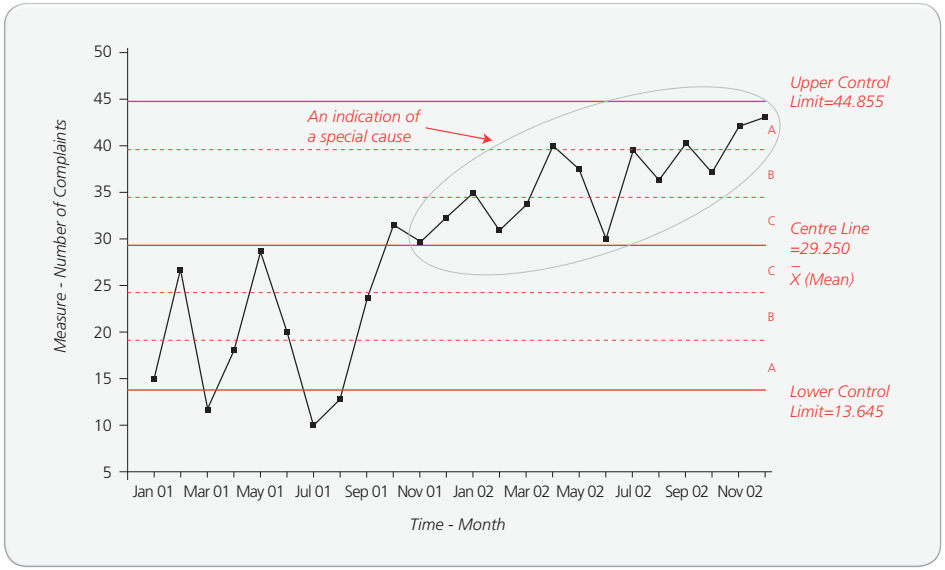
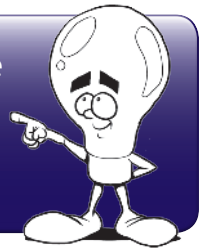


Figure 8.1a: An example of a control chart

All control charts share common features. They plot out the data over time and based on the variation in that data they display upper and lower boundaries which are generally referred to as control limits. These limits provide one of the tests for 'unusual' (ie special cause) data. An excessively delayed journey due to a motorway crash would probably show up as a point beyond one of these limits.

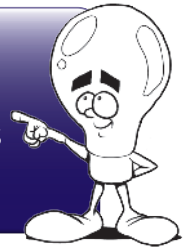
Hint: The other rules for identifying special cause variation and the different types of control chart are explained in the NHS Institute publication 'An introduction to control charts'



Control charts form the basis for ***monitoring impact*** since they allow you to track your project-based measures and determine through SPC techniques whether your changes have made an impact.

> *One of the things that lots of people don't understand, for example, is how to read SPC charts and if you can get the idea about that, it changes the way you look at what you're doing.*
>
> **Pilot site**

Hint: Control charts are also used for monitoring progress against your drivers and goals as described in **Card 10.1**.



Since the use of control charts is new to many people, the NHS Institute has produced two sister guides to accompany this framework entitled '**An introduction to the use of control charts**' and '**A guide to interpreting run and control charts**'. These have more detailed explanations and includes healthcare examples.

Copies are included with paper-based versions of this guide or can be downloaded from **www.institute.nhs.uk**

> *One of the things with information is how you present it that so people that aren't familiar with it can actually use it. That's why things like the SPC have been useful because people actually start to understand it as well as using the narrative at the same time.*
>
> **Pilot site**

Card 8.2 Monitor impact

Variation – why traditional methods of analysis and prediction are inadequate

Most of us have been schooled in measurement and analysis of data to some degree. Unfortunately, the ways we have been taught to think about measurement may actually prove to be inadequate or even counterproductive when making improvements.

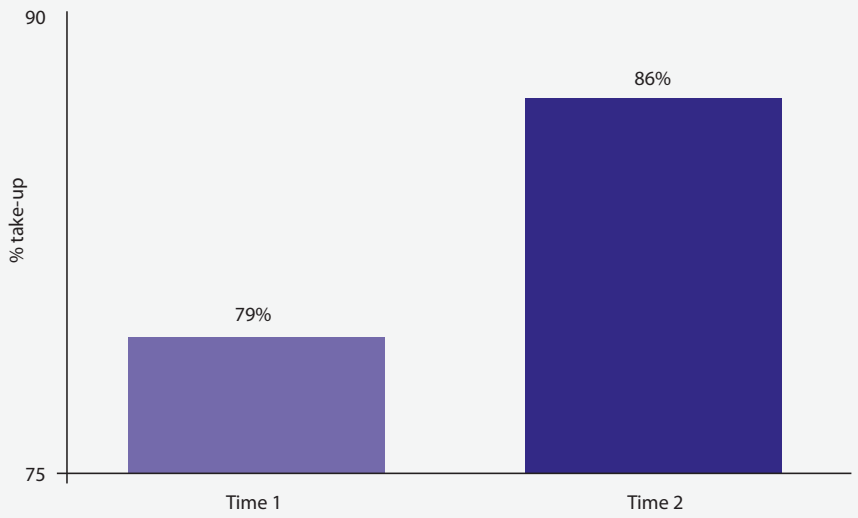


Figure 8.2a: Data on immunisation rates before and after a change was introduced

Consider figure 8.2a which shows some data on immunisation rates where a change was introduced between Time 1 and Time 2. How would you interpret the success (or otherwise) of the change? Typically people rate the change as a success (and it is easy to construct a scenario that also gives the illusion of success using a standard statistical analysis).

Now consider the same results but this time shown in more detail over time.

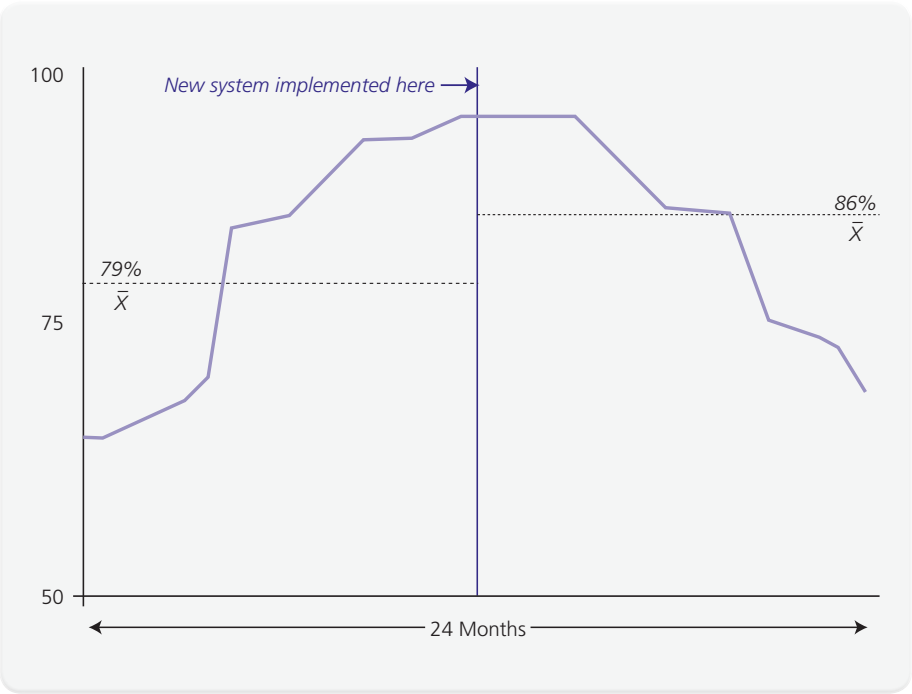


Figure 8.2b: Data on immunisation rates before and after a change was introduced

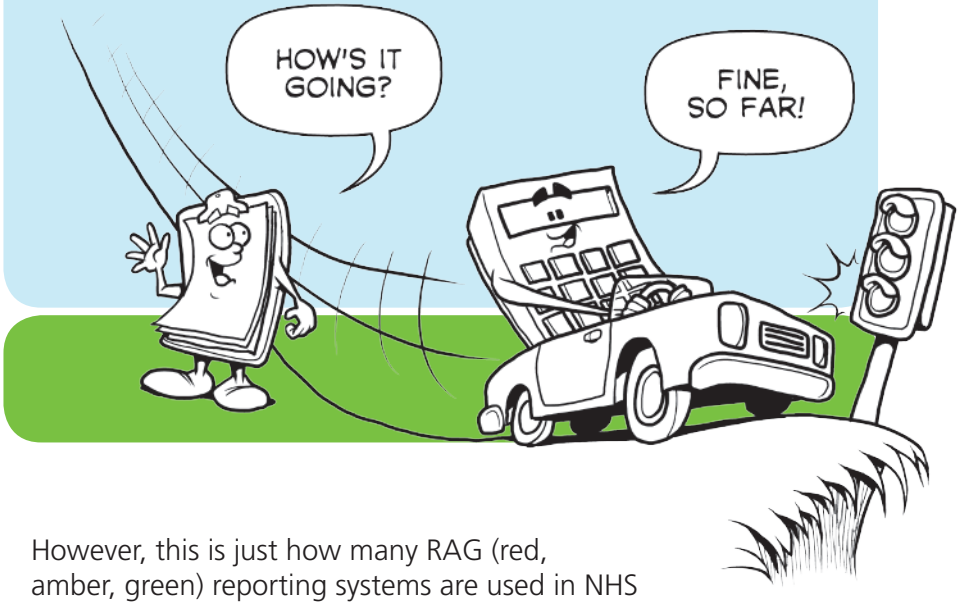
This time the data is plotted in more detail over time. The average rates for the two periods are shown.

What do you notice? In the first period, immunisation rates were steadily rising. After the change they were steadily declining. This 'eyeball' test now gives a different perspective. The change appears to have made things worse.

This unpicking of data over time so that you can see the detailed variation in performance is one of the central ways in which you can use measurement effectively in the context of improvement. The bars you saw in figure 8.2a gave a great snapshot of past performance but they did not help you see that the performance was steadily improving or deteriorating over time.

Similarly, 'prediction' is another concept that you may need to think differently about. In figure 8.2c it is pretty clear that 'Fine so far' is not a great predictor of being OK in the future.

Figure 8.2c: A history of green-rated performance is not a predictor of future success



However, this is just how many RAG (red, amber, green) reporting systems are used in NHS organisations. Often a 'green' rating symbolises that a target has been met in the last period. A succession of 'green' ratings is then taken incorrectly to mean that future performance will be 'green'. As figure 8.2c illustrates, this may not be the case.

Also, think about how people typically react to 'red' or 'green' ratings. Figure 8.2d shows a performance measure plotted over time, together with the associated 'red' and 'green' ratings. Have you ever sat in a performance meeting and either been the victim of a 'what are you doing about this red performance?' question or asked that question yourself? Plotting the data over time gives you a much better appreciation for how performance may naturally vary between time periods.

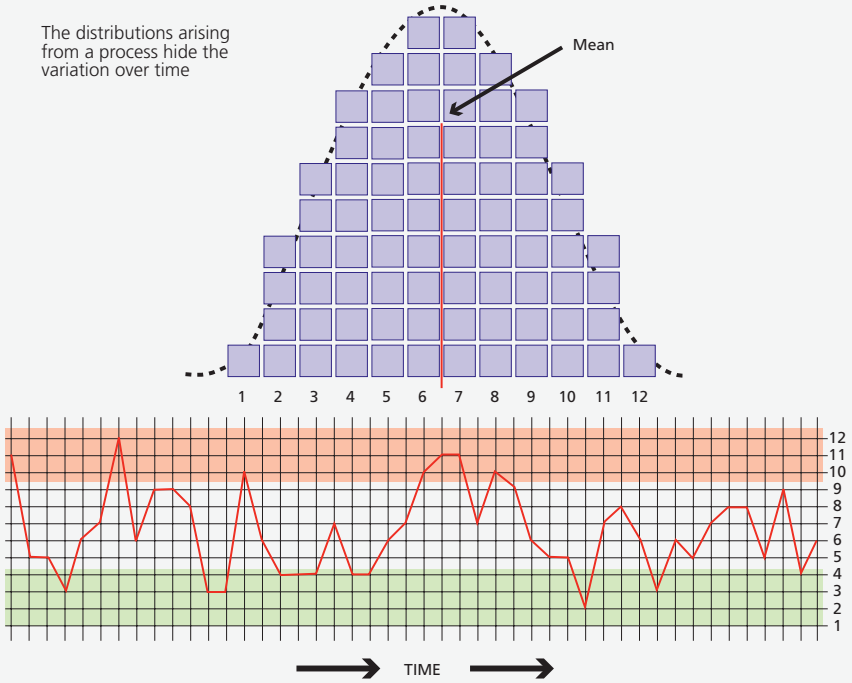


Figure 8.2d: Many 'normal' processes will show variation over time. Setting limits (shown in red or green) to act as triggers for action leads to an over-reaction to this natural variation

> *The driver diagrams have helped us generate objectives and the run charts have allowed us to move beyond a pass/fail mentality for how we're looking at progress.*
>
> **Pilot Site**

Card 9.1 Create sustainability

How to *create sustainability*

In the previous two steps you will have undertaken small scale testing within your projects and monitored the impact of each project.

In the ***create the improvement strategy*** phase you will have also set up your projects using sound project management principles (see **Card 6.1**). Throughout all of these activities (and indeed throughout the earlier phases) you need to sow the seeds for the sustainability of your improvements.

Sustainability can be defined as 'when new ways of working and improved outcomes become the norm'.

Unfortunately, sustainability is less common than you might at first think. Within the literature there is evidence of a high failure rate for organisational change with up to 70 per cent of changes failing to be sustained.

The NHS Institute has produced a ***Sustainability Guide*** to address this issue which is available both as a printable document and online resource at **www.institute.nhs.uk**.

The guide describes the ***NHS Sustainability Model*** which has been produced to help organisations and teams assess the likelihood that improvements will be sustained and to provide guidance on the things that you could do to increase the chances of sustainability.

The NHS Sustainability Model identifies ten factors that have been demonstrated to support sustainability. These are summarised in figure 9.1a together with a commentary on how they link to the improvement framework. More detail and supporting tools for each of the factors is available in the Sustainability Guide.

Sustainability factor	Links to the improvement framework for commissioners
Process factors:	
1 Benefits beyond helping patients (eg it also improves efficiency and makes the job easier for staff)	The benefits that different stakeholders may value can be identified as part of the ***understand and reframe*** phase
2 Credibility of evidence (ie the benefits are immediately obvious to stakeholders)	Driver diagrams can be used as a vehicle for linking proposed changes (and benefits) to overall improvement goals
3 Adaptability (ie the improvement is resilient to changes in staff, leadership, structures)	The lens of profound knowledge will help to identify the full extent of the system that needs to be altered in order for changes to be successful
4 Monitoring progress (ie processes are in place to monitor the process of change)	This is equivalent to the small scale testing and monitoring described at the start of the ***test, learn and deliver*** phase

Sustainability factor	Links to the improvement framework for commissioners
Staff factors:	
5 Involvement (ie staff who are affected by the change can contribute by being involved from the outset and trained in any new skills required)	Activities like the 'lens' and the creation of driver diagrams can be used to support staff involvement
6 Behaviours (ie reducing staff scepticism about the change)	Activities like the 'lens' and driver diagrams help staff to understand an improvement opportunity and contribute to identifying all the system elements that need to be addressed
7 Senior leaders (ie senior leaders engage with staff and take responsibility for sustaining change)	Senior leaders can be involved from the beginning in the ***understand and reframe*** phase and the importance of leadership behaviours can be drawn out in the *psychology* element of the 'lens'
8 Clinical leaders (ie clinical leaders also take responsibility for a projects success)	Again, like senior leaders, clinical leaders can be involved throughout the process and the need for leadership explored in the first phase

Sustainability factor	Links to the improvement framework for commissioners
Organisational factors:	
9 **Fit with organisational goals and culture (ie ensuring there is synergy between the improvement and organisational goals and vision)**	Recognising organisational goals will be an explicit part of the ***understand and reframe*** phase (as well as influencing efforts to ***define measurable goals***). Cultural issues should become evident when applying the 'lens'
10 **Infrastructure (eg ensuring that job descriptions, policies, staffing are consistent with the improvement)**	The multiple changes required to achieve an improvement goal should be identified through the driver diagram process

Figure 9.1a: The factors identified in the NHS Sustainability Model and the links to the improvement framework for commissioners

Card 10.1 Evaluate progress against drivers

How to *evaluate progress against drivers*

The final step in the improvement framework is ***evaluating progress against drivers***.

Here you are answering the final three questions that were posed in figure 7.1a (**Card 7.1**) reproduced below.

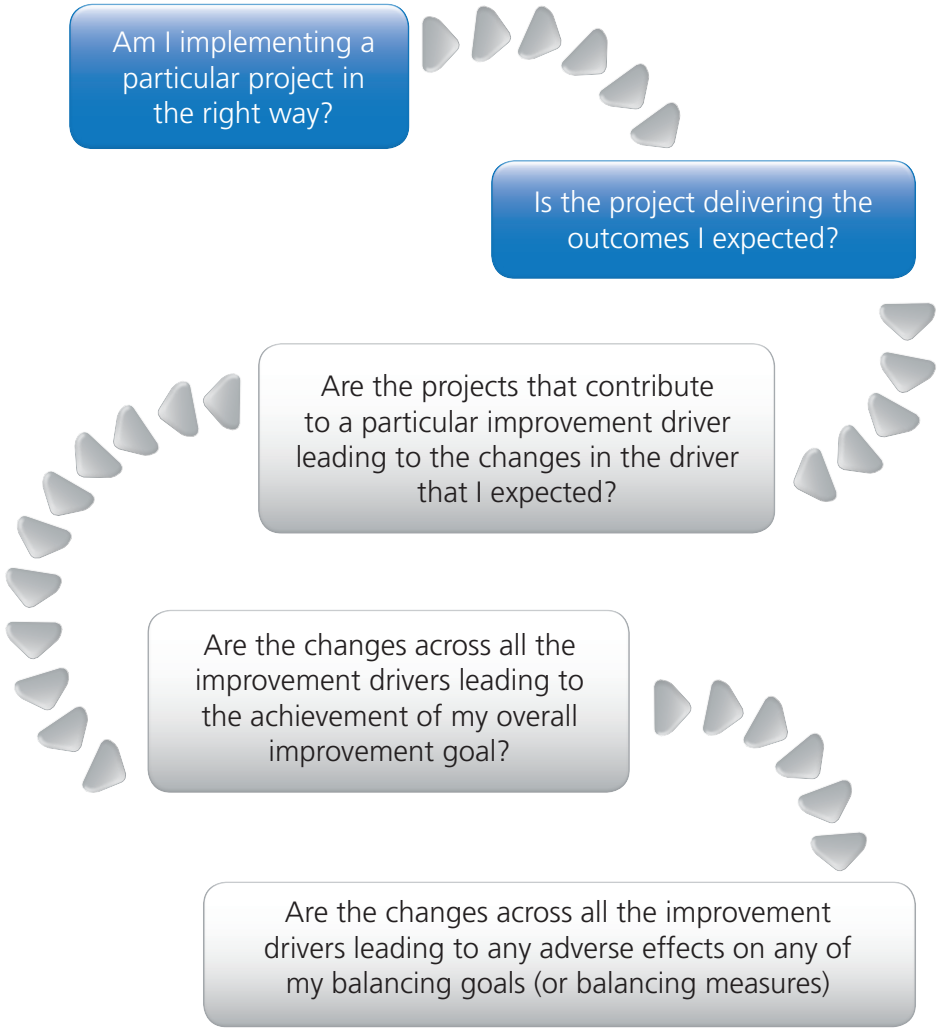


Figure 10.1a: Measurement questions

In the previous step you used control charts to understand whether projects were delivering the expected outcomes. Exactly the same principle applies to determining if multiple projects are delivering the expected effect on a particular driver.

To answer the questions about your overall improvement goal and balancing measures you need to use your control charts for all your drivers as a 'dashboard' for monitoring progress. Figure 10.1b shows this 'dashboard' of control charts in outline form for a single overall improvement goal.

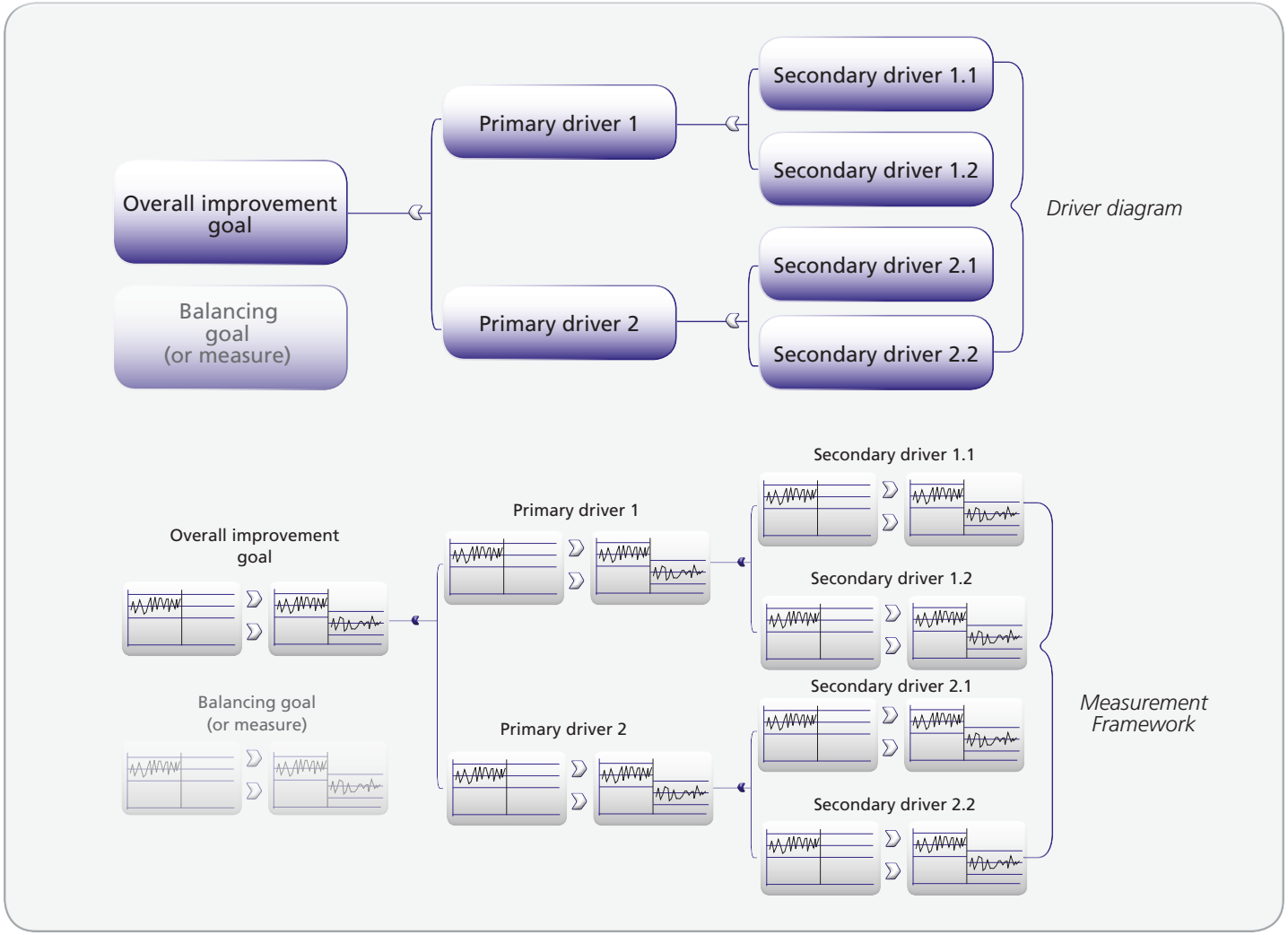


Figure 10.1b: A driver diagram and the associated measurement framework utilising control charts

When ***evaluating progress against drivers*** you are effectively using your measurement framework to ask whether the sum of the parts of your improvement work has added up to the impact that you anticipated.

- Have your projects changed the drivers as you expected?
- Has your overall improvement goal been reached?
- Are your balancing measures behaving as you expected?

If the answer is 'no' to any of these questions then you may need to revisit the work you did to ***create the improvement strategy***. Problems could have arisen in a number of ways. You might have:

- overestimated the impact that a project would have on a driver
- omitted a key driver or underestimated the importance of one of your drivers
- made an error in the way you created your measurement framework (eg by creating an inappropriate operational definition).

It might be that you have done nothing wrong and the complex, messy world around you has simply moved on. For example, by addressing one driver you might have unearthed or magnified another issue that needs tackling or something may have changed in your system outside of your improvement efforts. Always keep in mind that your driver diagram (and the measurement framework) should never be seen as a static model for your improvement strategy.

If all has gone well, your measurement framework will demonstrate that your drivers and goals are moving in the way you expect and your individual control charts will show that improvements have occurred. If that is the case, you have completed this improvement journey and over the coming months (or years) you can use your measurement framework to monitor the continued sustainability of your improvements.

Well done!