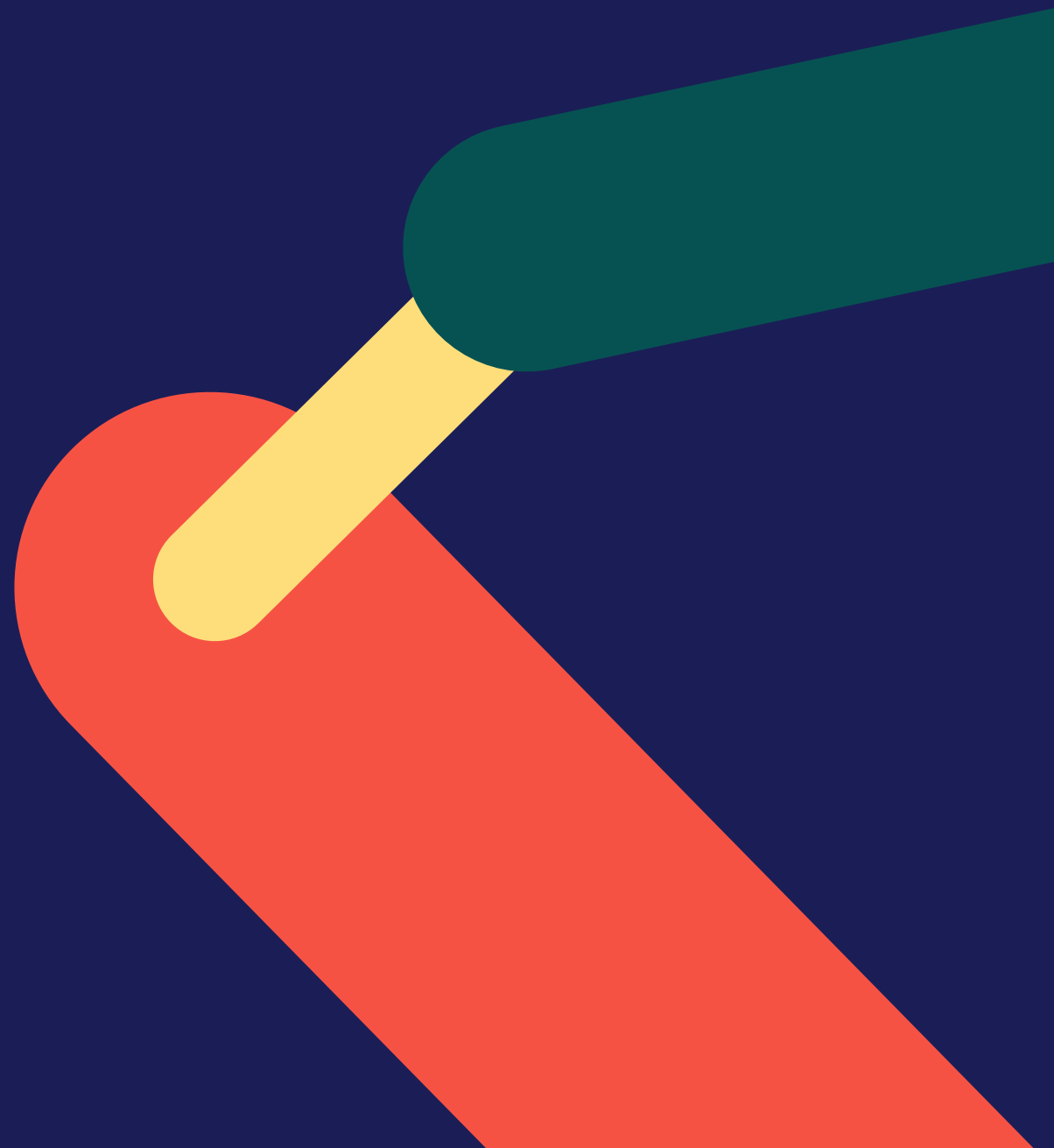Commissioned by the KPMG consortium for:

Government CAMPUS

Designed and delivered by:

The PSC

Policy Framing: Problem Structuring and Analytical Thinking

Today's agenda

OUTLINE 4-HOUR AGENDA (WITH APPLICATION DISCUSSION)

| Section	Time
Introduction	20 mins
Tool 1: Problem Definition Sheet	40 mins
Tool 2: Issue Trees	50 mins
Break	30 mins
Tool 3: Hypothesis Trees	55 mins
Tool 4: Boat Chart work planning	25 mins
Application of the tools together	20 mins
Reflection and wrap-up	15 mins

Welcome!

Before we get started, please complete the following form to rate your confidence with different elements of project work.

- **Link to pre-course survey: https://forms.office.com/e/9siz3NGKj4**

- **Name of this course:** Problem Structuring and Analytical Thinking

- **You can also follow the QR code** below to access the form:

You can scan the QR code with a **mobile device camera** to access the form
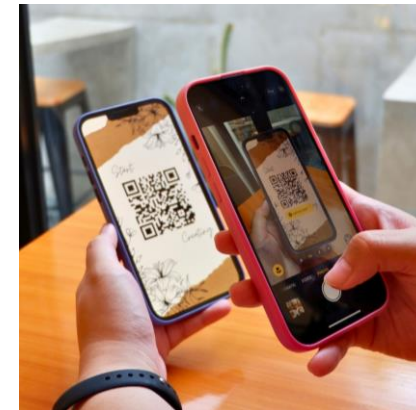
Why are we here today?

PROGRAMME AIMS

- The aim of this course is to introduce successful approaches to **problem-solving** and **analytical thinking**

- Today we will look at a **range of tools** to support you in effective problem-solving

- You will leave with an awareness of these tools and will have had some opportunity to **practise their application**

- Further practice is key to making them a part of your problem-solving skillset

- There are blog articles, templates and further strategic problem-solving and project delivery tools available on The PSC's website at https://thepsc.co.uk/capability-building

What is the intended end-point for your policy problem?

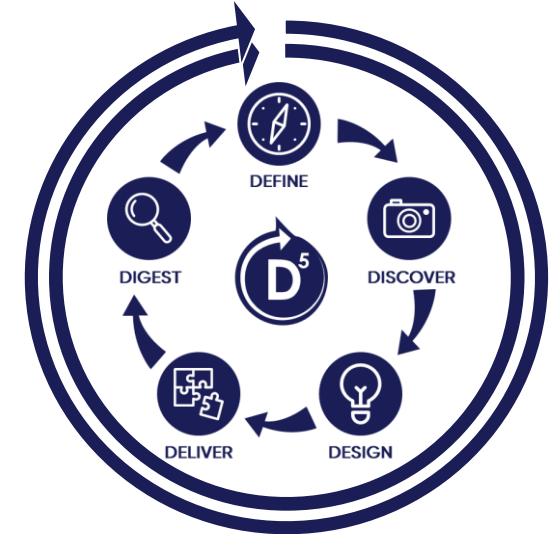RANGE OF FAST EFFECTIVE PROJECTS AND PROBLEMS

STRATEGIC RECOMMENDATIONS   **DELIVERY AND CONTINUOUS IMPROVEMENT**
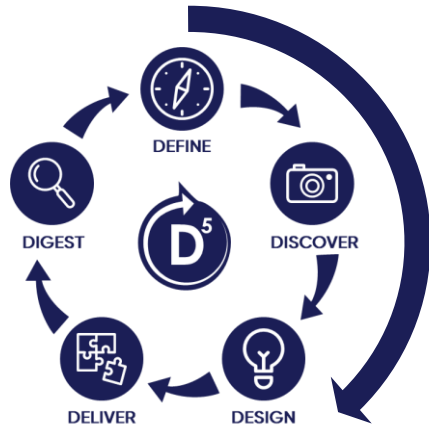
Where the project is on the spectrum depends on...

Project aims
Involvement in implementation
Time to delivery
Feasibility of rapid improvement cycles

- The project is focused on **design of an evidence-based recommendation** or set of options.

- The project team is responsible **for developing realistic and achievable recommendations** to inform a decision making process, but may not be involved in the implementation of the recommendations.

- The project is focused on **delivering a change**; this could be a new service model, pathway, or process.

- The team is involved in **implementing the options** and may use rapid improvement cycles to test and refine their recommendations

Problem-solving and where the tools fit in

D5 PROCESS OBJECTIVES

Defining the problem to be addressed, **setting the scope and KPIs,** planning the work, engaging with stakeholders to understand their view

Frequent review of improvement cycles, evaluating the outcomes of a project, identifying improvements and communicating success

Using quantitative and qualitative data and tools to discover the current state of a process or service, best practice and/or the root causes of a problem.

Using rapid improvement cycles to test changes, planning for implementation, engaging stakeholders in implementation and delivering a sustainable change

Establishing a vision for a future state: developing strategic recommendations and/or specific changes using design tools, options generation & evaluation

DEFINE

DISCOVER

DESIGN

DELIVER

DIGEST

D⁵

What is the context for your policy problem?

PREDICTABLE VERSUS COMPLEX PROBLEMS

Problems within linear systems or deterministic systems:

… where we can predict the likely effect of a particular action with considerable confidence, and over a long timescale
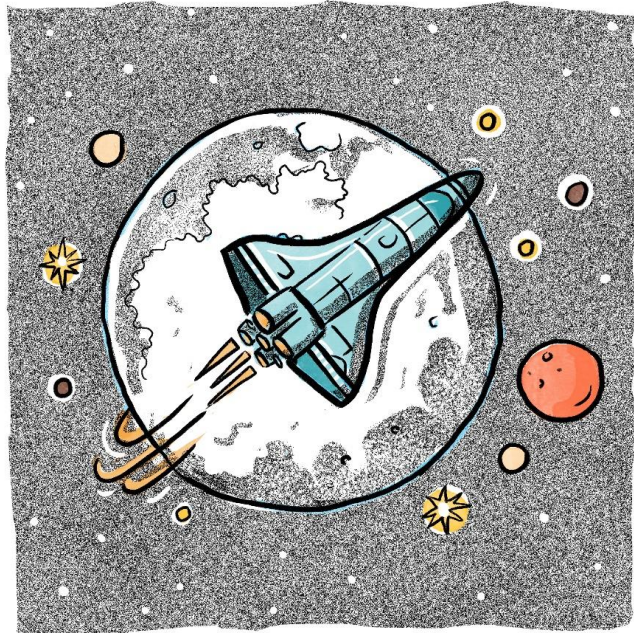
Problems within complex, adaptive, or chaotic systems:

… where the presence of feedback loops, non-linearities, complex sub-systems and memory effects make long-term predictions impossible
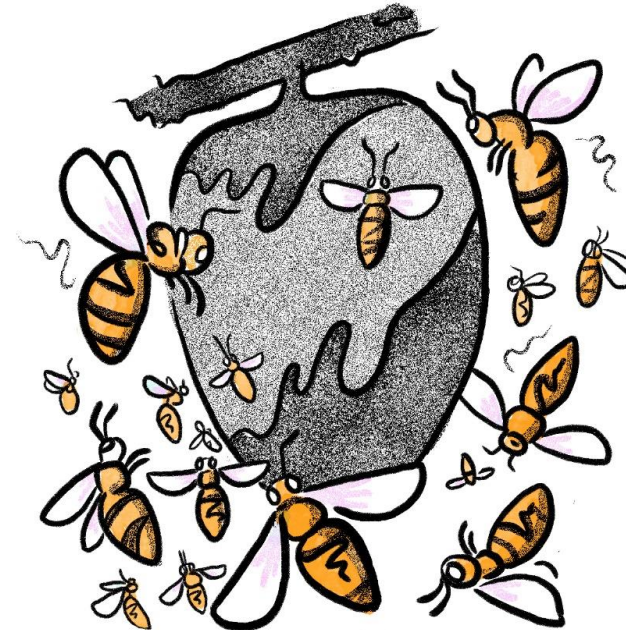
What tools will we learn about today and how will they help to solve your policy problem?

Tool 1: Problem Definition Sheet

Setting out the question to be addressed and the important parameters of the project on a single page

What are all the key factors of your problem?

What is the problem you are trying to solve?

What tools will we learn about today and how will they help to solve your policy problem?

Tool 1: Problem Definition Sheet

Setting out the question to be addressed and the important parameters of the project on a single page

Tool 2: Issue Tree

Breaking down your question or problem into distinct parts or workstreams, so that you can start to tackle it

How can we break down your problem into manageable chunks?

What are the component parts of your problem?

What tools will we learn about today and how will they help to solve your policy problem?

Tool 1: Problem Definition Sheet

Setting out the question to be addressed and the important parameters of the project on a single page
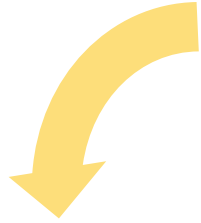
Tool 2: Issue Tree

Breaking down your question or problem into distinct parts or workstreams, so that you can start to tackle it

Tool 3: Hypothesis tree

Testing your recommendation or hypothesised answer to the problem by structuring evidence

What is your recommended solution?

What evidence do you need to collect to prove or disprove this?

What tools will we learn about today and how will they help to solve your policy problem?

Tool 1: Problem Definition Sheet

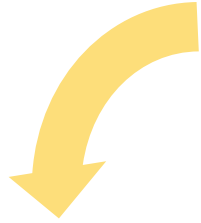Setting out the question to be addressed and the important parameters of the project on a single page

Tool 2: Issue Tree

Breaking down your question or problem into distinct parts or workstreams, so that you can start to tackle it

Tool 3: Hypothesis tree

Testing your recommendation or hypothesised answer to the problem by structuring evidence

Tool 4: Boat Chart

A project plan on a page that pulls together your phases, activities, meetings, and outputs

How are you going to solve this problem?

What are you going to do over the next few months?

Defining the problem: Problem Definition Sheets (PDS)

The Problem* Definition Sheet ('PDS')

The problem statement needs to show the underlying question, and not a solution for it.

- A Problem Definition Sheet sets out on a single page the question to be addressed and the important parameters of the project.

- They are helpful in ensuring everyone starts from the same understanding and agreement.

1. Basic question to be resolved	
2. Stakeholders, decision makers and project resourcing	3. Desired outputs and criteria for success
4. Scope of the work (in/out)	5. Outline timings and milestones
6. Context/ background	7. Constraints and risks/ dependencies/ interfaces

The Problem Definition Sheet sets out your project on a page

PROBLEM DEFINITION SHEET (GUIDANCE)

PROJECT TITLE:

1. **Basic question to be resolved** Be as specific as possible and, within this, as succinct as possible. The question should be time bound and refer to a specific organisation, department, or process. Describe the underlying question that the project is aiming to answer, so you can use it to shape your analysis and test your hypotheses.

2. Stakeholders, decision makers and project resourcing

- Who are the project lead, sponsor and project mentors?
- What type of **project governance** is needed to monitor quality, decide on plans and provide external challenge, for example, a project board or steering group?
- Who are the **key stakeholders** with whom you must engage? Where do you expect the most support for this project to come from?
- Who are your **delivery partners** (e.g. information team)?

4. Scope of the work

- What's **included** within the project and what's not?
- If it is **out of scope**, is it being reviewed elsewhere?

6. Context / background

Why is the work being done now?

3. Desired outputs and criteria for success

- What are the **key performance indicators** (financial and non-financial) that will show the project has been successful? What targets are you aiming for on each one, for example, at least one option which meets criteria X / Y / Z, stakeholder support for our proposal to meet criteria X / Y / Z, a pilot demonstration of achieving Q / C / D)?
- What **specific end products** are required?
- Goals should be '**SMART**' (Specific, Measurable, Attainable, Realistic and Timely).

5. Outline timings and milestones

- When are the project steering groups or **end of phase reviews**?
- When are the **key deliverables due**?

7. Constraints and risks / dependencies / interfaces

- Outline the key likely **risks / constraints** to the project and any interaction with other projects or work.

Here's a first draft PDS for a cancer workforce question – what can you learn from it, what questions does it raise?

PROJECT: CANCER WORKFORCE STRATEGY (TRUST)

1. Basic question to be resolved
How many cancer professionals will the local NHS Trust need in 15 years time, and how can we ensure we have them?

2. Stakeholders, decision makers and project resourcing
- NHS Trust leadership (names)
- Cancer leads and workforce leads at each hospital(names)
- Project team (name)
- Steering group (fortnightly)
- Monthly reporting to Cancer Alliance leadership

4. Scope of the work
In scope:
- Impact of attrition, transition, retention, recruitment (incl international), retirement as well as requirement for flexible working
- Considering impact of new technology and treatments (e.g., genomics, diagnostics) on clinical and workforce model
- Demand for services (reflecting incidence, demographics, and public health interventions)
- Cancer professional roles including histopathology, clinical radiology, clinical and medical oncology, diagnostic and therapeutic radiography
Out of scope:
- Non-cancer workforce. Nursing not included in this phase, or other staff groups.

6. Context / background
In the light of ongoing workforce and budget challenges, and increasing demand for cancer diagnostic and treatment services, alongside potentially transformational evolution of care, the Trust would like to create a strategic workforce plan looking up to 15 years ahead.

3. Desired outputs and criteria for success
Output:
- A clear baseline 'do nothing' scenario
- A set of scenarios covering external influences
- A set of options for the Trust to action against the scenarios
- Recommended strategy for the next 15 years

Success criteria:
- Agreement with leadership on 15-year strategic cancer workforce plan, with support from across the hospital teams
- Confidence across the stakeholders that the plan is realistic and achievable

5. Outline timings and milestones
- Phase 1 by October – research and modelling towards interim report on BAU, scenarios and potential levers / options
- Phase 2 by January – options co-development
- Phase 3 by March – delivery and governance planning

7. Constraints and risks/dependencies / interfaces
- Staff availability for interviews will drive timeline
- Data availability may drive timeline
- Early stakeholder engagement needed to ensure effective scenarios and options are considered

Reference: How to use a Problem Definition Sheet (PDS) and the PPT template

What is this tool?

The Problem Definition Sheet ('PDS') is a one-page overview of the objectives for a challenging problem-solving project where the question and required output and success factors are clear (the 'solution space') but the answer is not. It shows the boundaries of what the project will involve. Its main purpose is to ensure that the project team and stakeholders start the project from the same base.

When to use this tool?

The PDS should be used throughout the project. It guides the problem-solving towards an answer to the question that meets the success criteria, and helps the team stay within the boundaries for timing, resourcing and scope.

Tips for problem definition

- The PDS is most useful when it's a **live document,** reviewed and refined regularly by the team with their sponsor. Use a first draft when scoping and test it widely with the team and stakeholders until you are sure everyone is on the same page. Don't be afraid to return to the PDS to reflect your increased understanding, or if stakeholders seek to widen the scope.

- Expect to spend **60% of the time agreeing the 'question'** – which your Issue Tree will structure into workstreams and your Hypothesis Tree will aim to answer – as it drives all your problem-solving. It should be as specific as possible and, within this, as succinct as possible. The question should be time-bound and refer to a specific organisation / department or process.

- Make sure you identify both the **outputs of your project**, for example,, a report of options or recommendations, or an implemented solution) and **the success criteria**, for instance, when you meet these you will stop).

Mentoring questions for using a PDS:

- **Start by identifying the basic / governing question**. Does this effectively state the problem that the project is aiming to tackle?
- **Identify key decision makers and stakeholders**. Do this quickly the first time through, it's easy to spend time here
- **Highlight the project outputs and success factors** (including Key Performance Indicators)
  - How will you measure / know the problem is sufficiently solved? Make sure this is quantifiable
  - What will you do / produce?

- **Identify the key contextual issues for the project.** Does the context box explain why this project matters, and how it's different from similar projects before?
- **Note what is in / out of scope**
- **Identify what constraints or interdependencies might exist**. Note important risks here too
- **Consider potential milestones for the project**. How soon can you test or 'PDSA' (Plan-Do-Study-Adjust)?

PowerPoint Instructions

- The template has three tables to make it easy to adjust the balance of the seven boxes, both within each column and between the two columns – the question is a single cell table, and each column is a separate table.
- The guiding question is coloured to highlight its role as the focus of the problem-solving.

Problem Definition Sheet template

- The question box is a separate shape.

- Each column is a separate table – adjust the balance by changing the column widths.

1. Basic question to be resolved	
2. Stakeholders, decision makers and project resourcing ▪ Sponsors: ▪ Steering: ▪ Leads: ▪ Key Stakeholders: ▪ Delivery team: ▪ Support:	**3. Desired outputs and criteria for success** Output: ▪ - Success criteria: ▪ -
4. Scope of the work In scope: ▪ - Out of scope: ▪ -	**5. Outline timings and milestones**
6. Context / background	**7. Constraints and risks/dependencies/interfaces** Challenges: ▪ - Risks: ▪ -

PDS exercise

ACTIVITY

In pairs or small groups, spend 20 minutes developing a PDS for a project you have at work, using the template on the previous page.

1. **Start by identifying the core question.** Does this effectively state the problem that the project is aiming to tackle?

2. **Identify key decision makers and stakeholders.** Skip this, or do this very quickly the first time through – it's easy to spend time here.

3. **Highlight the project outputs and success factors** (including Key Performance Indicators).
   – How will you know the problem is sufficiently solved? Make sure this is quantifiable.
   – What will you produce?

4. **Identify the key contextual issues for the project.** Does the 'context' box explain why this project matters, and how it's different from similar projects before?

5. **Note what is in and out of scope.**

6. **Identify what constraints or interdependencies might exist.** Note important risks here too.

7. **Consider potential milestones for the project.** How soon can you test or PDSA?

We will wrap up with sharing for 5 minutes as a whole group.

Structuring the problem: Issue Trees

Issue Trees*

INTRODUCTION

Once you've written the problem statement, the next step is to break the problem down into manageable chunks. The issue tree helps you to:

1. Break the work down into clear, separate workstreams

2. Give you confidence that you've looked at the full extent of the project

How Issue Trees work

An Issue Tree works by setting out the 'basic question to be resolved' on the left-hand side of the page, then breaking out this question into increasingly more specific questions as you go from left to right

Basic question to be resolved

Sub-question
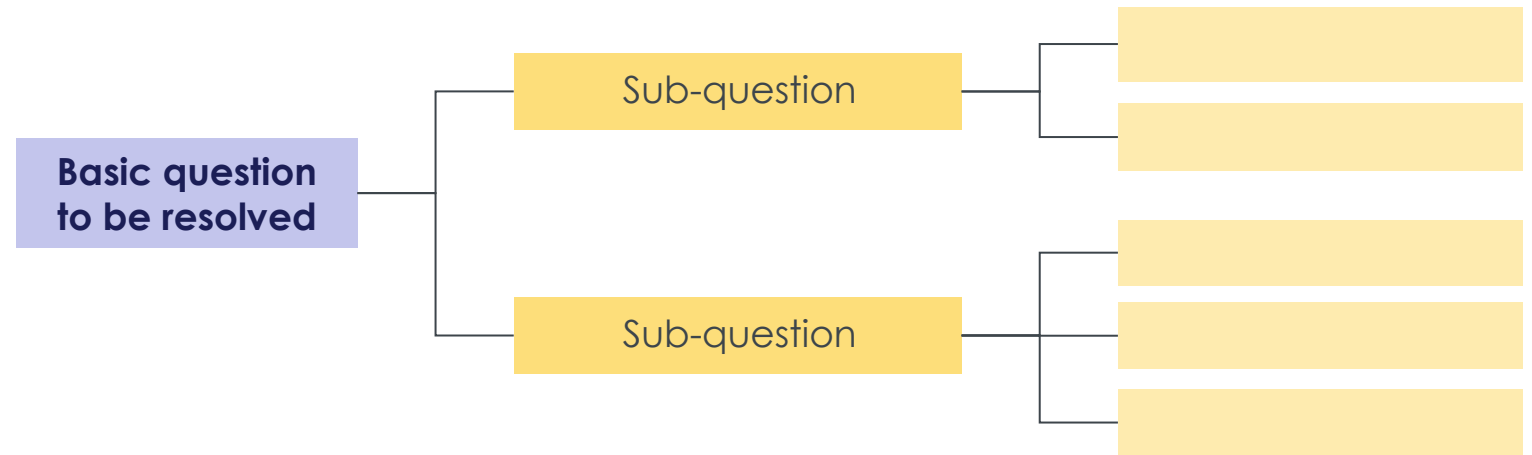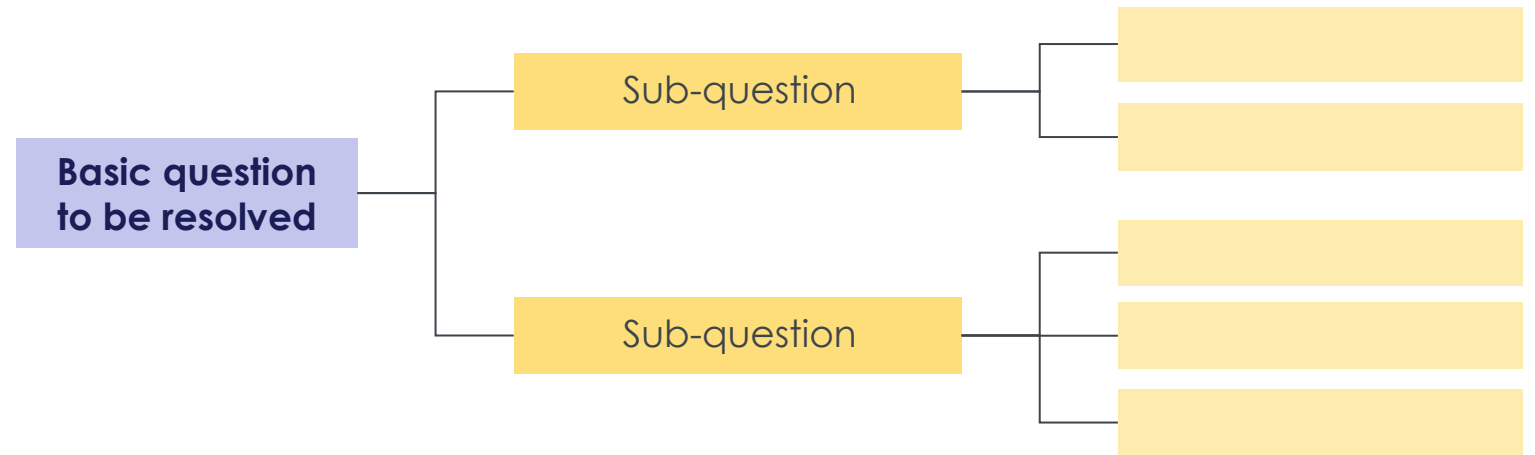
Sub-question

How Issue Trees work

BREAKING DOWN YOUR PROBLEM

An Issue Tree sets out the 'basic question to be resolved' and breaks it down into increasingly more specific questions.

The right-hand side of an Issue Tree shows a set of areas of potential experiments / solutions / analyses / workstreams

Basic question to be resolved

Sub-question
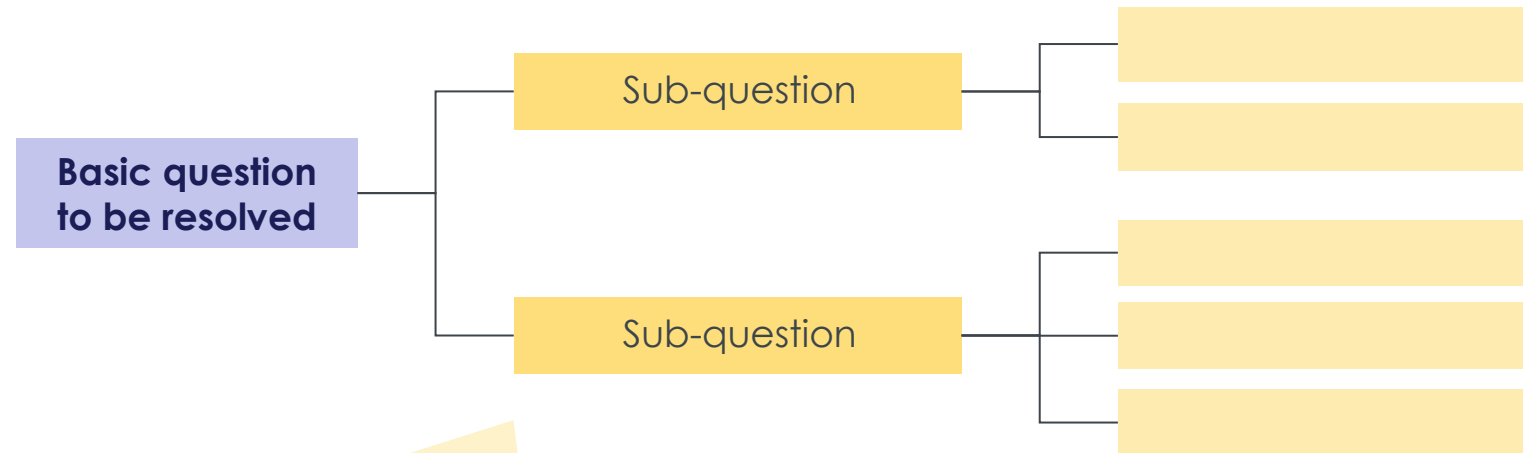
Sub-question

Good Issue Trees have questions at each level (vertical cut through the Tree) which:
a) can be answered without reference to other questions in the same level (**M**utually **E**xclusive questions)
b) when taken together, add up to the question to the left (**C**ollectively **E**xhaustive questions)
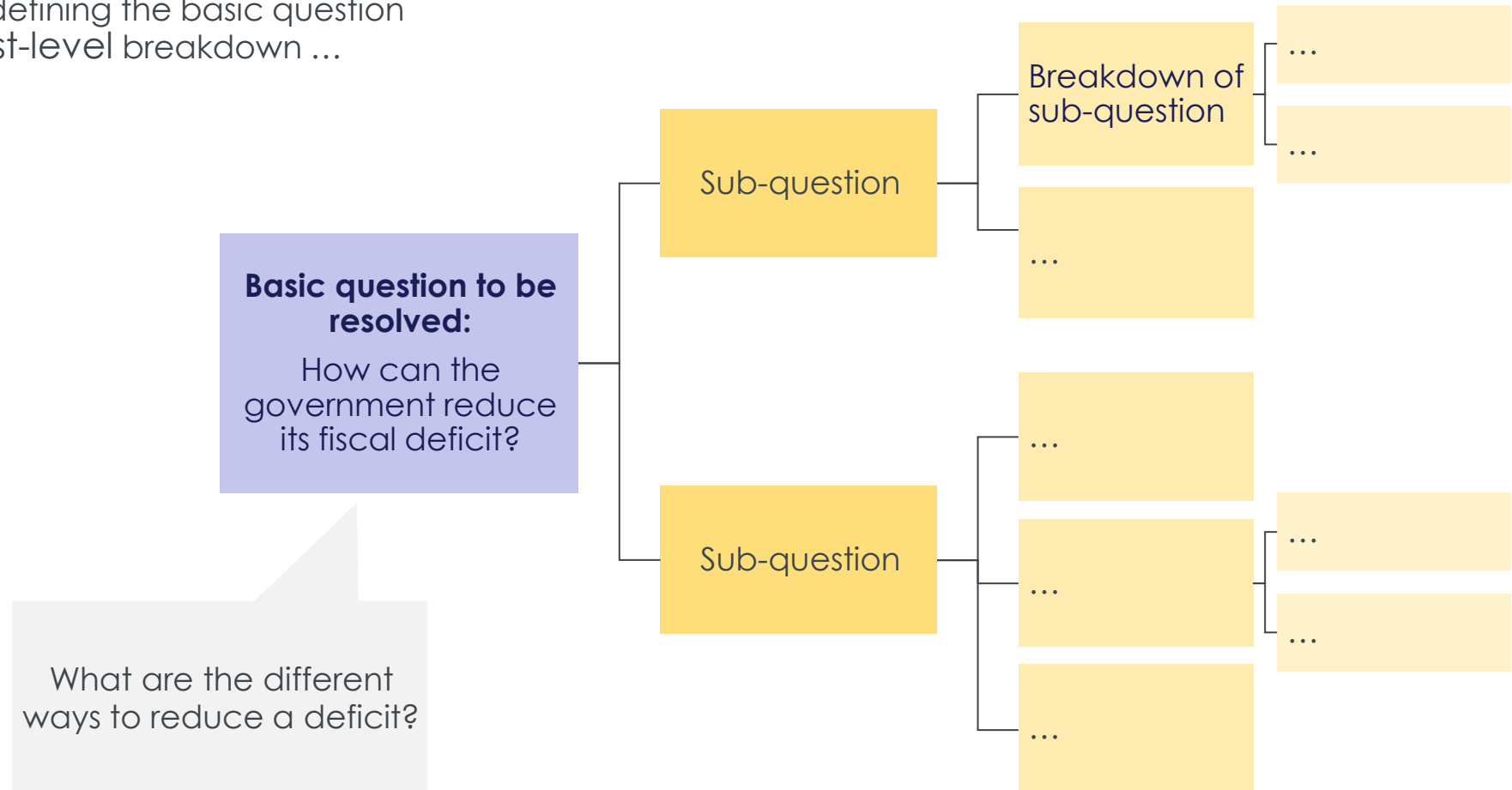
Simple Issue Tree example (2/3)

…then work through your second-level breakdown.

Basic question to be resolved:
How can the government reduce its fiscal deficit?

Can the government increase tax receipts?

Can the government reduce public expenditure?

Breakdown of sub-question

…

…

…

…

What are all the different sources of tax?
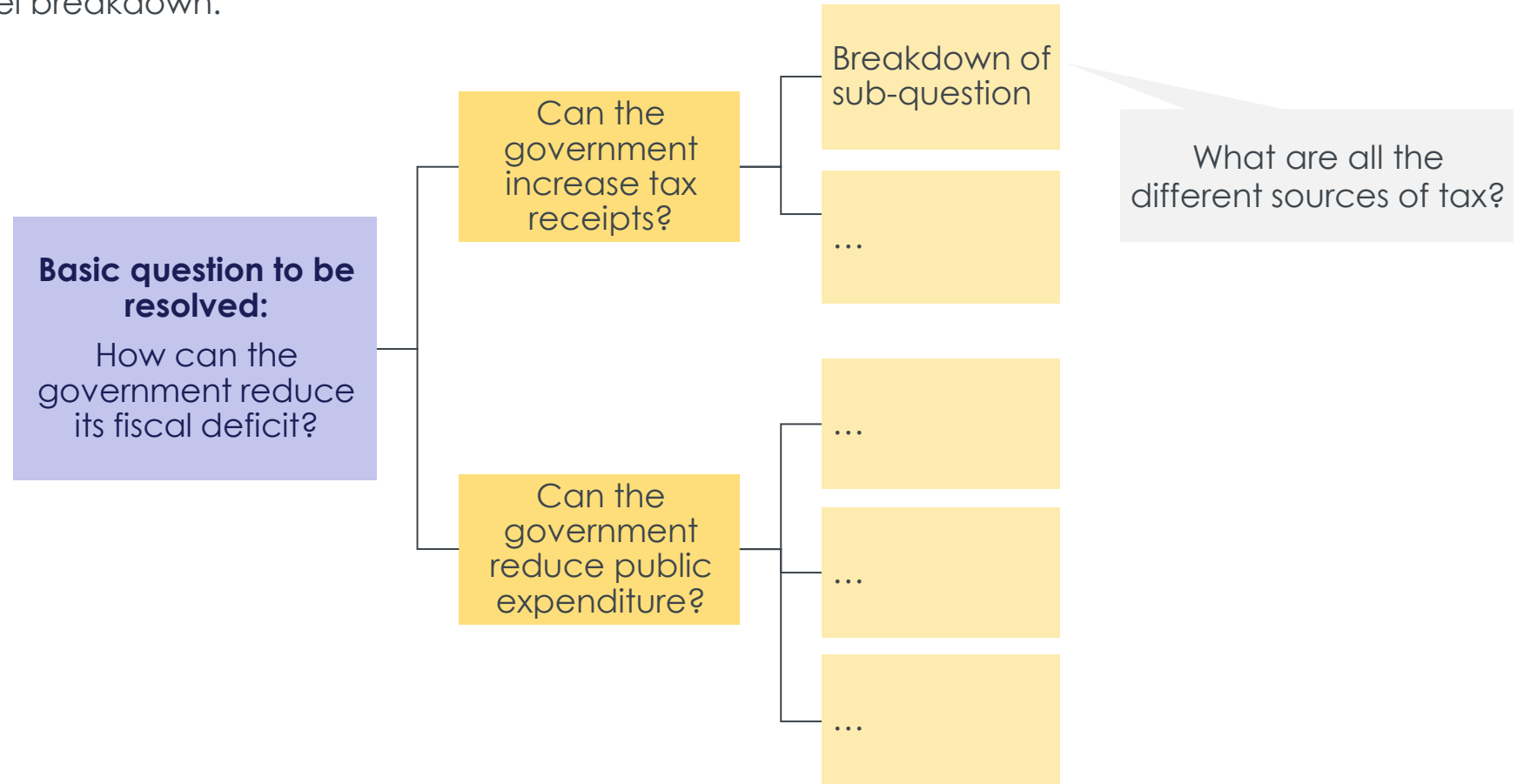
Simple Issue Tree example (3/3)

Stop breaking down when your sub-issues are sufficient to drive independent workstreams.

Basic question to be resolved:

How can the government reduce its fiscal deficit?

Can the government increase tax receipts?

Can the government increase income tax receipts?

Can the government increase VAT receipts?

Can the government increase other tax receipts?

This could form the basis of an income tax workstream

Can the government reduce public expenditure?

…

…

A weak Issue Tree

DISCUSSION

- What is weak or ineffective about this Tree?
- Is it 'MECE' (Mutually Exclusive and Collectively Exhaustive)?

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

- Can we provide more resources?

- Would increasing the number of teachers help?
  - Could we increase the number of teachers in training in the UK?
  - How could we improve retention?

- Could teaching materials be improved?

Source: illustrative team analysis
DfE = Department of Education

A weak Issue Tree

DISCUSSION

- What is weak or ineffective about this Tree?
- Is it 'MECE' (Mutually Exclusive and Collectively Exhaustive)?

Not **M**utually **E**xclusive – more resources and more teachers overlap!

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

Can we provide more resources?

Would increasing the number of teachers help?

Could we increase the number of teachers in training in the UK?

How could we improve retention?

Could teaching materials be improved?

Not **C**ollectively **E**xhaustive – there are a range of other factors that could help to improve grades!

The PSC

An improved Issue Tree

DISCUSSION

▪ Is this tree stronger or more effective? If so, why?

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

How can we improve the quality of teaching?

- Can we increase the teacher to student ratio?
- Can we provide better resources to improve teaching methods?
- Can the learning environment for students be improved?

Can we increase the time students spend studying?

- Can we improve productivity of teaching time?
- Can we extend term times?

An improved Issue Tree

DISCUSSION

- Is this tree stronger or more effective? If so, why?

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

How can we improve the quality of teaching?

Can we increase the teacher to student ratio?

Can we provide better resources to improve teaching methods?

Can the learning environment for students be improved?

Not **C**ollectively **E**xhaustive – what more could you do to improve quality?

Not **M**utually **E**xclusive – productivity is not independent of quality of teaching!

Can we increase the time students spend studying?

Can we improve productivity of teaching time?

Can we extend term times?

A further improved Issue Tree

DISCUSSION

- How is this example stronger or more effective?
- How else could it be improved?
- Are the yellow boxes MECE?

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

How can we improve the quality of teaching?

Can we improve the quality of the teachers?

Would more training for teachers help improve grades?

Can we increase the teacher to student ratio?

Can we provide better resources to improve teaching methods?

Can the curriculum be improved?

Can the learning environment for students be improved?

Can we increase the time students spend studying?

Can we fund after-school clubs and summer schools?

Can we fund supervised revision and studying sessions?

Can we extend term times?

A further improved Issue Tree

DISCUSSION

- How is this example stronger or more effective?
- How else could it be improved?
- Are the yellow boxes MECE?

How could DfE help to improve the GCSE grades obtained by students across the UK by 2030?

How can we improve the quality of teaching?

Mutually **E**xclusive: quality of teaching is distinct from the time students spend studying

Can we increase the time students spend studying?

Can we improve the quality of the teachers?

Can we provide better resources to improve teaching methods?

Can the curriculum be improved?

Can the learning environment for students be improved?

Would more training for teachers help improve grades?

Can we increase the teacher to student ratio?

Collectively **E**xhaustive: teacher's ability, teaching methods, curriculum and learning environment add up to quality overall

Can we fund after-school clubs and summer schools?

Can we fund supervised revision and studying sessions?

Can we extend term times?

Issue Trees can be used for many different questions, including exploring a complex policy issue…

POLICY ISSUE TREE

What can the UK do to slow climate change?

- What can the UK do to set and deliver **domestic emissions reduction** targets?
  - What can the UK do to reduce CO2 and other emissions from **energy use**?
    - What can the UK do to improve carbon efficiency of energy production?
    - What can the UK do to increase energy consumption efficiency?
    - What can the UK do to reduce or constrain energy demand?
  - What can the UK do to reduce CO2 emissions from **land use change**?
    - What can the UK do to reduce deforestation?
    - What can the UK do to increase forestation?
  - What can the UK do to reduce methane and NO2 emissions from **agriculture**?
    - What can the UK do to decrease NO2 emissions from agricultural soils and other sources?
    - What can the UK do to decrease methane emissions from livestock and manure?
  - What can the UK do to reduce CO2 emissions from **waste** (landfill, waste water, other waste?
    - What can the UK do to reduce CO2 emissions from landfill and other waste?
    - What can the UK do to reduce CO2 emissions from waste water?
- What can the UK do to **set standards for products and equipment** used in the UK and exported internationally?
  - ?
- What can the UK do to put **pressure on other countries** to reduce emissions through diplomatic and trade channels?
  - ?
- What can the UK do to **develop new technologies and approaches** to reduce emissions and deliver negative emissions?
  - ?

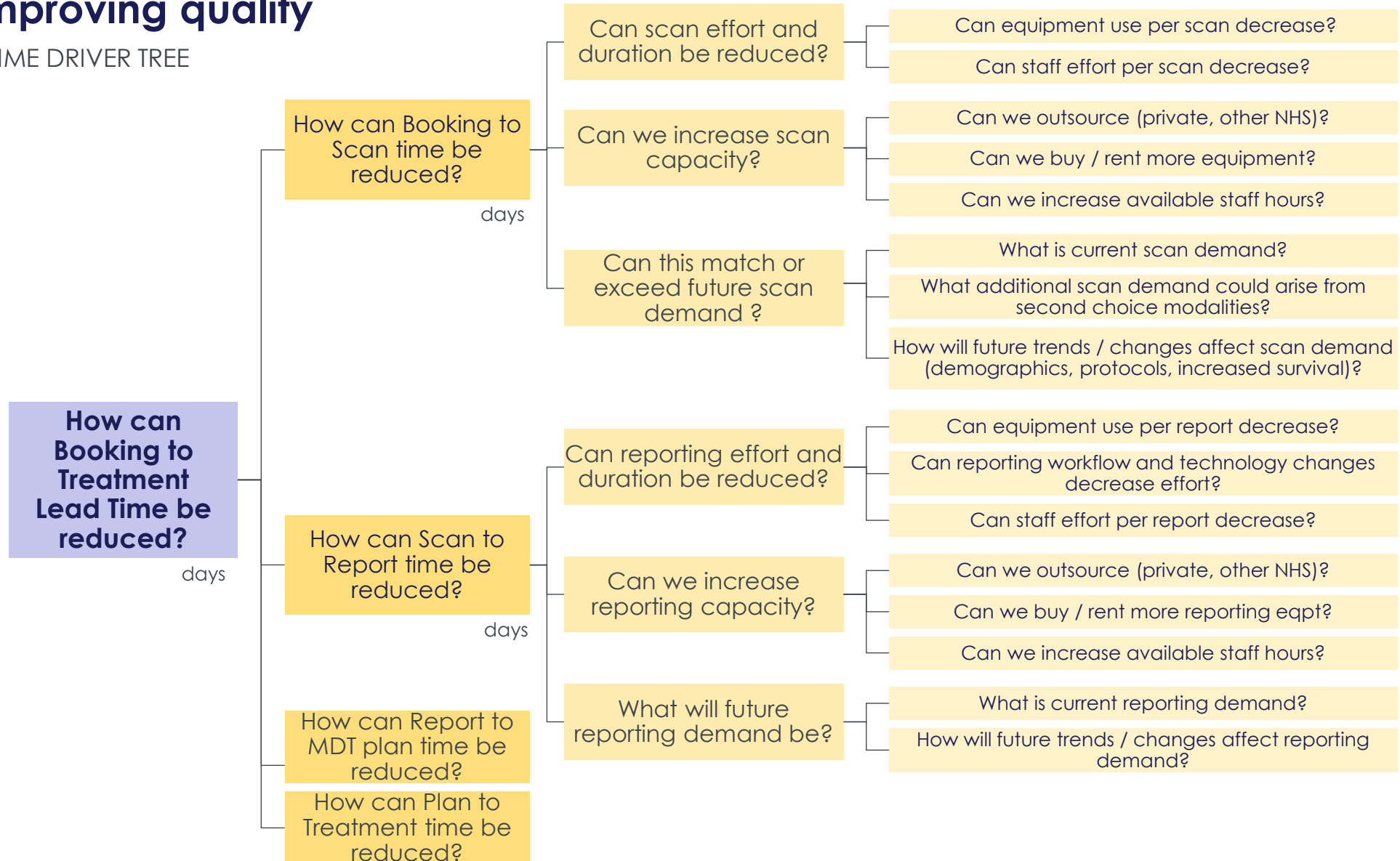# …or exploring process improvement drivers for reducing waiting time or cost, or improving quality

RADIOLOGY LEAD TIME DRIVER TREE

How can Booking to Treatment Lead Time be reduced?
days

How can Booking to Scan time be reduced?
days

Can scan effort and duration be reduced?
- Can equipment use per scan decrease?
- Can staff effort per scan decrease?

Can we increase scan capacity?
- Can we outsource (private, other NHS)?
- Can we buy / rent more equipment?
- Can we increase available staff hours?

Can this match or exceed future scan demand ?
- What is current scan demand?
- What additional scan demand could arise from second choice modalities?
- How will future trends / changes affect scan demand (demographics, protocols, increased survival)?

How can Scan to Report time be reduced?
days

Can reporting effort and duration be reduced?
- Can equipment use per report decrease?
- Can reporting workflow and technology changes decrease effort?
- Can staff effort per report decrease?

Can we increase reporting capacity?
- Can we outsource (private, other NHS)?
- Can we buy / rent more reporting eqpt?
- Can we increase available staff hours?

What will future reporting demand be?
- What is current reporting demand?
- How will future trends / changes affect reporting demand?

How can Report to MDT plan time be reduced?

How can Plan to Treatment time be reduced?

A few things to keep in mind when using Issue Trees to structure your work

ISSUE TREES KEY POINTS

1. Get to **individual tasks or workstreams** – experiments, qualitative and/or quantitative analysis, or research

2. Check for **independent and complete** sections (MECE)

3. Keep **iterating**

4. Use existing **frameworks** where possible

5. Or try grouping structurally, time-based or in categories

6. Breakdown the **content of the question**, don't put project management or PDS questions here

7. There's **no right answer**

Reference: How to use Issue Trees and the PPT template
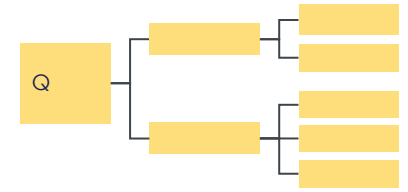
What is this tool?
An Issue Tree breaks the question down (from the PDS) into manageable chunks. This creates clear, separate workstreams and gives you confidence that you've looked at the full extent of the problem.

When to use this tool?
Keep iterating the Tree throughout the project as you develop the answer. The first draft will help unlock the key questions and lead to hypotheses, which in turn will allow the next iteration of the Issue Tree to get to the heart of the problem. There is no single right answer – although it is important for the Tree to be MECE, it does not need to be perfect and there are multiple 'right answers'. They can also be useful within a project to set up a specific analysis, think through challenges for the first time, or decide priority areas for action.

Tips for developing and using Issue Trees

- You've reached the **right level of disaggregation** when the questions are specific enough to assign resources to them as tasks or workstreams – typically experiments, qualitative and / or quantitative analysis, or research. If you have more than ~4 levels of the Tree, consider if you've gone into too much detail. Remember, the Tree doesn't have to be perfect – just good enough to lead to a workplan.
- Use **existing frameworks** where appropriate: financial profit = revenue minus costs; similarly for process improvement quality, cost and lead time or options appraisal cost / benefit. And where appropriate, an Issue Tree should work mathematically. This helps ensure MECE-ness.
- Aim to **capture existing preconceptions / myths** so they can be discussed.
- **Issue Trees are useful in making your case to stakeholders** – not to present to them, but to demonstrate thinking.

**Mentoring questions for working with Issue Trees**

- Are the questions at each level (a vertical cut) **independent and complete**, aka MECE (Mutually Exclusive and Collectively Exhaustive)? This avoids workstreams becoming tangled or important analyses being missed.
- If you're stuck, think about a **natural way of grouping the topic** – is it structural (divide a whole into parts), time based (sequence or cause and effect), or are there categories (can you group like things).
- If you have **many different ways of grouping the topic**, think about which sequence of grouping helps you to create independent (Mutually Exclusive) workstreams – structural then framework, or framework then structural?
- Focus on **content, not process** – "What data is available?" and "How should we evaluate options?" are not valid questions for solving the problem. Nor are project management questions like "Who are my stakeholders?". Whereas "By how much can productivity be improved?" is a content question.

PowerPoint Instructions

- This Issue Tree is created using PPT's 'SmartArt' illustration feature, using a 'horizontal hierarchy' layout to create a horizontal tree.
- Either copy across the Tree object to your own presentation, or insert the same SmartArt type directly. When you click on the Tree, a text box will appear to the left where you can easily edit text and use TAB and ENTER to create new lines (boxes) and indent them to the level you want.
- Two 'SmartArt tools' tabs will also appear in the ribbon when you click on the Tree so you can format and design the Tree as you wish.
- You can also double 'ungroup' to convert to normal shapes.

Issue Tree template

Click the Smart Art to open the Text Pane in bullet-point view and add / indent elements (you may need to click the arrow control on the left side of the graphic to open the Text Pane).
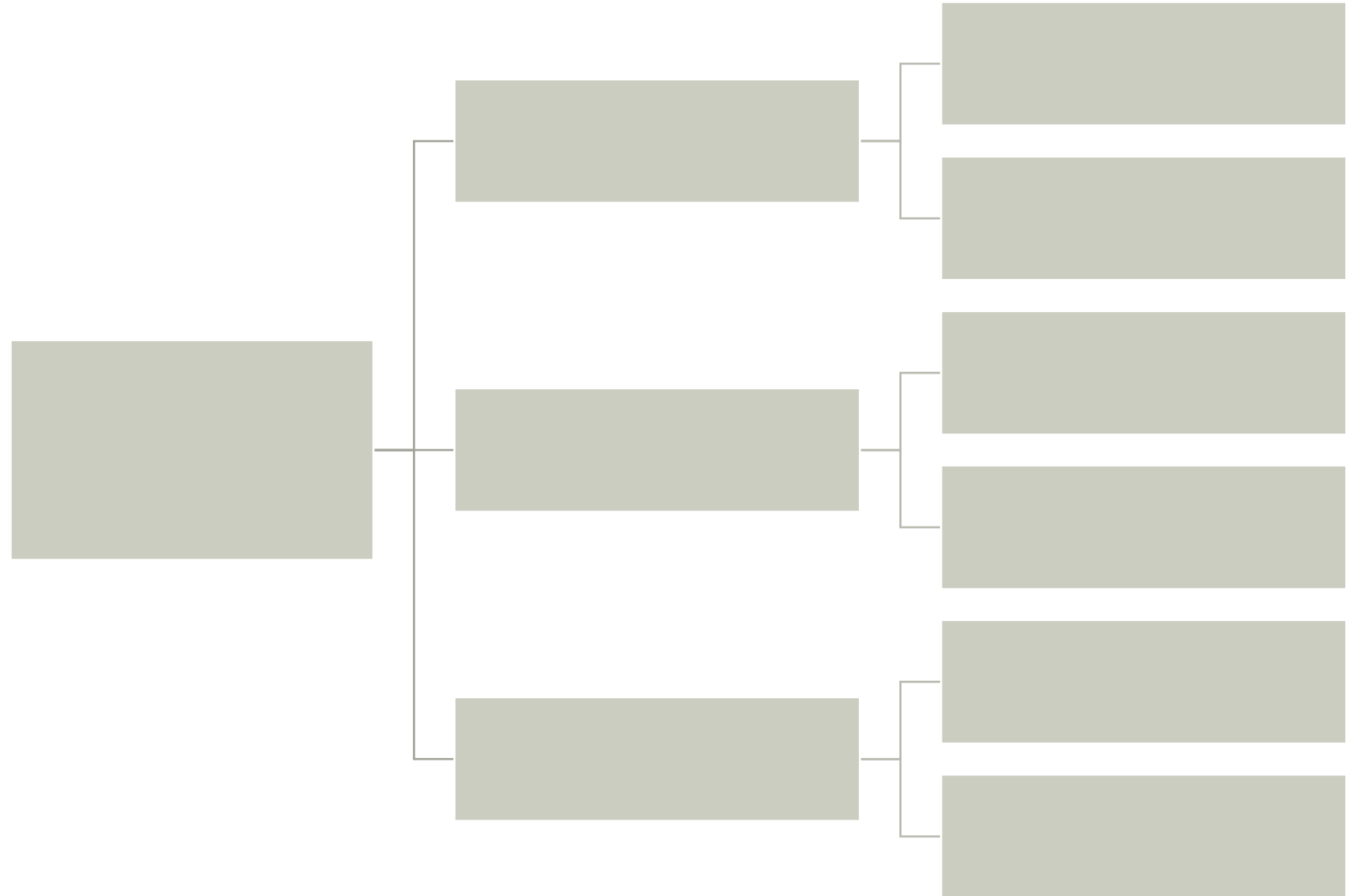
Issue Tree exercise

ACTIVITY

In pairs or small groups, spend 20 minutes preparing an Issue Tree based on your own project.

1. **Use your PDS to guide you.**

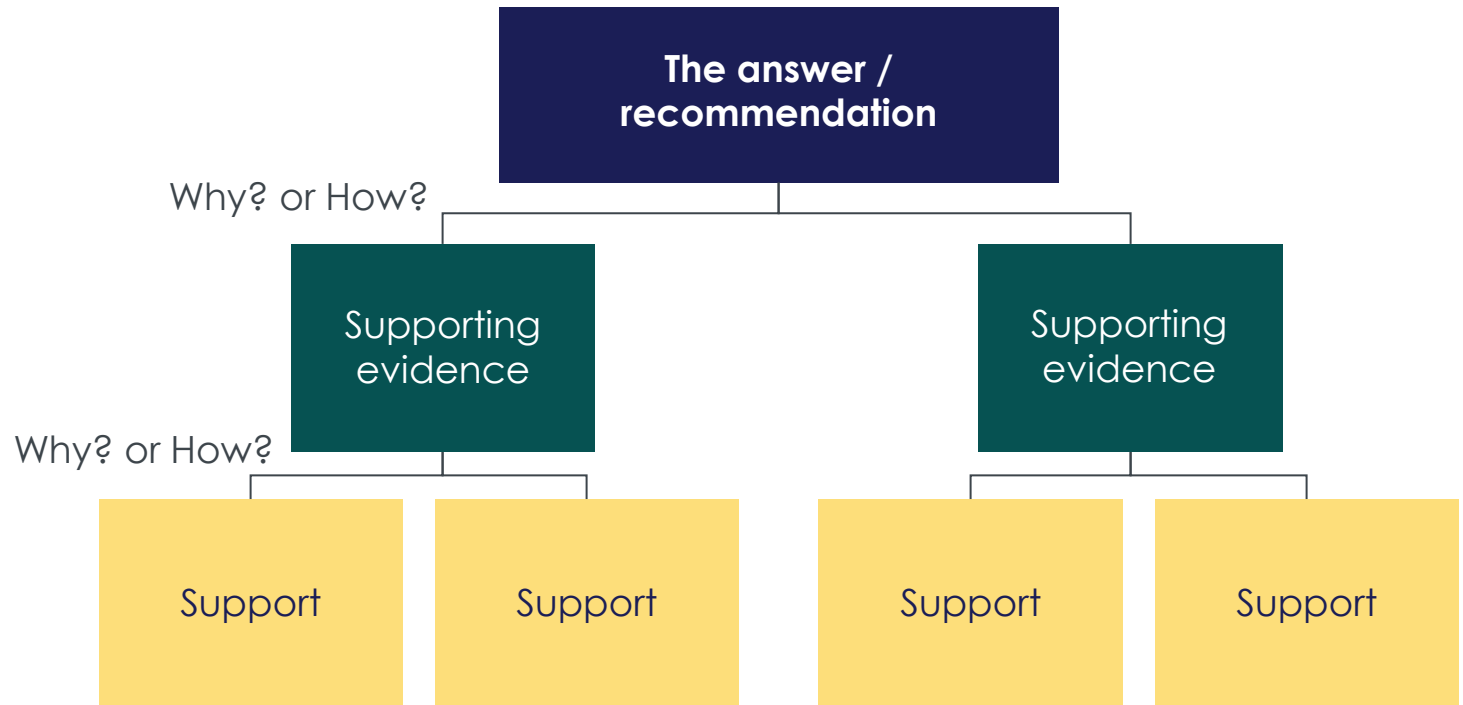2. **Work to 'good enough' initially and then refine** – it doesn't have to be perfect first time.

We will wrap up with sharing for 5 minutes as a whole group.

Developing Insight: Hypothesis Trees

Hypothesis Trees help us order our thinking by proposing a likely answer to our PDS question and laying out the supporting evidence

- They can be used to **organise your thoughts** and highlight where the gaps in your logic are to:

  – clarify thinking

  – debunk myths

  – synthesise recommendations

- This **avoids jumping to the solution**, and makes clear how the work ties together (and if it doesn't, may identify lower priority or unnecessary work)

- BUT… it's vital not to be 'wedded to your solution' and **iterate** whenever the facts don't support the current working hypothesis.

```
                    The answer /
                    recommendation
   Why? or How?
              Supporting              Supporting
              evidence                evidence
   Why? or How?
         Support   Support      Support    Support
```

We develop a Hypothesis Tree by asking "Why do we believe this?" at each level until it's self-evident or it is a statement you can test

What is your best guess answer to the key question at this time?

Answer or recommendation

What is your recommendation?

We develop a Hypothesis Tree by asking "Why do we believe this?" at each level until it's self-evident or it is a statement you can test

DEVELOPING A HYPOTHESIS TREE

Answer or recommendation

Supporting evidence

Supporting evidence

What do you **need to be true** in order to believe your hypothesis? Why? Or How?

In conjunction with your other branch, **what else needs to be true to prove your hypothesis** (or what would disprove it)?

Your supporting evidence must be **sufficiently convincing** that the hypothesis is true

We develop a Hypothesis Tree by asking "Why do we believe this?" at each level until it's self-evident or it is a statement you can test
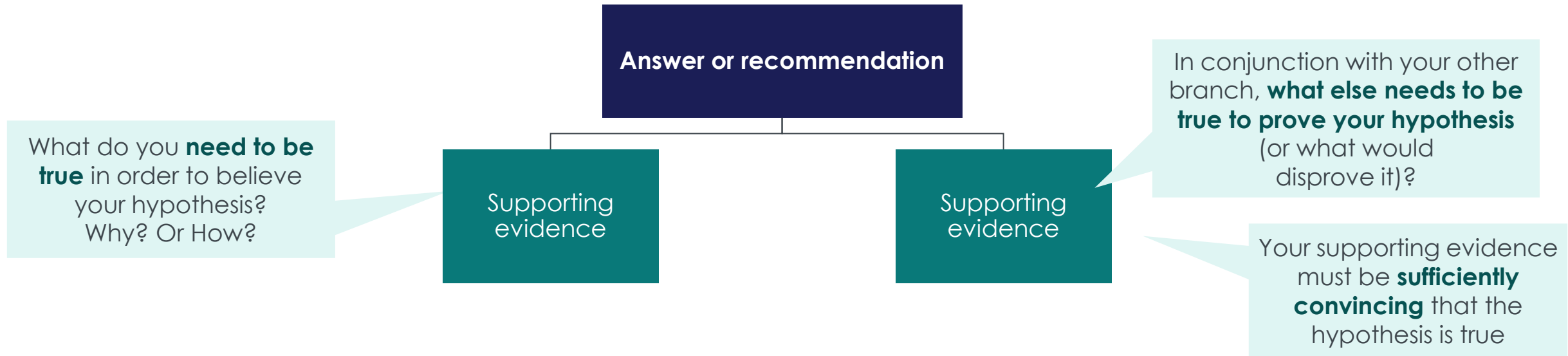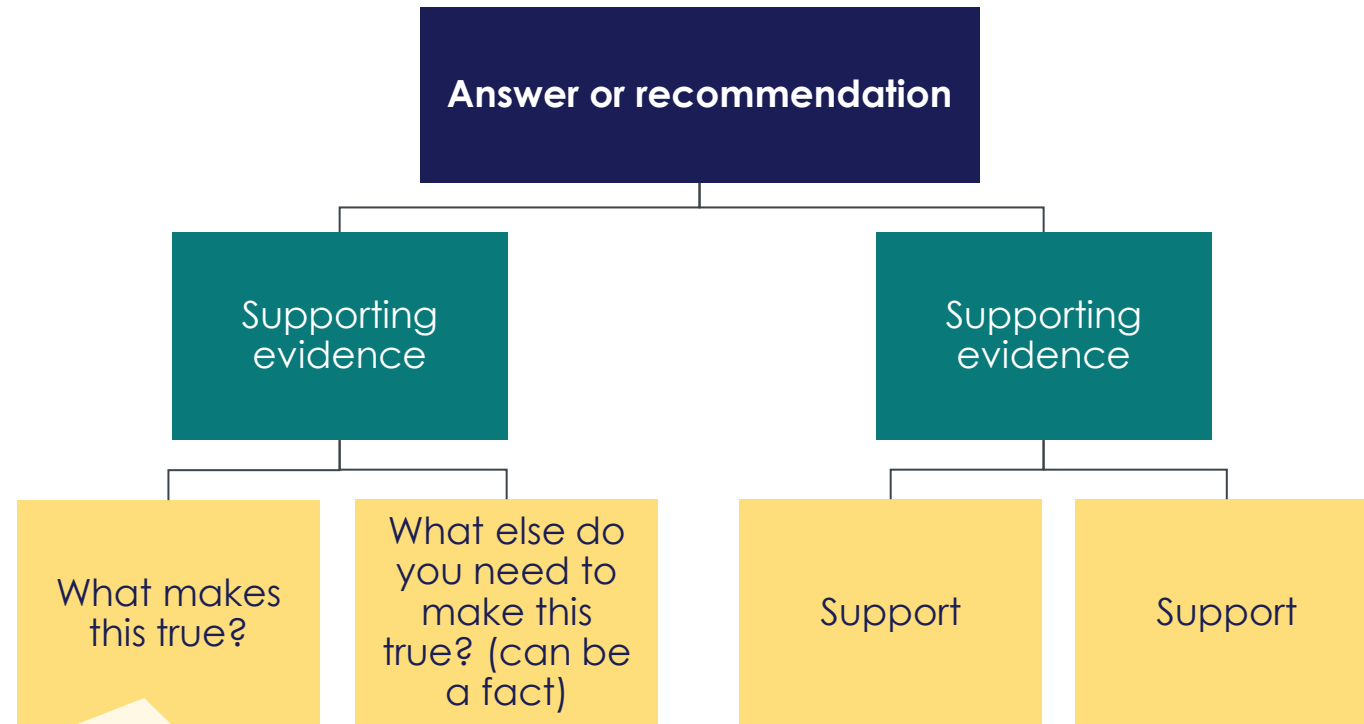
Answer or recommendation

Supporting evidence

Supporting evidence

What makes this true?

What else do you need to make this true? (can be a fact)

Support

Support

You know you've reached your lowest level when you are either **stating facts** that are self-evident, not opinion / drawn conclusions, or points which you are **planning to test** through your work

- Ideas at **any level** in the pyramid must always be a **'summary' hypothesis** based on the ideas grouped below
- Ideas in each grouping must always be the **same kind of idea**
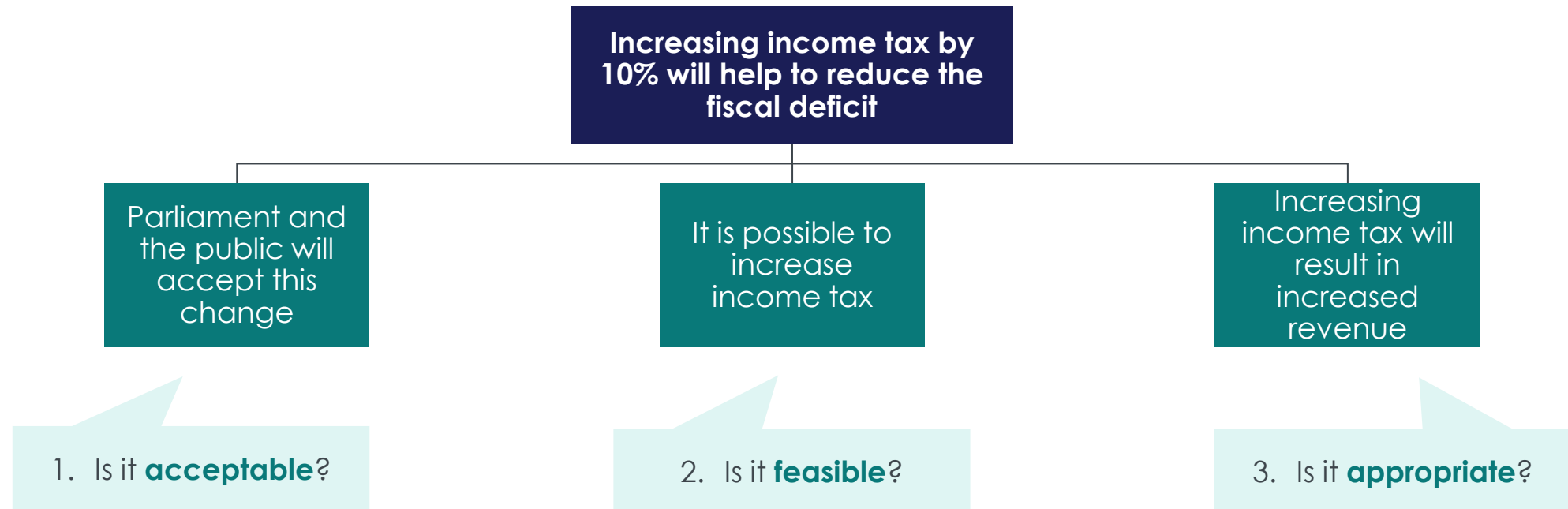- Ideas in each grouping must always be **logically ordered**

Illustrative example: Reducing fiscal deficit

DEVELOPING A HYPOTHESIS TREE – ILLUSTRATIVE EXAMPLE

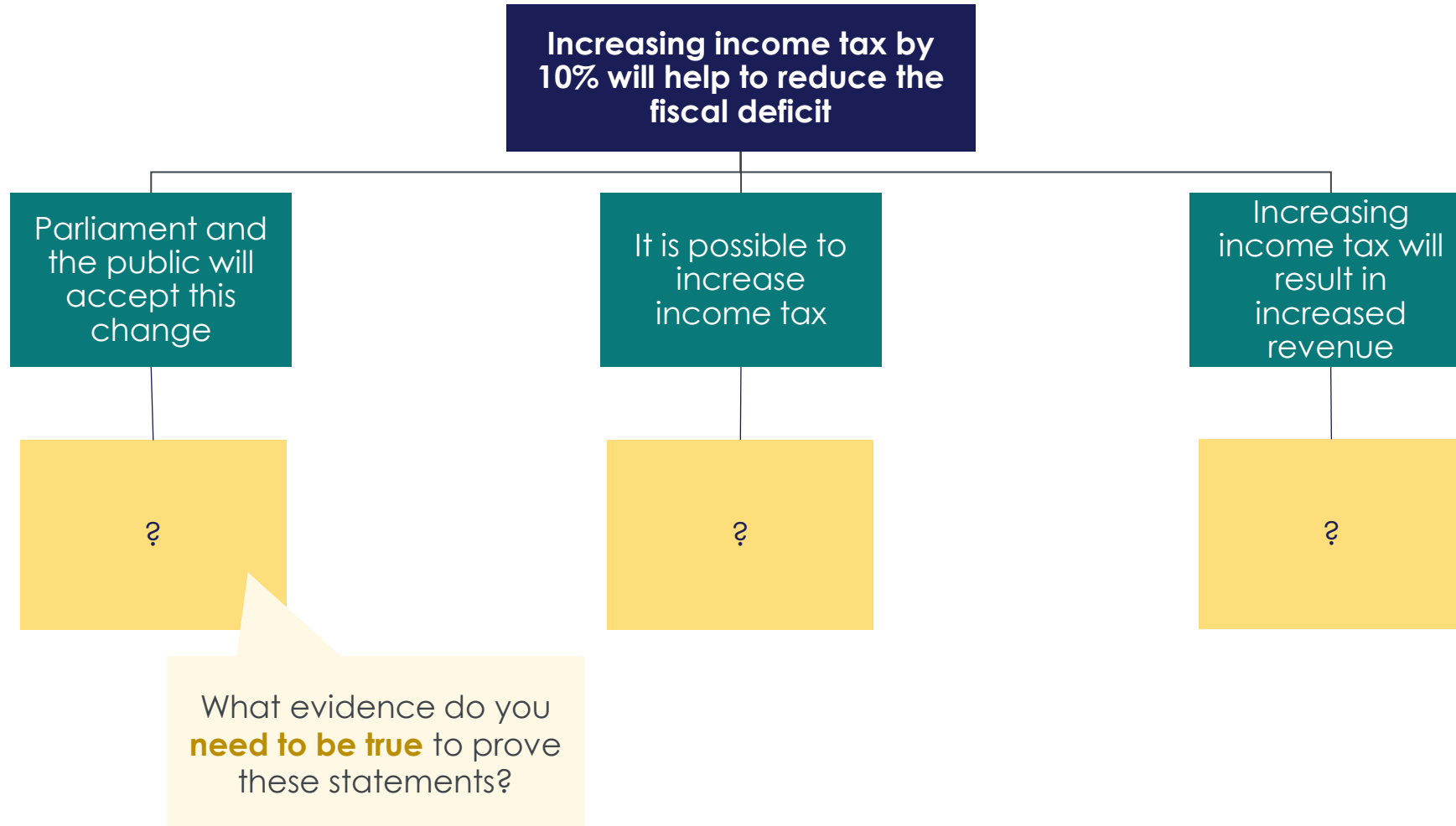**Increasing income tax by 10% will help to reduce the fiscal deficit**

A helpful framework to use for your first level is:
1. Is it **acceptable**?
2. Is it **feasible**?
3. Is it **appropriate**?

What <u>needs</u> to be true?

What <u>needs</u> to be true?

Illustrative example: Reducing fiscal deficit

DEVELOPING A HYPOTHESIS TREE – ILLUSTRATIVE EXAMPLE

Increasing income tax by 10% will help to reduce the fiscal deficit

Parliament and the public will accept this change

It is possible to increase income tax

Increasing income tax will result in increased revenue

1. Is it **acceptable**?

2. Is it **feasible**?

3. Is it **appropriate**?

Illustrative example: Reducing fiscal deficit

DEVELOPING A HYPOTHESIS TREE – ILLUSTRATIVE EXAMPLE

Increasing income tax by 10% will help to reduce the fiscal deficit

Parliament and the public will accept this change

It is possible to increase income tax

Increasing income tax will result in increased revenue

?

?

?

What evidence do you **need to be true** to prove these statements?

Illustrative example: Reducing fiscal deficit
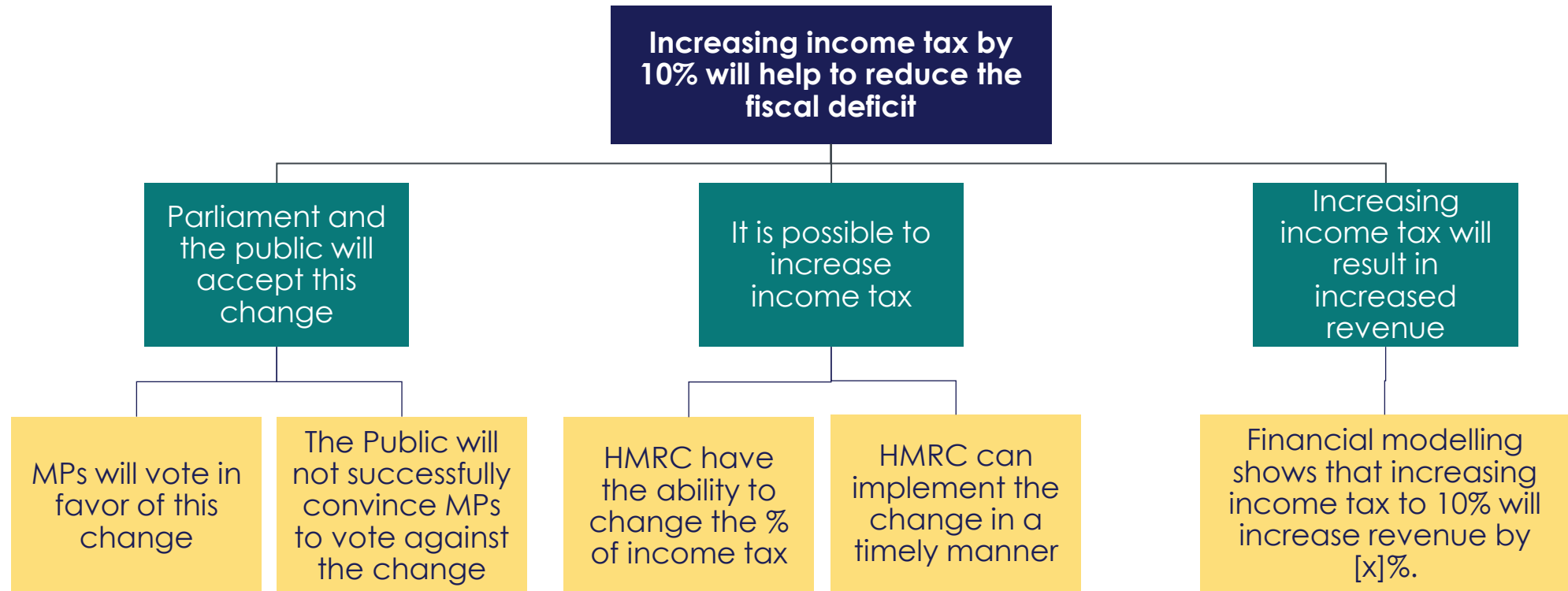
DEVELOPING A HYPOTHESIS TREE – ILLUSTRATIVE EXAMPLE

Increasing income tax by 10% will help to reduce the fiscal deficit

Parliament and the public will accept this change

It is possible to increase income tax

Increasing income tax will result in increased revenue

MPs will vote in favor of this change

The Public will not successfully convince MPs to vote against the change

HMRC have the ability to change the % of income tax

HMRC can implement the change in a timely manner

Financial modelling shows that increasing income tax to 10% will increase revenue by [x]%.
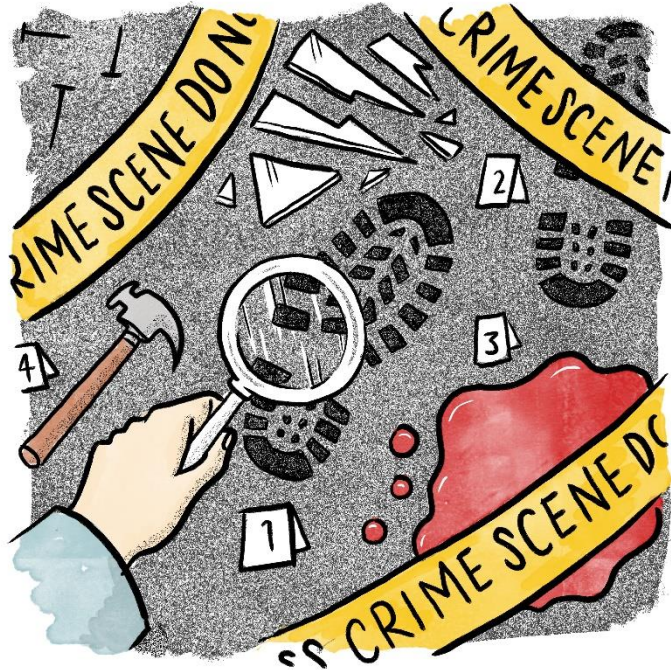
You would now need to answer: **Are these statements true?**
You would now go away and complete the required analysis to either prove or disprove the statements

The PSC

57

Hypothesis testing is common in many professions – we will look at two examples
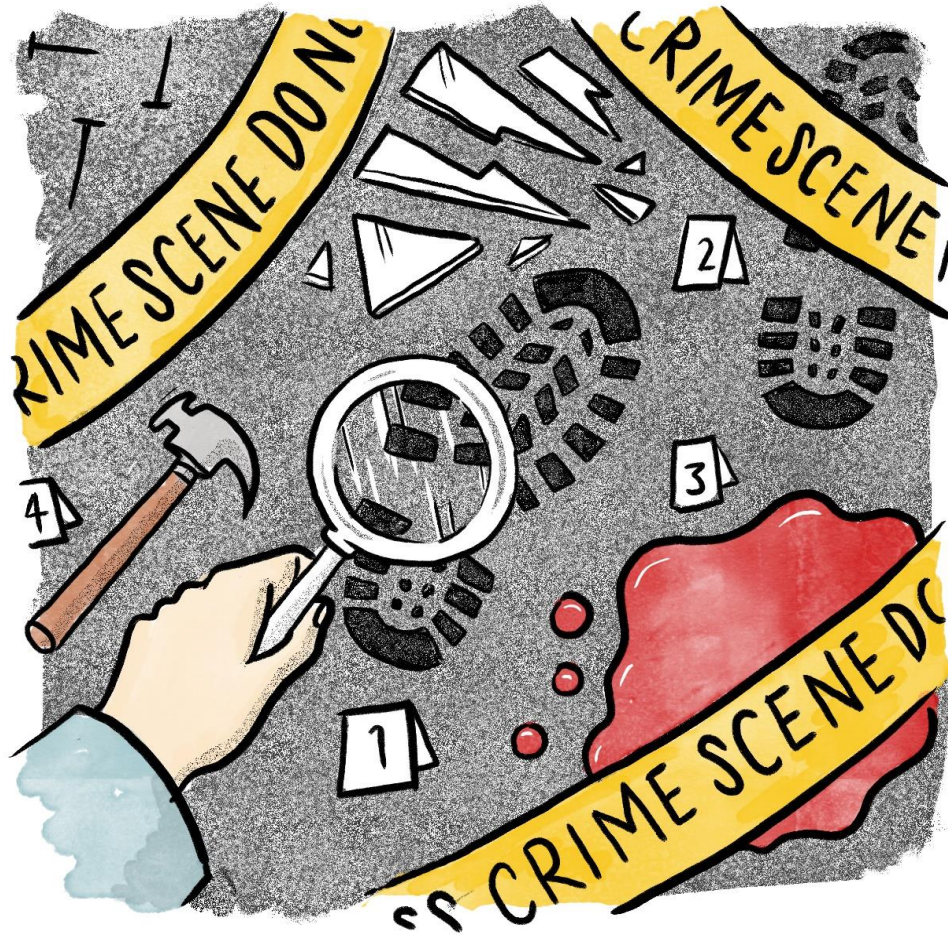
Hypothesis testing in criminal justice

Hypothesis testing and medical diagnosis

How do criminal investigators use exhaustive versus hypothesis-based processes?

When investigating a crime, what steps do investigators take that are **exhaustive**, for example, not hypothesis-based)?

What steps do investigators take that are **hypothesis-based**?

Once hypotheses are formed, **how are these tested** in the criminal justice system?

How do GPs diagnose their patient's illness?

Dr Ian Watson

Been coughing for 3 weeks? Tell your doctor.

A 50-year-old man sees this advert (left) and visits his GP, stating that he has a cough that he has had for more than 3 weeks, and that he is worried that it is not getting better
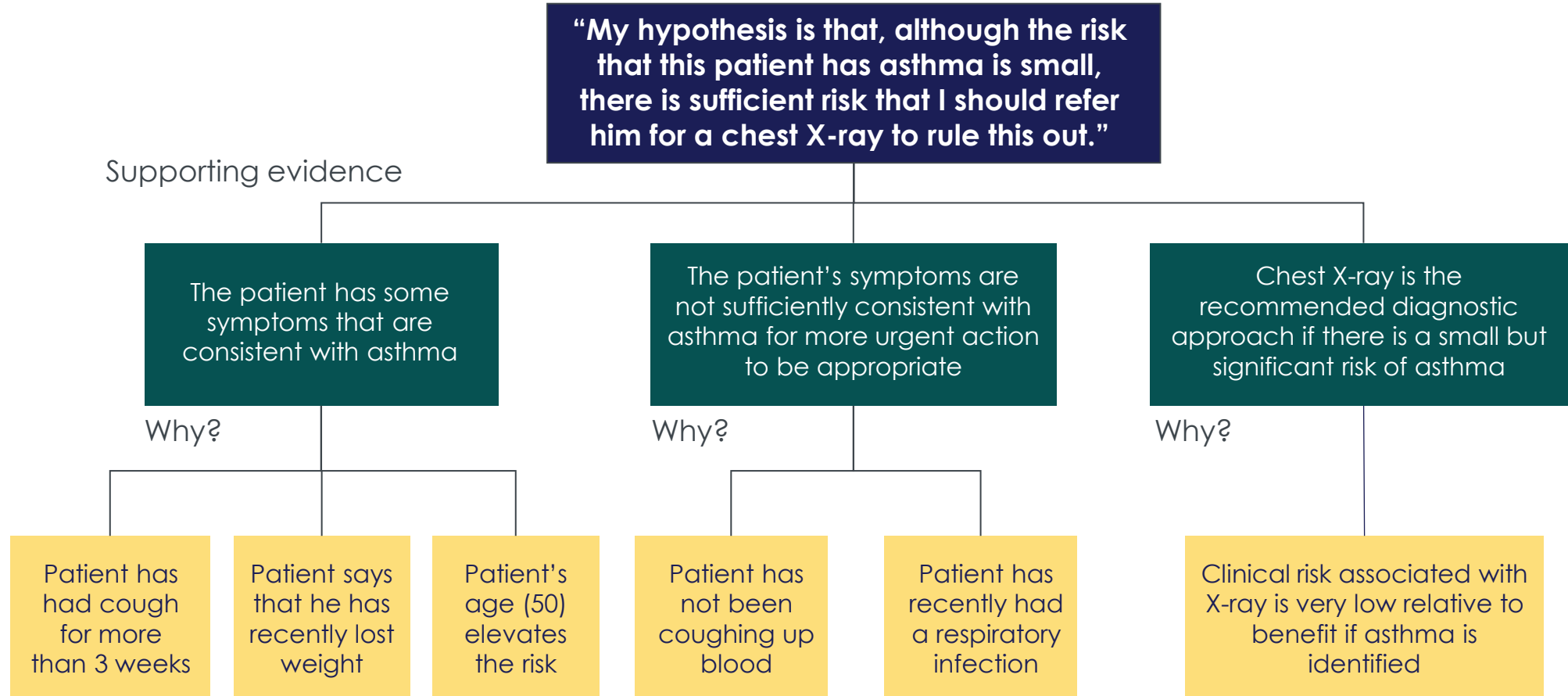
How might the GP **diagnose the cause** of the problem?

What hypotheses might the GP test, and how might they **test these**?

The GP can use a Hypothesis Tree to rule out an unlikely (but serious) diagnosis

"My hypothesis is that, although the risk that this patient has asthma is small, there is sufficient risk that I should refer him for a chest X-ray to rule this out."

Supporting evidence

| The patient has some symptoms that are consistent with asthma | The patient's symptoms are not sufficiently consistent with asthma for more urgent action to be appropriate | Chest X-ray is the recommended diagnostic approach if there is a small but significant risk of asthma |

Why? | Why? | Why?

| Patient has had cough for more than 3 weeks | Patient says that he has recently lost weight | Patient's age (50) elevates the risk | Patient has not been coughing up blood | Patient has recently had a respiratory infection | Clinical risk associated with X-ray is very low relative to benefit if asthma is identified |

Review: Hypothesis testing is common in many professions

HYPOTHESIS TESTING EXAMPLES
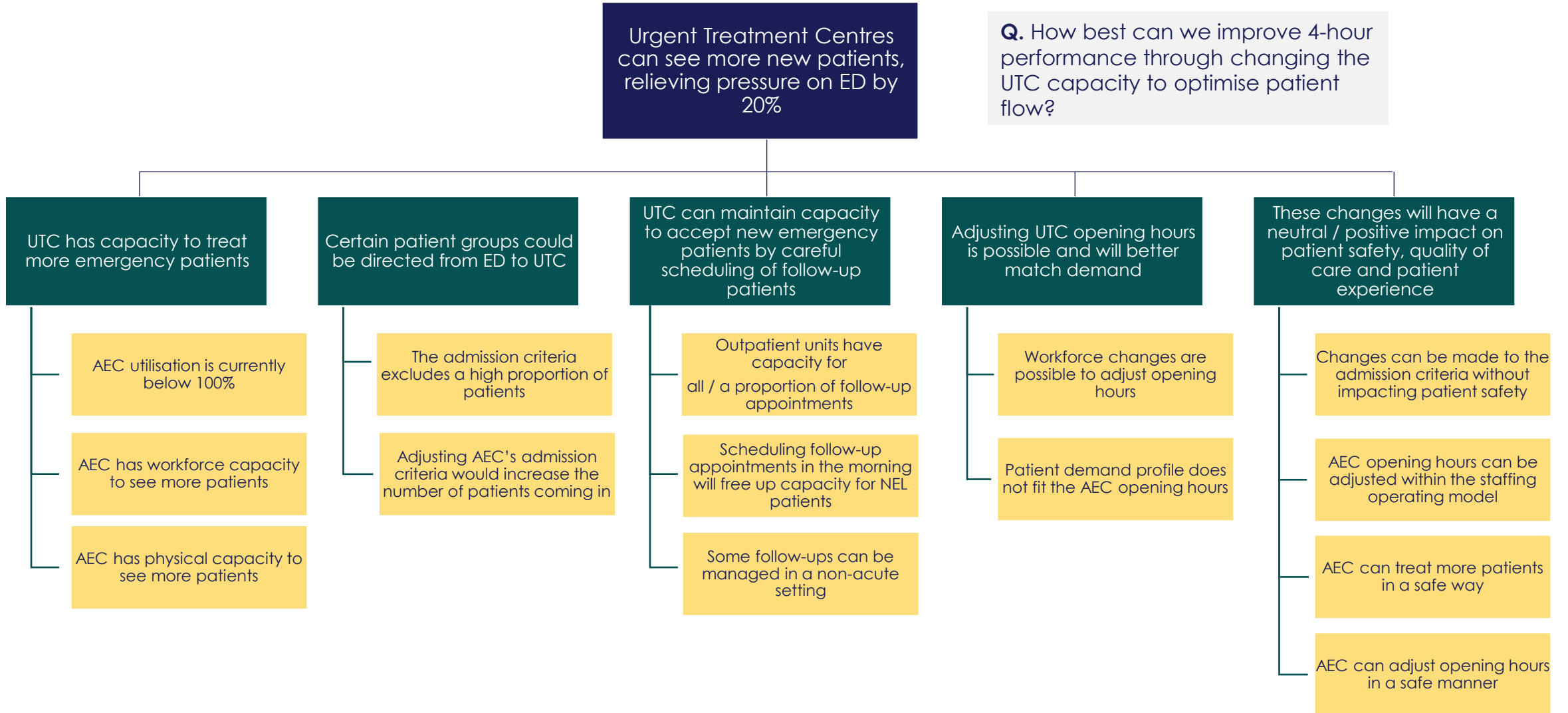
Hypothesis testing in criminal justice
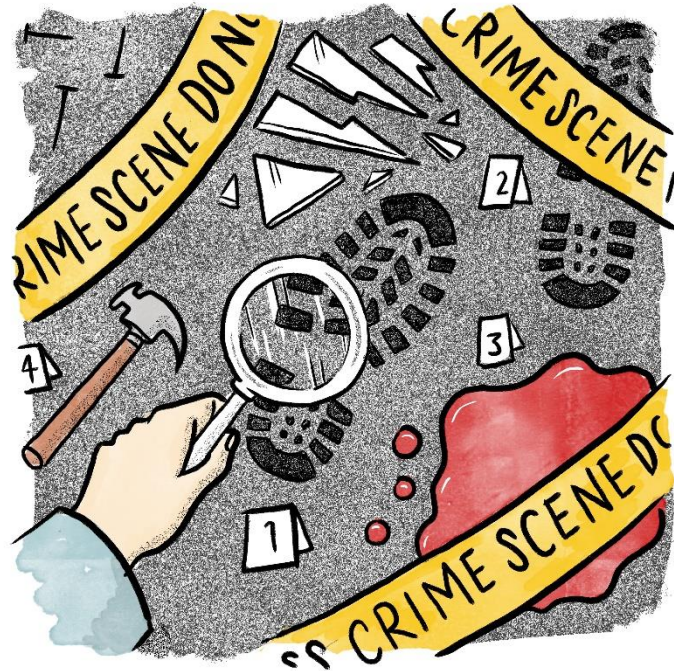
Hypothesis testing and medical diagnosis

Hypothesis Trees can structure and support answers to strategic and policy questions

SAME DAY EMERGENCY CARE CAPACITY

Urgent Treatment Centres can see more new patients, relieving pressure on ED by 20%

Q. How best can we improve 4-hour performance through changing the UTC capacity to optimise patient flow?

UTC has capacity to treat more emergency patients

- AEC utilisation is currently below 100%
- AEC has workforce capacity to see more patients
- AEC has physical capacity to see more patients

Certain patient groups could be directed from ED to UTC

- The admission criteria excludes a high proportion of patients
- Adjusting AEC's admission criteria would increase the number of patients coming in

UTC can maintain capacity to accept new emergency patients by careful scheduling of follow-up patients

- Outpatient units have capacity for all / a proportion of follow-up appointments
- Scheduling follow-up appointments in the morning will free up capacity for NEL patients
- Some follow-ups can be managed in a non-acute setting

Adjusting UTC opening hours is possible and will better match demand

- Workforce changes are possible to adjust opening hours
- Patient demand profile does not fit the AEC opening hours

These changes will have a neutral / positive impact on patient safety, quality of care and patient experience

- Changes can be made to the admission criteria without impacting patient safety
- AEC opening hours can be adjusted within the staffing operating model
- AEC can treat more patients in a safe way
- AEC can adjust opening hours in a safe manner

The PSC

Acronyms: ED – Emergency Department; **AEC** – Ambulatory Emergency Care; **UTC** – Urgent Treatment Centre; **NEL** – Non-Elective

© The PSC / Circulation Limited – Client for The PSC course participant use only

63

Hypothesis Trees are used throughout the problem-solving cycle and they become more certain as more analysis is completed

HYPOTHESIS TREES THROUGHOUT THE PROBLEM-SOLVING CYCLE

Early planning and setup	During problem-solving	Final recommendations
Purpose:		
▪ Guide analysis more efficiently than randomly seeking data	▪ Disprove some hypotheses and develop new ideas to test	▪ Synthesise your findings and communicate to stakeholders
Usage:		
▪ Structure your project workstreams, by understanding what an answer might look like ▪ Make sure the project analyses test the supporting arguments	▪ Communicate why previous ideas have been disproved ▪ Scope additional analyses needed to test new ideas	▪ Bring together your findings into a structure recommendation based on robust analysis
Evolution:		
▪ Trees do NOT have to be correct at this stage – they are only designed to give you an efficient way to analyse information ▪ Being able to disprove a hypothesis and move on is a success	▪ Your tree is becoming more confirmed at this stage	▪ Your tree is now confirmed and is designed to make your supporting evidence transparent

Whilst the concept of a Hypothesis Tree is a pyramid structure for communicating with others, they can be simple dot-dash lists, visual-lists or fully visual diagrams with varying levels of detail
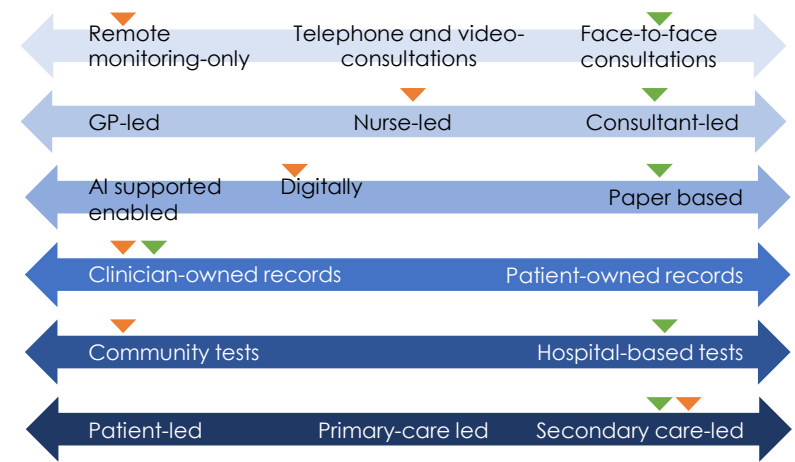
My hypothesis is that, although the risk that this patient has asthma is small, there is sufficient risk that I should refer him for a chest X-ray to rule this out.

- The patient has some symptoms that are consistent with asthma
  - Patient has had cough for more than 3 weeks
  - Patient says that he has recently lost weight
  - Patient's age (50) elevates the risk
- The patient's symptoms are not sufficiently consistent with asthma for more urgent action to be appropriate
  - Patient has not been coughing up blood
  - Patient has recently had a respiratory infection
- Chest X-ray is the recommended diagnostic approach if there is a small but significant risk of asthma
  - Clinical risk associated with X-ray is very low relative to benefit if asthma is identified

---

My hypothesis is that, although the risk that this patient has asthma is small, there is sufficient risk that I should refer him for a chest X-ray to rule this out.

The patient has some symptoms that are consistent with asthma	• Patient has had cough for more than 3 weeks • Patient says that he has recently lost weight • Patient's age (50) elevates the risk
The patient's symptoms are not sufficiently consistent with asthma for more urgent action to be appropriate	• Patient has not been coughing up blood • Patient has recently had a respiratory infection
Chest X-ray is the recommended diagnostic approach if there is a small but significant risk of asthma	• Clinical risk associated with X-ray is very low relative to benefit if asthma is identified

Symptoms +ve

Diagnostic approach

Symptoms -ve

Low-risk patient, service design decisions

Remote monitoring-only	Telephone and video-consultations	Face-to-face consultations
GP-led	Nurse-led	Consultant-led
AI supported enabled	Digitally	Paper based
Clinician-owned records		Patient-owned records
Community tests		Hospital-based tests
Patient-led	Primary-care led	Secondary care-led

Chest X-ray is recommended diagnostic approach

Symptoms +ve

Symptoms -ve

Diagnostic approach

Reference: How to use a Hypothesis Tree and the PPT template

What is this tool?

A Hypothesis Tree helps to organise thoughts on 'the answer' and shows the gaps in your logic. It radically reduces the overall work required to develop insight into recommendations or options, as you focus resources on filling the gaps to support or disprove your working hypothesis.

When to use this tool?

It can be used to clarify thinking, debunk myths and synthesise recommendations. The biggest trap you can fall into is leaving the development of insights and hypotheses until the end of the project. Keep iterating the Tree throughout the project. The answers to your first Issue Tree will drive a first set of hypotheses, which will allow you to refine the Issue Tree, break the question down more meaningfully, and build an improved set of hypotheses based on the evidence.

Tips for using Hypothesis Trees

- It's vital not to be 'wedded to your solution' – iterate whenever the facts don't support the current working hypothesis, and if you're part of a team, speak up when you discover that a foundation 'fact' isn't turning out to be true.

- Use existing frameworks where possible. If one doesn't exist, invest the time in developing your own and testing it with others.

- Aim to capture existing preconceptions / myths so they can be discussed. And give stakeholders plenty of time to react to your emerging hypotheses of options and recommendations.

- Check your workstreams feed into your current working hypothesis – as the hypotheses iterates, some work may become higher or lower priority for resource investment.
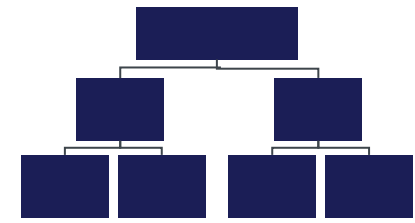
**Mentoring questions for working with Hypothesis Trees**

- Start by stating what you believe (based on the available evidence) to be the best answer(s) or options(s) for the basic question to be resolved. Then add the supporting evidence below. Keep asking "why?" and "how?" until the logic and evidence are rock solid.

- Ensure the answers at each level (a horizontal cut) are independent (Mutually Exclusive). But unlike Issue Trees, they do not need to be complete (Collectively Exhaustive). Only the evidence sufficient to disprove or prove the point is necessary.

- Are there alternative / counter / null hypotheses worth exploring? Are the facts sufficient to give confidence in the answer (not just a collection of confirmatory statements)?

PowerPoint Instructions

- This Hypothesis Tree is created using PowerPoint's 'SmartArt' illustration feature, using an 'Organisation chart' layout to create a vertical tree.

- Either copy across the Tree object to your own presentation, or insert the same SmartArt type directly.

- When you click on the Tree, a text box will appear to the left where you can easily edit text and use TAB and ENTER to create new lines (boxes) and indent them to the level you want.

- Also, when you click on the Tree, the two 'SmartArt Tools' tabs will appear in the ribbon so you can format and design the Tree as you wish.

- You can also double 'ungroup' to convert to normal shapes.

Hypothesis Tree template

Click the Smart Art to open the Text Pane in bullet-point view and add / indent elements (you may need to click the arrow control on the left side of the graphic to open the Text Pane).
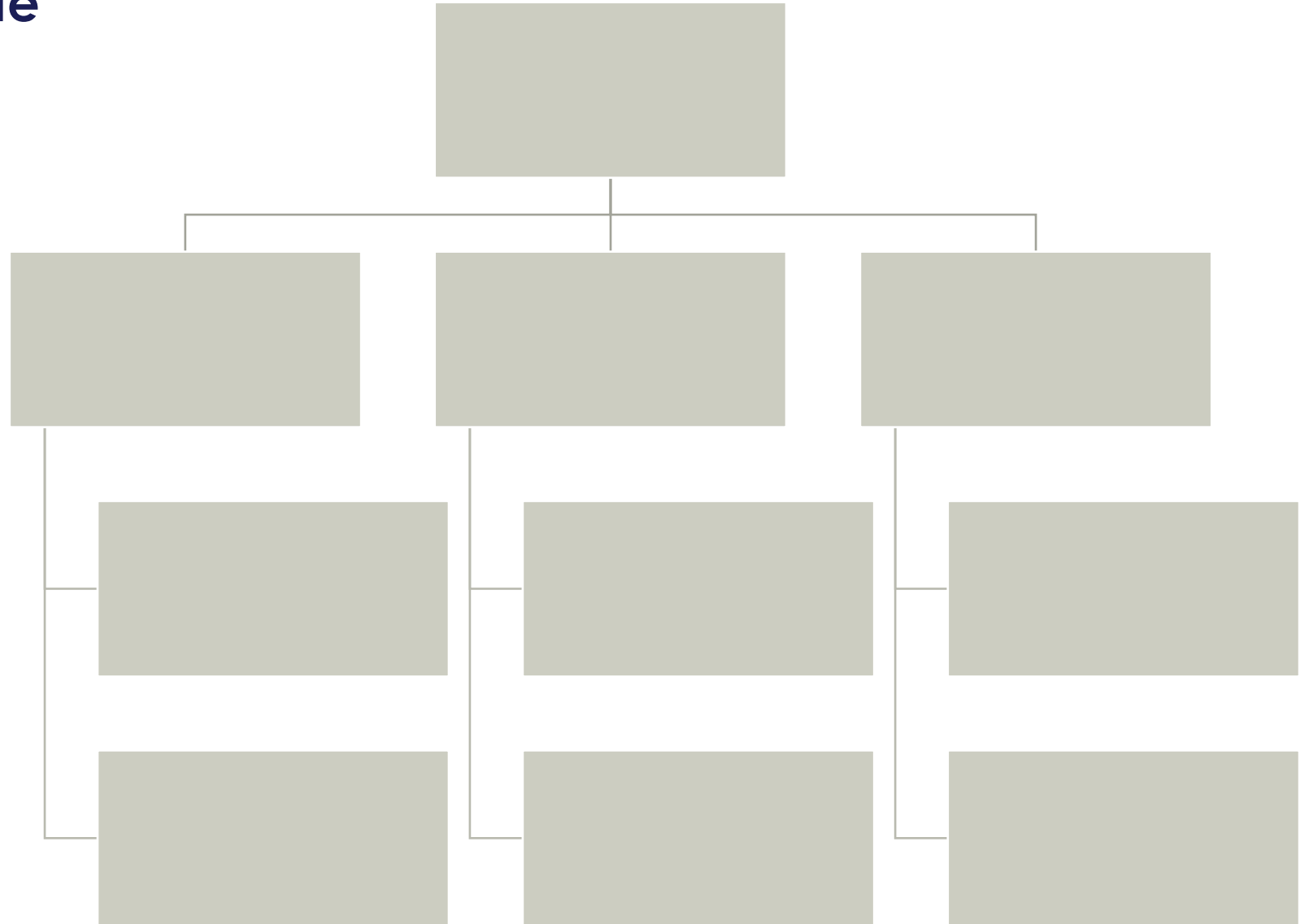
Hypothesis Tree exercise

ACTIVITY

In pairs or small groups, spend 30 minutes preparing a Hypothesis Tree based on your own project.

1. **Use your PDS to guide you.**

2. **Use Post-It notes to draft your Hypothesis Tree.**

    i. You can start top down by proposing a solution and assembling facts to support it.

    ii. Or you work bottom up by grouping facts and asking: "What does this mean for my question?"

    iii. At the early stages in a project, a Hypothesis Tree is simply to guide analysis more efficiently than randomly seeking data. It does not have to be correct. Being able to disprove a hypothesis and move on is a success.
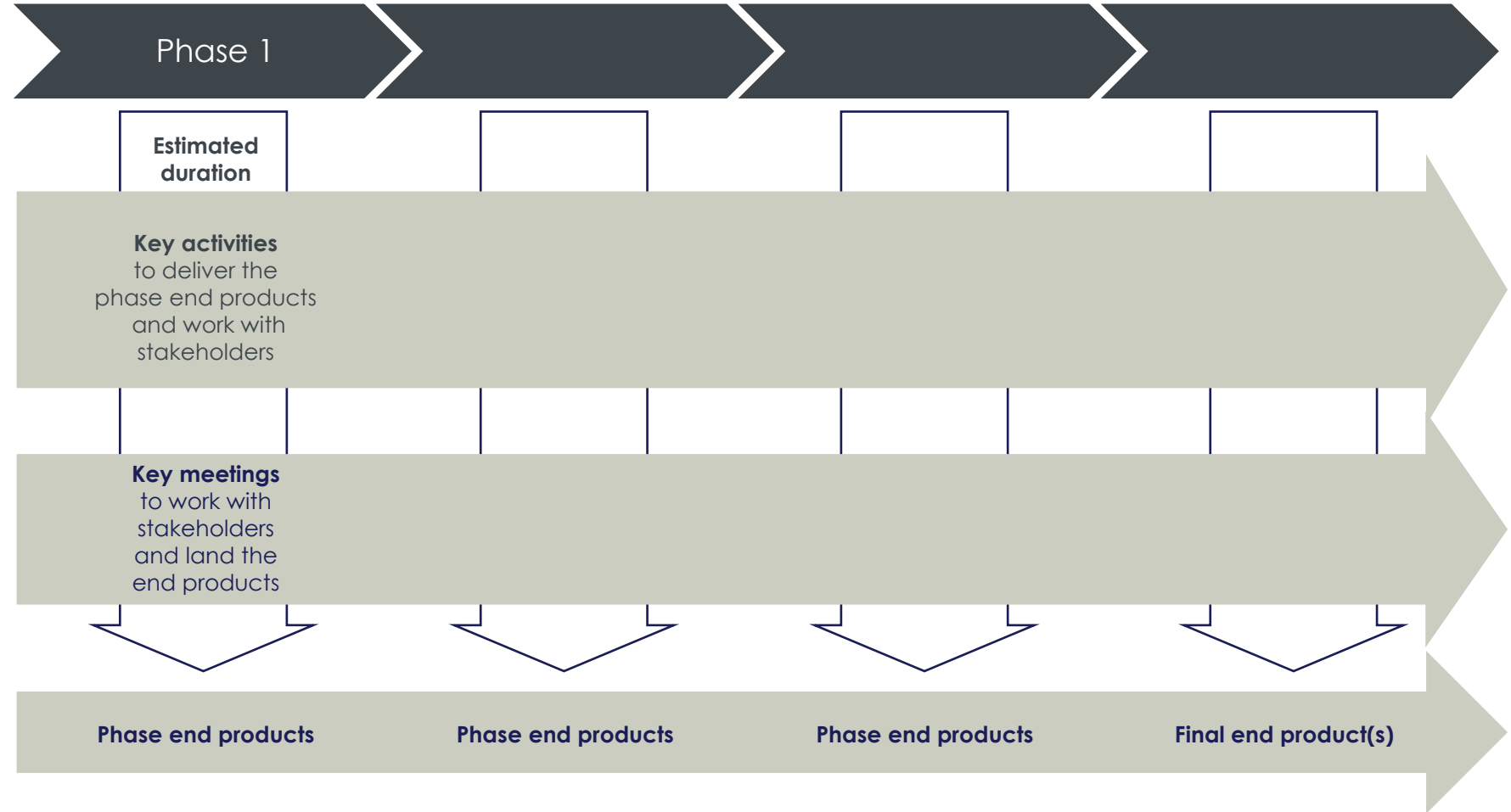
    We will wrap up with sharing for 5 minutes as a whole group.

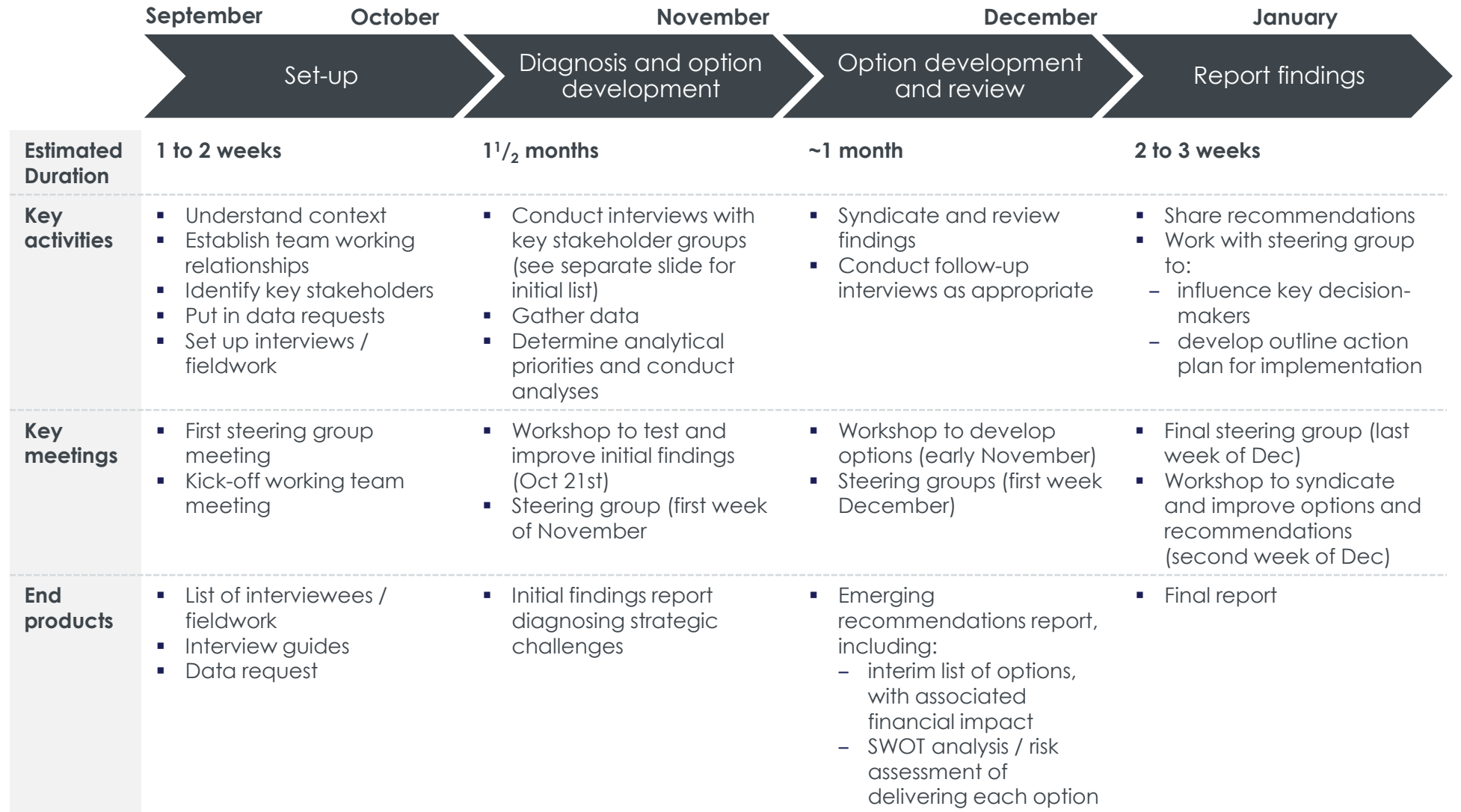# Planning the work: Boat Chart workplans and prioritising

Boat Charts

In conjunction with a PDS, a 'Boat Chart' or 'project on a page' is a useful overview for both project leads and stakeholders. It's often sufficient for planning, saving time in maintaining complex project plans.

Phase 1

Estimated duration

Key activities
to deliver the phase end products and work with stakeholders

Key meetings
to work with stakeholders and land the end products

**Phase end products**   **Phase end products**   **Phase end products**   **Final end product(s)**

Boat Chart example

To write or check them, start with the final end product, then work backwards through the phase end products, and then upwards in each phase through the meetings and activities.

|	September / October	November	December	January
	Set-up	**Diagnosis and option development**	**Option development and review**	**Report findings**
Estimated Duration	1 to 2 weeks	$1\frac{1}{2}$ months	~1 month	2 to 3 weeks

Key activities	• Understand context
	• Establish team working relationships
	• Identify key stakeholders
	• Put in data requests
	• Set up interviews / fieldwork
		• Conduct interviews with key stakeholder groups (see separate slide for initial list)
		• Gather data
		• Determine analytical priorities and conduct analyses
			• Syndicate and review findings
			• Conduct follow-up interviews as appropriate
				• Share recommendations
				• Work with steering group to:
				  – influence key decision-makers
				  – develop outline action plan for implementation

Key meetings	• First steering group meeting • Kick-off working team meeting	• Workshop to test and improve initial findings (Oct 21st) • Steering group (first week of November	• Workshop to develop options (early November) • Steering groups (first week December)	• Final steering group (last week of Dec) • Workshop to syndicate and improve options and recommendations (second week of Dec)

End products	• List of interviewees / fieldwork
	• Interview guides
	• Data request
		• Initial findings report diagnosing strategic challenges	• Emerging recommendations report, including:
			  – interim list of options, with associated financial impact
			  – SWOT analysis / risk assessment of delivering each option
				• Final report

Alongside your Boat Chart you can use more specific planning tools, like a Gantt / timeline or deliverables tracker – aim to use the minimum / simplest format necessary for planning and monitoring your project work

PLANNING / TRACKING EXAMPLES: GANTT VARIATIONS, DELIVERABLES GRID / SPRINT TRACKER AND TIMELINE
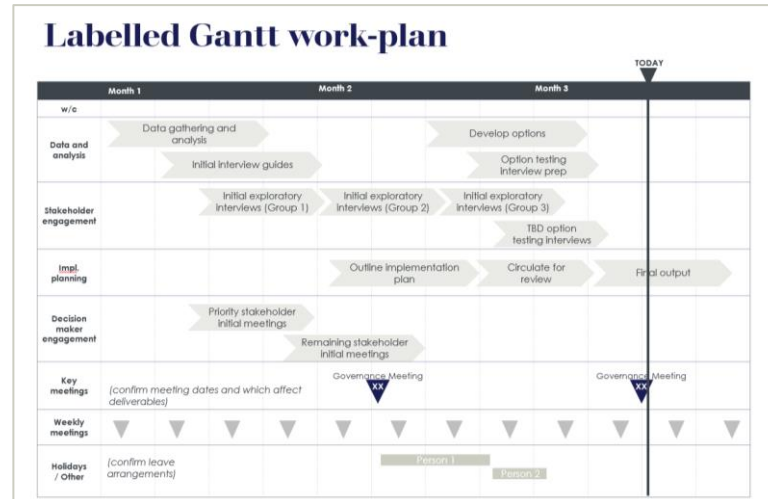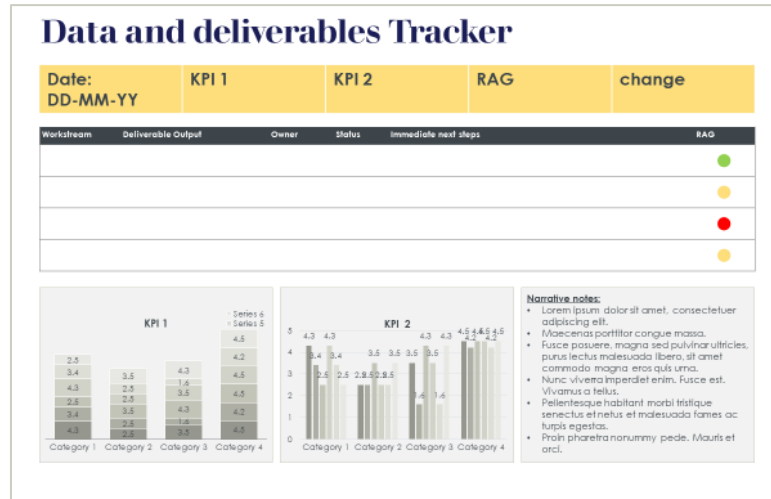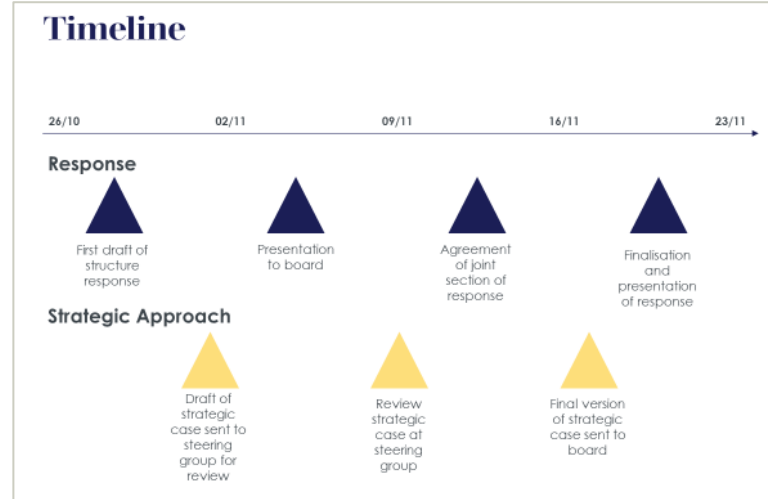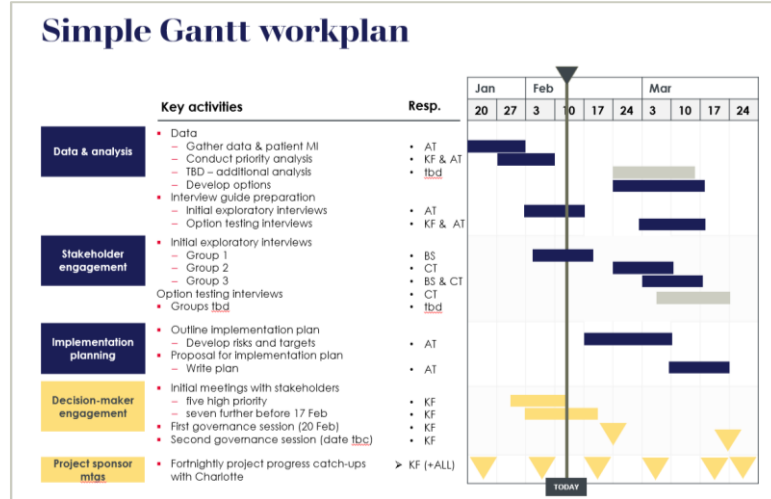
Your project plan needs to reflect the work you identified in your Issue Tree – but you'll need to prioritise as it's unlikely to be valuable to exhaustively do everything

WORKSTREAM PRIORITISATION
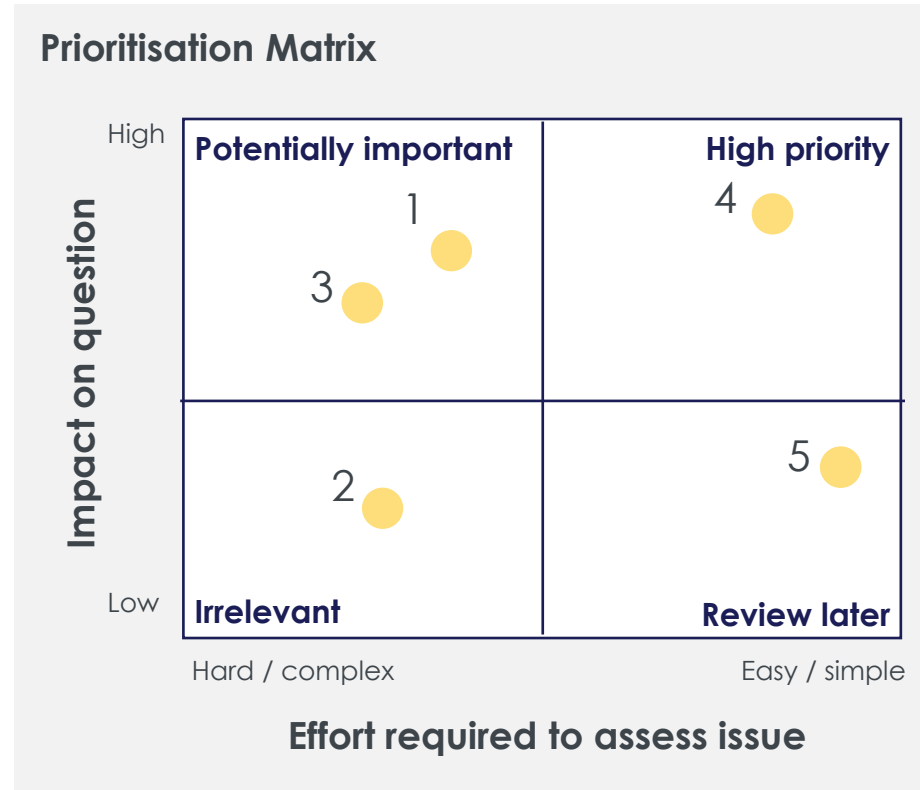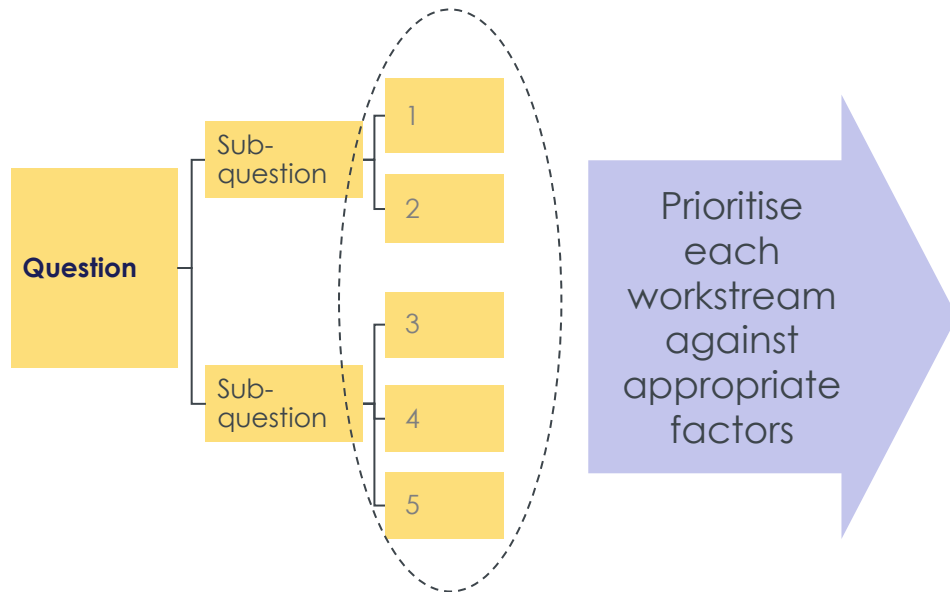
- Use simple tests – don't do the project at this stage!

- Focus time on the simplest work that's likely to get to a 'good enough' answer that meets your success criteria

- Prioritise ruthlessly – be clear on what you're NOT doing, whether it's entire potential workstreams, or limiting the scope / activity within a workstream

Reference: How to use Boat Chart Workplans and the PPT template

*THEY ARE CALLED 'BOAT CHARTS' BECAUSE THE CHEVRONS LOOK LIKE A LINE OF BOATS FOLLOWING EACH OTHER.

What is this tool?
A 'Boat Chart'* is a very simple style of work plan showing end-products, key activities and meetings, and the overall timing of each project phase. A prioritisation matrix can help with deciding which work to include.

When to use this tool?
It is useful for projects involving complex problems without clear solutions, where the detailed path of the project is not evident at the outset, for example, decision-making, option generation, reviews).

Tips for using Boat Chart workplans and prioritising workstreams

- Keep it simple: the purpose is to help the team achieve the project objectives on time and in full. (Running the work plan is not an objective in itself.)

- Remember to use your Issue Tree and prioritisation matrix to identify and select the workstreams which go into your work plan.

- The work plan often ends up being used primarily as a tool for communicating with stakeholders, so make sure it is easily understandable (avoid jargon and acronyms) and fits on a single page.

Mentoring questions for working with Boat Charts:

- Review the series of end products from the final one (bottom right) working to the left – is this a sensible sequence of deliverables?
- Review each column – are these the necessary stakeholder meetings to land the end products? And what are the necessary activities (from Issue Tree and Hypothesis Tree) to develop them?
- Review timings for each phase – are they sensible given resourcing?
- Review the Issue Tree and prioritisation matrix and stakeholder planning – are you spending time on the work most likely to allow you to find a good enough solution (that meets your success criteria), within the time and resources agreed, and that stakeholders agree with?

PowerPoint Instructions

- This 'Boat Chart' was created by combining a table (to make the text align nicely) with PPT's 'SmartArt' illustration feature (look it up on the web to find out more).
- This template uses the 'basic chevron process' SmartArt layout. You can either copy across the table and SmartArt object to your own presentation, or insert a table and SmartArt object directly.
- When you click on the chevrons (the 'boats'), a text box will appear to the left where you can easily edit text and use ENTER to create new chevrons.
- Also, when you click on the chevrons, the two 'SmartArt tools' tabs will appear in the ribbon so you can format and design it as you wish.
- You can resize the whole object using the outer box.
- You can also double 'ungroup' to convert.
- The table can be sized and adapted – the 'distribute columns' option in the table layout tab is useful for aligning columns with the chevrons.

Boat Chart template

- Phases are Smart Art – click the left-side arrow to add / remove phases

- The main content below the arrows is a table – add / remove columns

- The 'months' are text boxes – move as necessary

	<Phase 1>	**<Phase 2>**	**<Phase 3>**	**<Phase 4>**
Estimated Duration	X weeks	X weeks	X weeks	X weeks
Key activities				
Key meetings				
End-products				

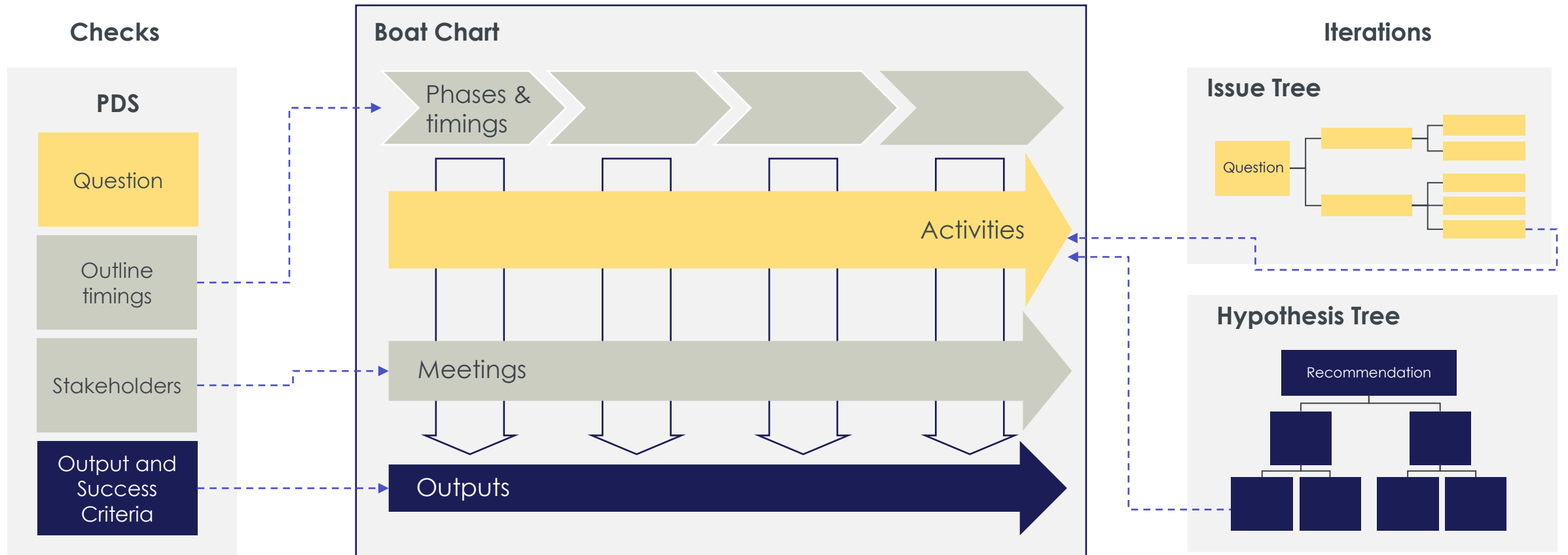# Boat Chart exercise

ACTIVITY

In pairs or small groups, spend 15 minutes preparing a Boat Chart workplan for your project.

- **Remember to work (or at least check) from right to left and bottom to top.**

  We will wrap up with sharing for 5 minutes as a whole group.

To plan to solve your problem, check your plan against your PDS and iterate it with your Tree(s) as you evolve your hypothesis – so you focus on the most useful activities

THE PLANNING CYCLE

Checks

PDS

Question

Outline timings

Stakeholders

Output and Success Criteria

Boat Chart

Phases & timings

Activities

Meetings

Outputs

Iterations

Issue Tree

Question

Hypothesis Tree

Recommendation

Review and Reflect

Problem Solving and Analytical Thinking

The tools are 'live' and iterate over time between each other

PROBLEM SOLVING CYCLE
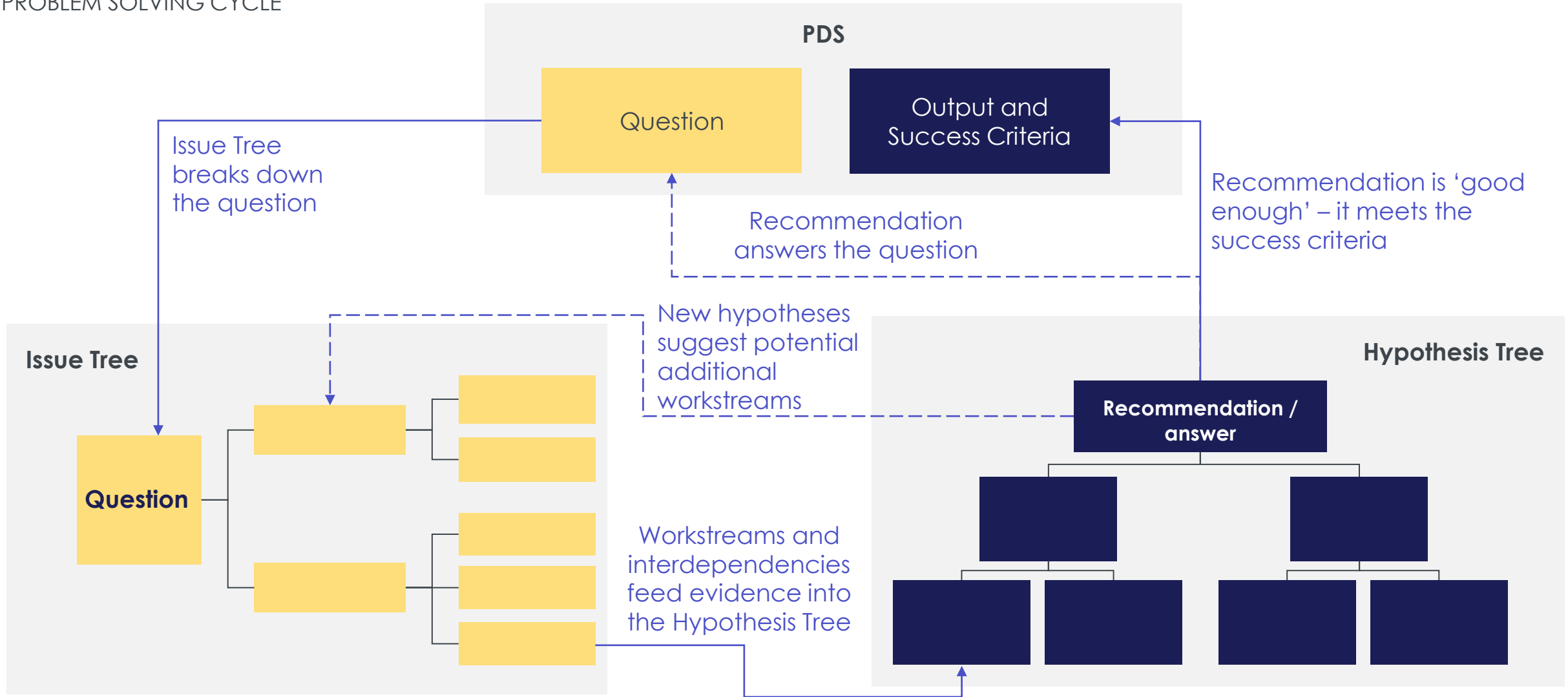
How would the tools work together for the kinds of problems you work on?

How could you **use the tools** in your current projects?

Which tools would you find **most useful** for the problems you are working with?

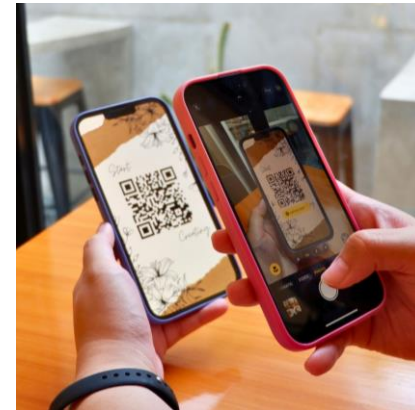What can you **practice before the next session** to test what you have learnt today?

There are blog articles, templates, and further strategic problem-solving and project delivery tools available on The PSC's website at https://thepsc.co.uk/capability-building

Before we finish…

Complete the following feedback form to rate your confidence with different elements of project work and provide feedback on this training session.

- **Link to post-course survey: https://forms.office.com/e/WJFJpRbDRi**

- **Name of this course:** Problem Structuring and Analytical Thinking – Part 1

- **You can also follow the QR code** below to access the form:

You can scan the QR code with a **mobile device camera** to access the form

The PSC