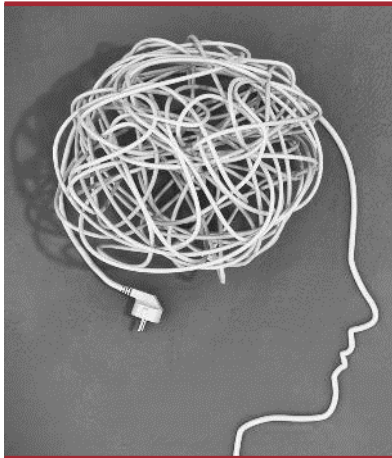


Optimisation and Efficiency Levers



Stantec consider in their large-scale capital programmes, time spent in considering how the work should be optimised and identifying points of efficiency at the start, provides a delivery sure footing that can be the difference between overall success and failure.



Programme and Project Types

To be able to apply optimisation techniques and levers and mechanisms to improve efficiency. We first categorise the work into groupings such as project reference types, we also consider geographical location, delivery complexity

Analysis of Reference Types

To understand how to optimise the portfolio or programme of work and identify efficiencies, a two-stage review of the programme is required where every project is categorised.

Typical Reference Types	Stage 1 Year 1 only	Stage 2	S2 - Categorisation	S2 - Issues	S2 - Root causes	S2 - Improvements	S2 - Efficiency adoption
<ul style="list-style-type: none"> Pumping Stations Storm Tanks Pipelines with DCO Pipelines without DCO Overhead Lines Substations Interim Stores Process Plants 	Identify no-regrets Projects that can go forward (Left Shift)	In-depth analysis of the balance of the projects within the Programme	<ul style="list-style-type: none"> Define Project Reference Types within the programme Categorise Into reference Groups 	<ul style="list-style-type: none"> Collate Historic Data on issues that have occurring in the reference groups Define the specific Reference Type error traps and issues 	<ul style="list-style-type: none"> Analysis of the cause of project reference types Define common root causes of issues in reference type projects 	<ul style="list-style-type: none"> Remove historic project outliers Define Potential Efficiency Improvements for Reference Type Issues 	Bake improvements into reference type project delivery models

In a typical five-year portfolio or programme, the front end process is conducted within Y1. left shift is used to maintain the momentum whilst optimisation and efficiencies are clearly mapped.



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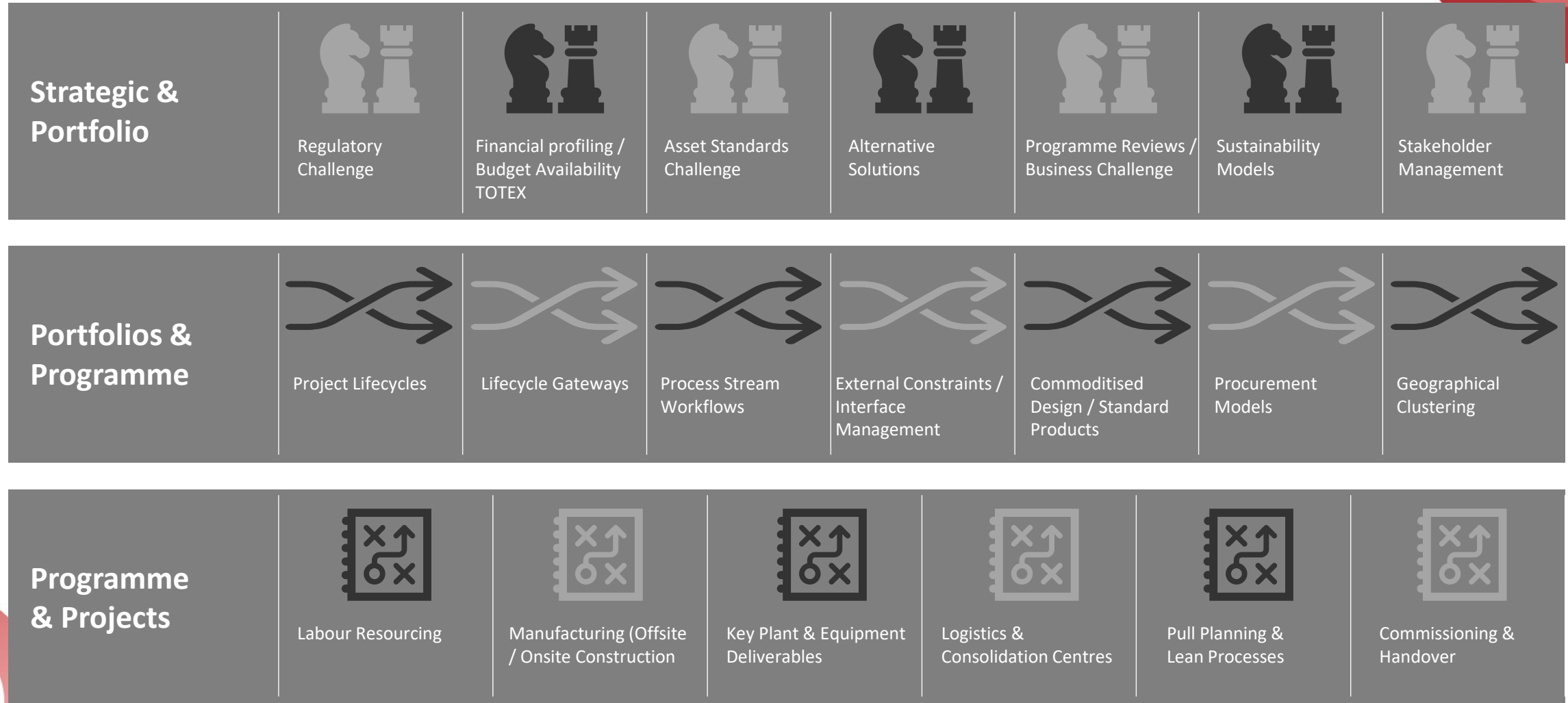
Optimisation and Efficiency Levers

Using the information collated around the Portfolio, Programme and Project.
We then apply optimisation and efficiency levers at different levels.

Each level has differing stakeholders
and interfaces.

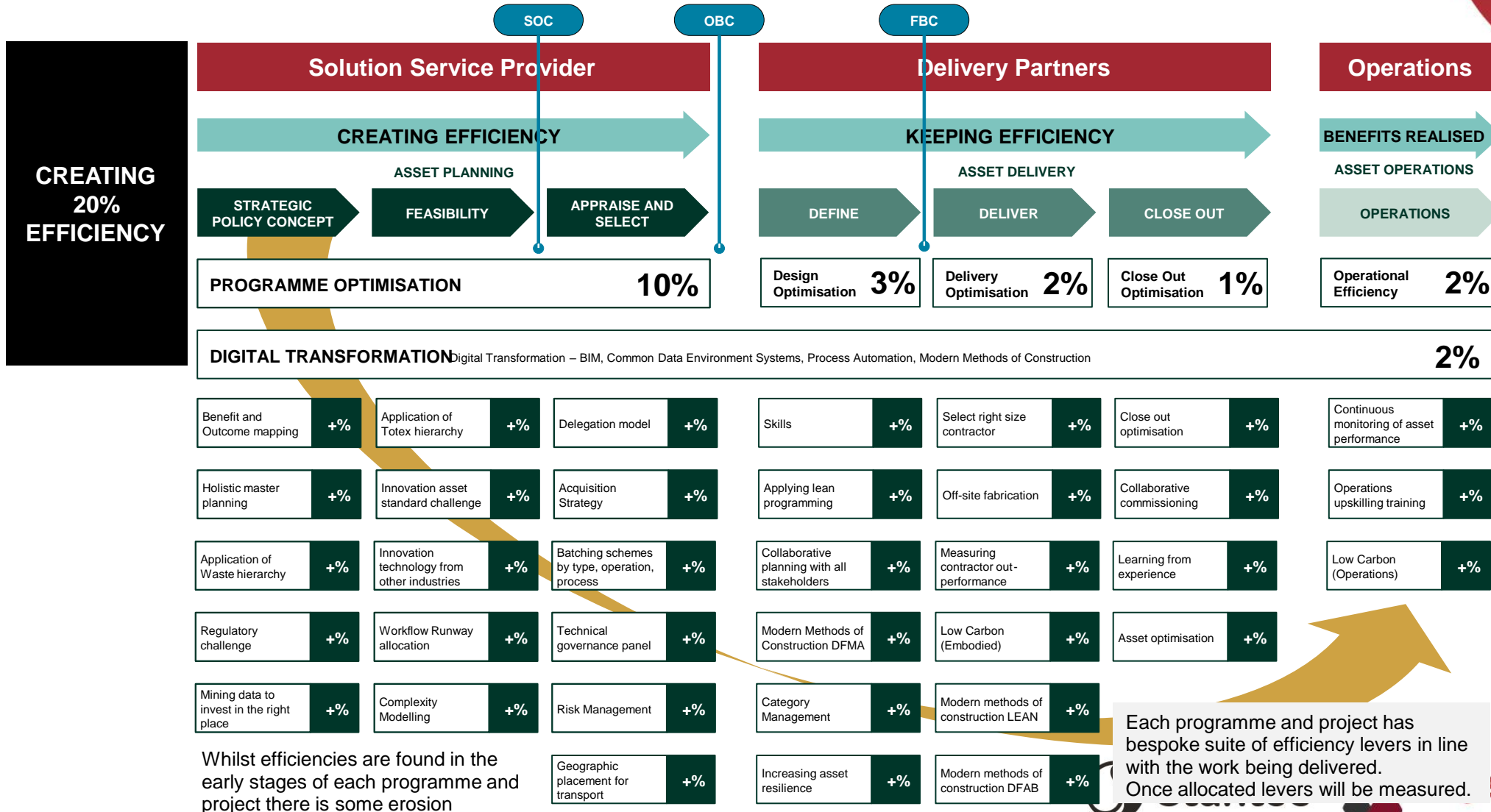
Defining Optimisation and Efficiency Levers

Efficiency levers are different in the operating levels of a business and require mapping where to best apply



Allocating of Optimisation and Efficiency Levers

INTEGRATED EFFICIENCY DELIVERY MODEL



Effective Organisational structures

To maximise efficiencies and business optimisation, processes and methodologies on their own will not enable that.

We also need to understand how our organisation is set up to delivery.

High Performing Teams

Business Efficiencies will not happen unless we develop effective organisations and teams.

When part of Anglian@one Alliance we looked extensively at the attributes of what makes Programme and Project teams successful.

Using repertory grid method to study personnel a set of 12 principles were defined.

These integrated HPT have been the key building block to innovation collaboration and transformation.

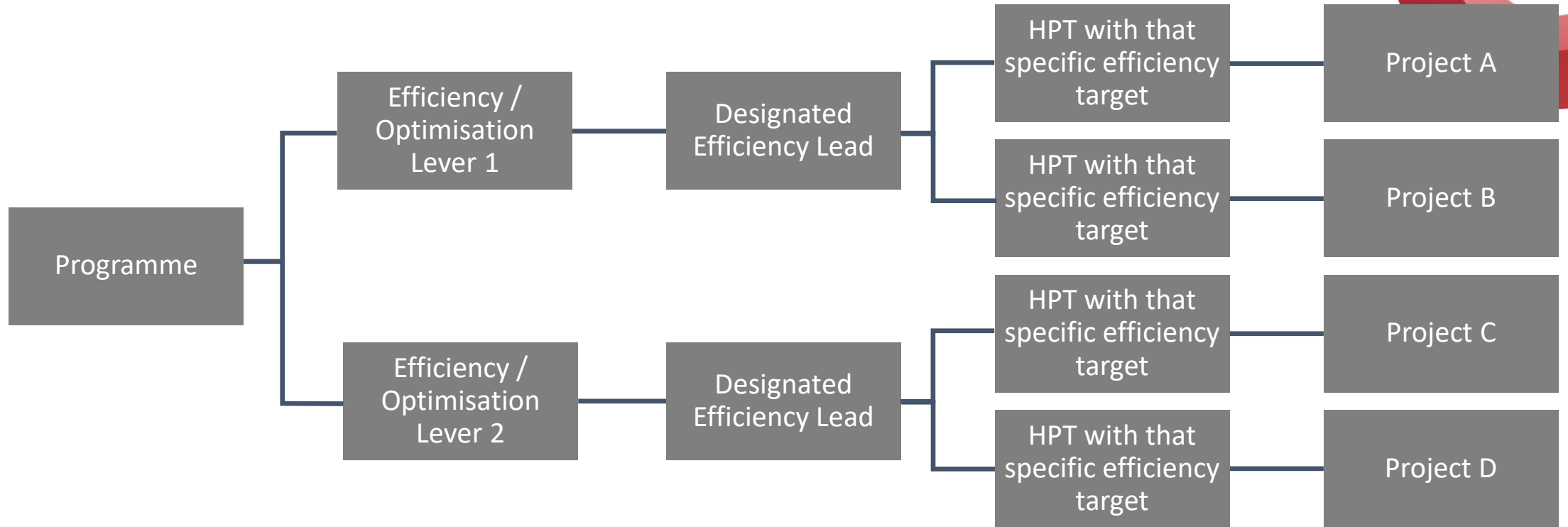
The HPT principles have been cascaded into specific leadership behaviours for individuals, team leaders and senior manager.

These behaviours are built into the role description against which individuals are recruited, managed and developed against.

Ownership	Communications	Clarity and Purpose
Collaboration	Single Entity One team	Capability
Stakeholder Management	Leadership	Roles and Responsibilities
Continuous Improvement	Visible Performance	Teamwork



Efficiency and Optimisation Leads



Efficiency Leads are dedicated to specific efficiency levels based on the project reference types.



Their role is to ensure the specific allocated projects adopt and manage the efficiency in the manner intended.



The Efficiency Lead will report back on the specific efficiency benefits being realized.

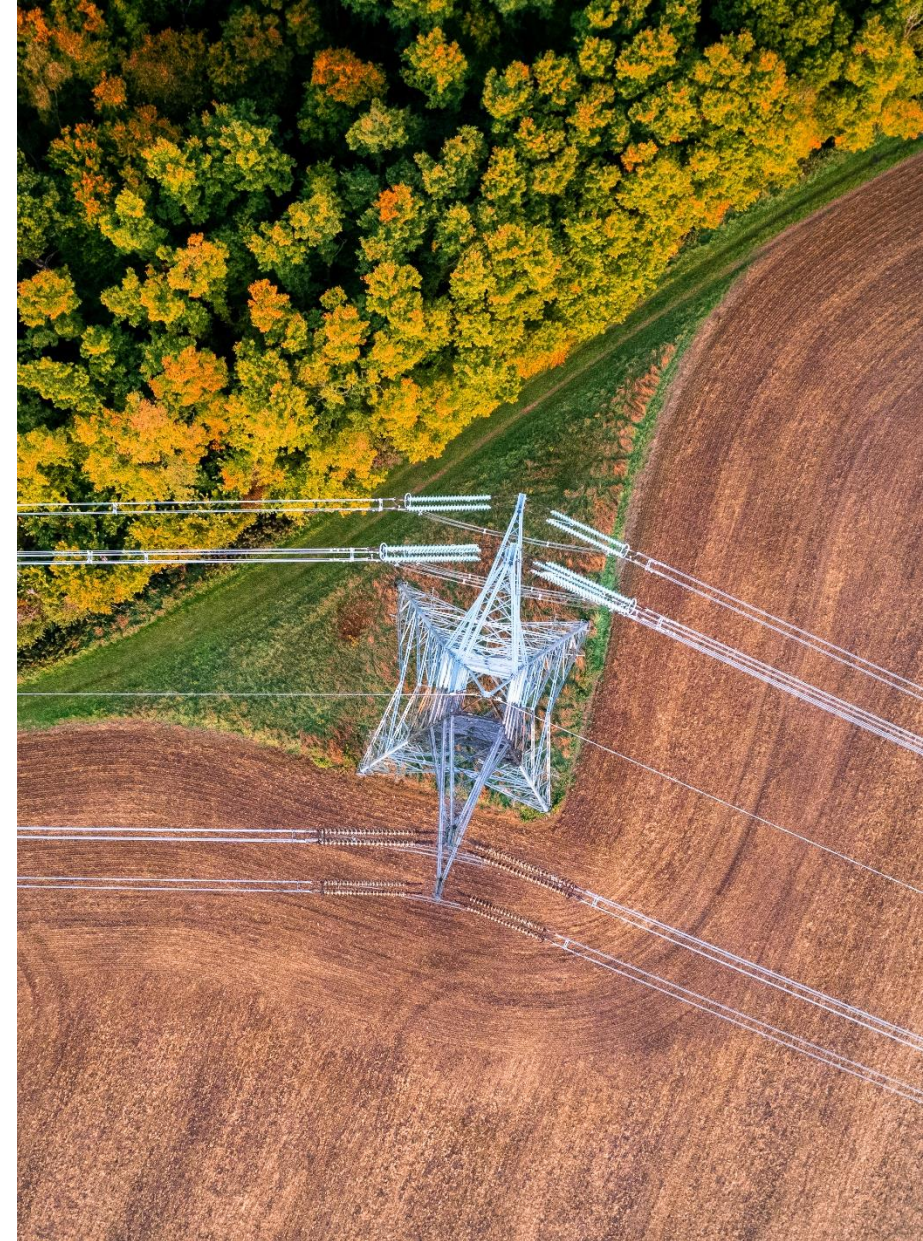
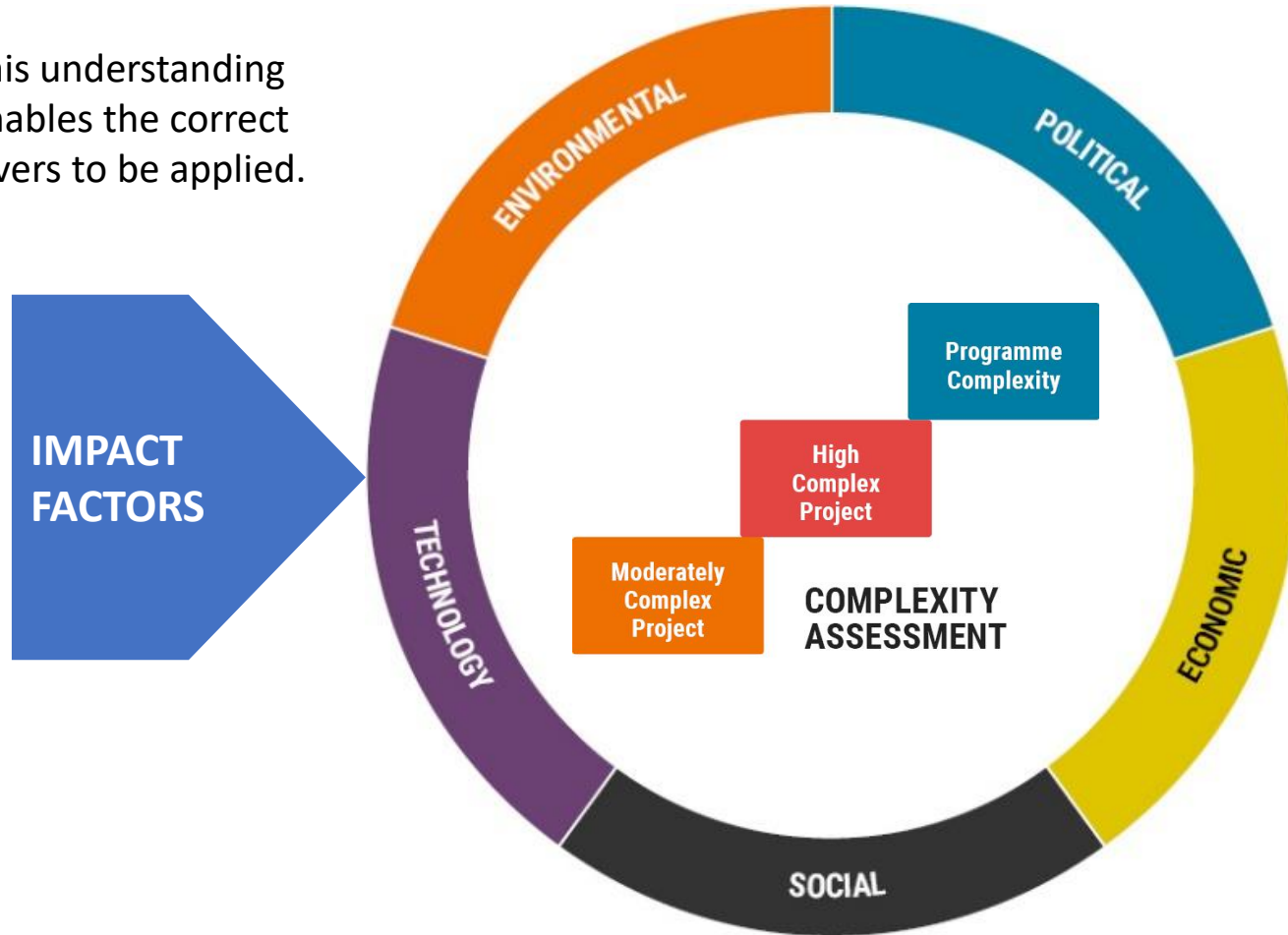
Programme and Project Complexity

Gearing the Governance and Assurance within a Programme or Project is essential to ensure the management service costs are proportionate to the investment being made and the complexity of delivery.

Complexity Modelling

It is important to understand the complexity of the portfolio, programme or a project reference type.

This understanding enables the correct levers to be applied.



Scaled Gateway Management

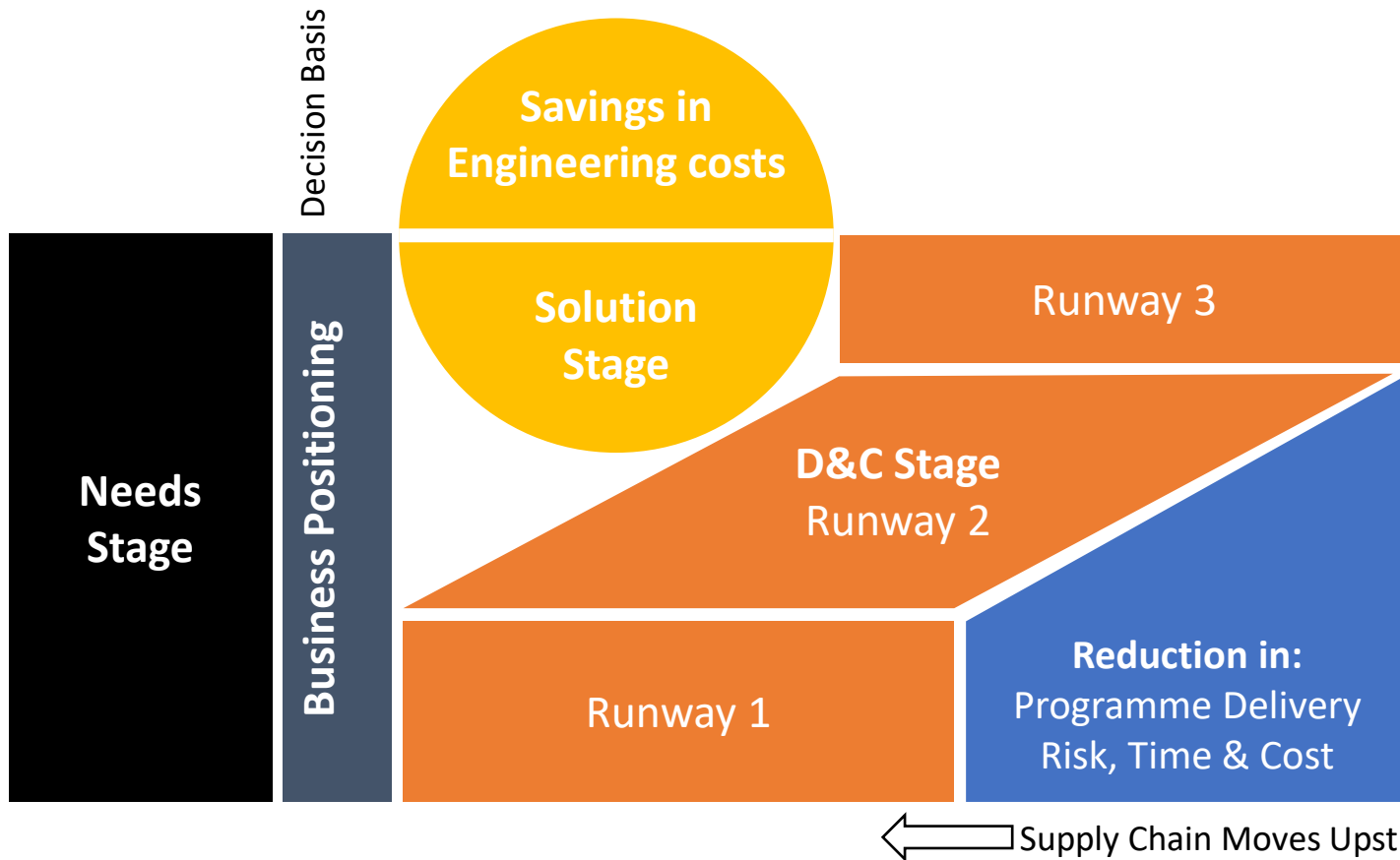
Score	Sponsor	Project Board Required	Level of PM Required	Impact Monitoring	Gateway Approval Level
Up to (4 + 1) = 5 (Simple)	Programme level but with delegated authority to PM	No	Junior Project manager	Reduced	Department Level
6 to 8 (Medium)	Programme level but with delegated authority to PM	No	Project Manager	Monthly	Department Level
9 to 16 (Medium)	Programme Level	Optional	Project Manager	Monthly	Department Level
13 to 16 (High)	Portfolio Level	Yes	Project Manager	Fortnightly	Divisional Level
Over 16 (Very High)	Board Level	Yes	Senior Project Manager	Weekly	Board Level

Using complexity model scoring, enables the more appropriate levels of governance to be applied.

This risk based on complexity approach to view specific projects, reduces unnecessary management intervention and limits.

As part of the approach, fixed lines of enquiry based on project reference type and project complexity are also essential.

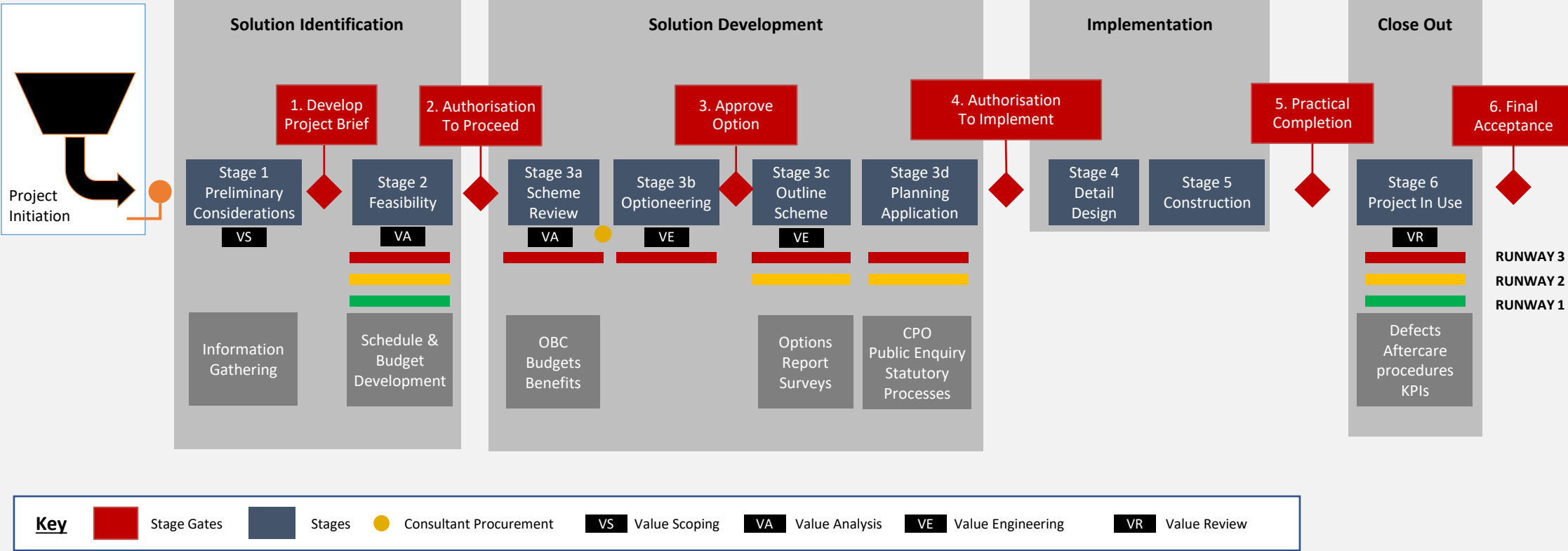
Allocation of Runways



APM STAGES	PHASE	RUNWAY 1 (R1)	RUNWAY 2 (R2)	RUNWAY 3 (R3)
Concept	Needs	✓	✓	✓
	Optioneering	✗	✗	✓
Definition	Outline Design	✗	✓	✓
	Procure	✓	✓	✓
Implement	Construct	✓	✓	✓
	Install	✓	✓	✓
Handover	Commission	✓	✓	✓
	Handover	✓	✓	✓

Based on Project Reference types and the level of Complexity. The application of delivery lifecycle runways enables some of the individual projects within the portfolio to have reduced whole lifecycle timescales, reducing design costs and management prelims associated with these projects.

Common Workflow inc Runways



Standard project delivery workflows, build a consistency of approach over a Portfolio or Programme of work and acts as an enabler for efficiency levers to be applied in a common approach and also enable effective tracking of the benefits the efficiency lever brings.

Delivery Optimisation and Efficiency

The Toyota Production System (TPS)

Timwoods

**Six Sigma and 8D - Eight disciplines
of problem solving**

**Eliminating waste and maximizing
efficiency in manufacturing and logistics.**

Establishing permanent corrective actions.

**Developed by Motorola to reduce production
issues that developed over time.**

Key highlights of TMS

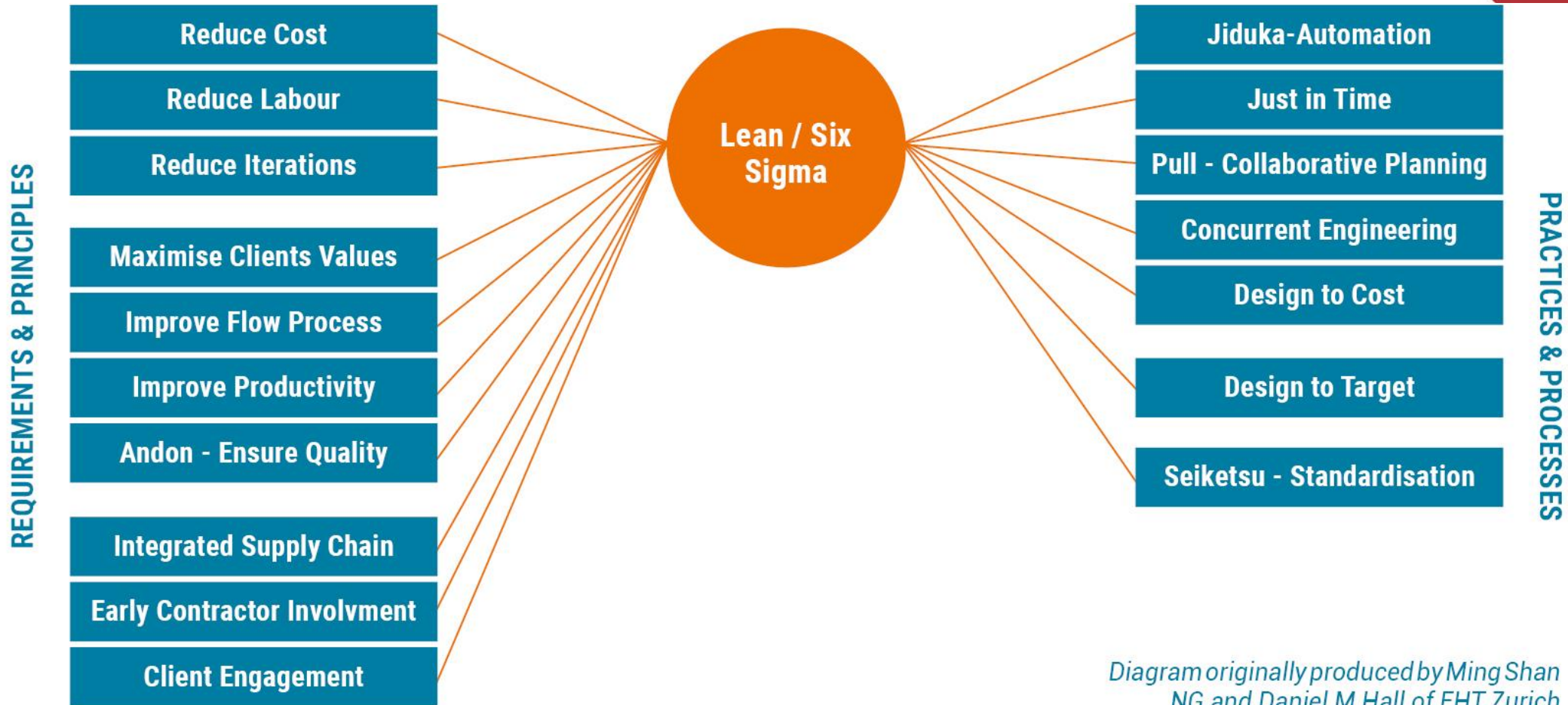


Diagram originally produced by Ming Shan
NG and Daniel M Hall of EHT Zurich



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Lean (TIMWOOD)

A key part of efficiency is the management of waste

TRANSPORT

- Sequencing the installation to minimise unnecessary transport movement of plant and equipment.

INVENTORY

- Evaluate material and equipment needs, based on timescales, reduce equipment inventory at any one-time, minimising storage costs.

MOVEMENT

- Establish regional hubs, to enhance efficient delivery and management of a project team's movement: Use teams with geographical proximity to the sites.

WAITING

- External / Internal stakeholder engagement plan to maximise coordination. Lookaheads minimising onsite waiting / downtime of equipment and resources.

OVER PRODUCTION

- Continuously review and challenge material quantities including carbon measurement to minimise over production, and what can be used elsewhere.

OVER PROCESSING

- Enforce standard design solutions, method statements and other documentation. Instigate common factory acceptance testing, generic commissioning model to minimise over processing.

DEFECTS

- For multiple installations, capital cost for equipment must be evaluated against operational reliability, supporting right first time and minimising overall defects.

SKILLS

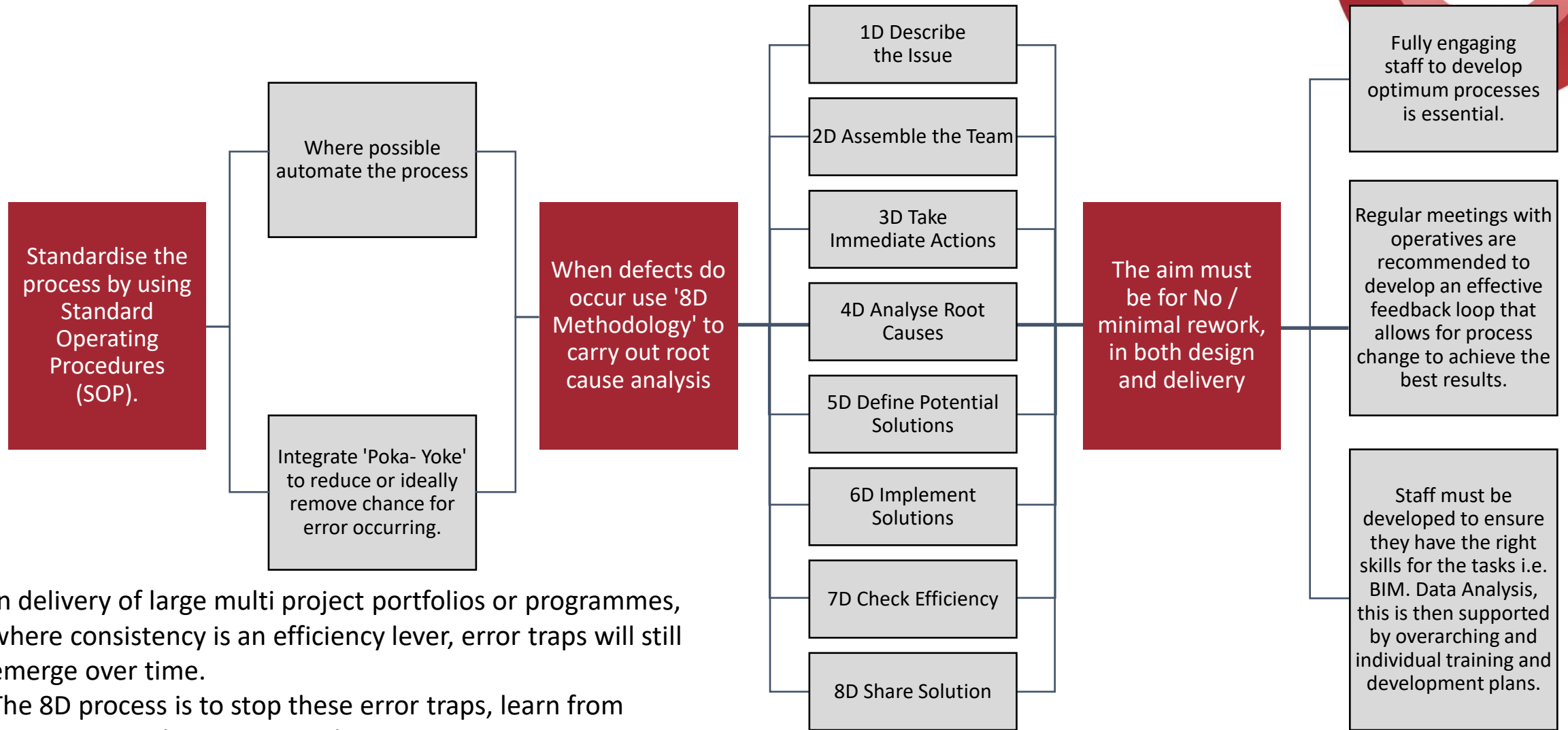
- It is fundamental to ensure the right team skills are deployed. If there are multiple projects, lessons learnt on early work will amend the approaches on the later deployments.

Every programme and project should have:

- Lean Registers identifying opportunities to reduce waste.
- Identification on how waste reduction is going to be implemented.
- When the reduction methodology will be available.
- Allocation of responsible owner.



Six Sigma – reducing error traps



In delivery of large multi project portfolios or programmes, where consistency is an efficiency lever, error traps will still emerge over time.

The 8D process is to stop these error traps, learn from experience and maintain productivity.

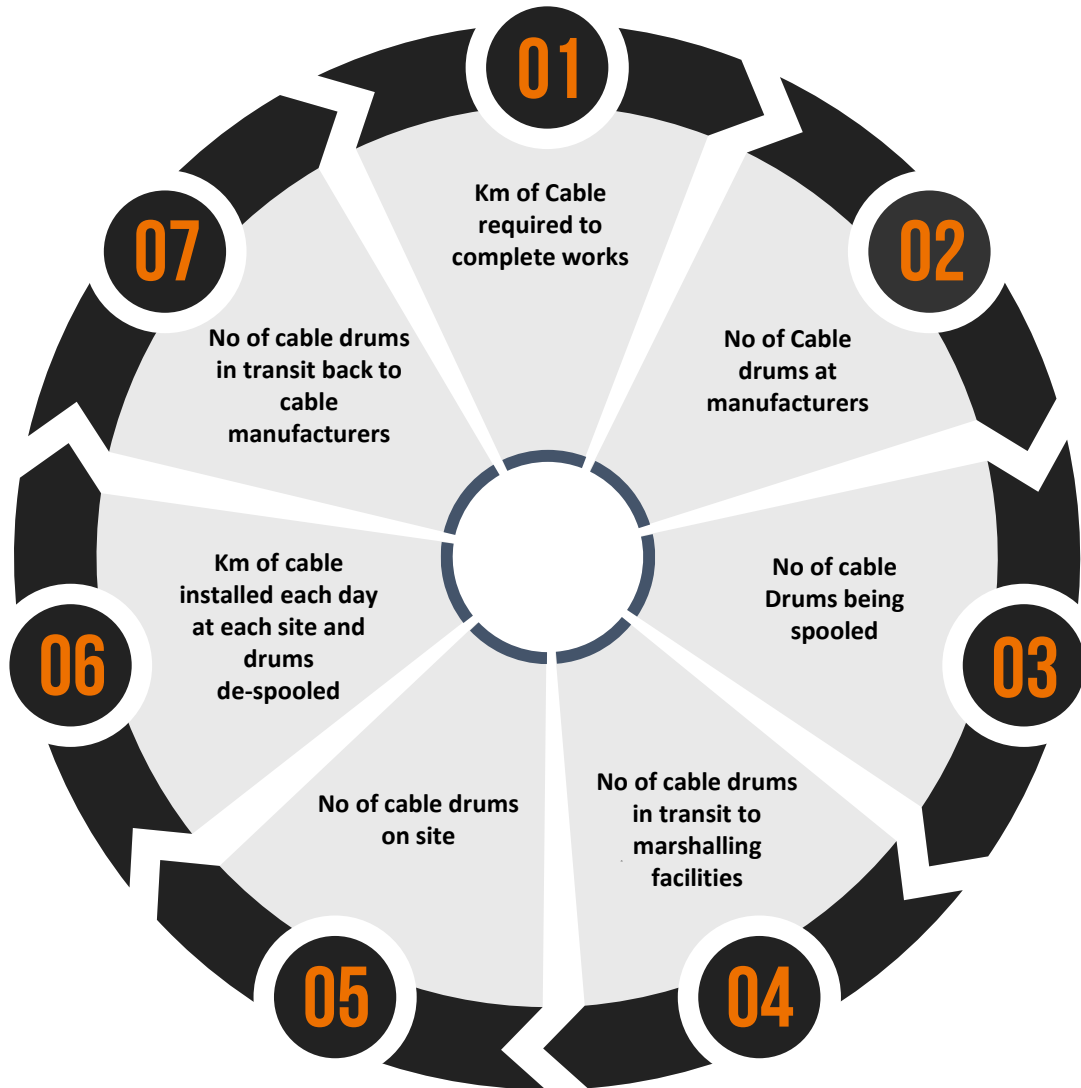
8D - Eight disciplines of problem solving

Using Logistics more effectively

Once a programme or projects move into the delivery stages the management of Logistics becomes a critical success factor.

Many construction management companies subcontract the work to logistic specialist organisations who provide an additional dimension to delivery efficiency

Plotting the logistics to maintain delivery



When dealing with offsite manufacturing understanding logistics is critical for delivery efficiencies.

In this example a major programme was installing 8700 km of cable in Europe in early 2000s

The critical item to success was not the gangs on site, or the factory production rates, but understanding the location of all the drum spools in real time.

Once a model was developed the delivery organisation had to acquire an additional 500 spool drums to maintain the delivery rate and deliver the overall programme.



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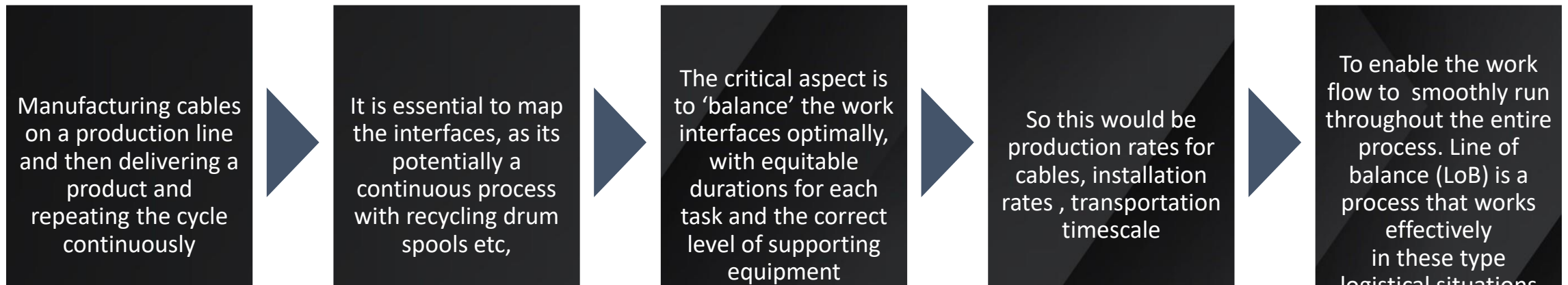


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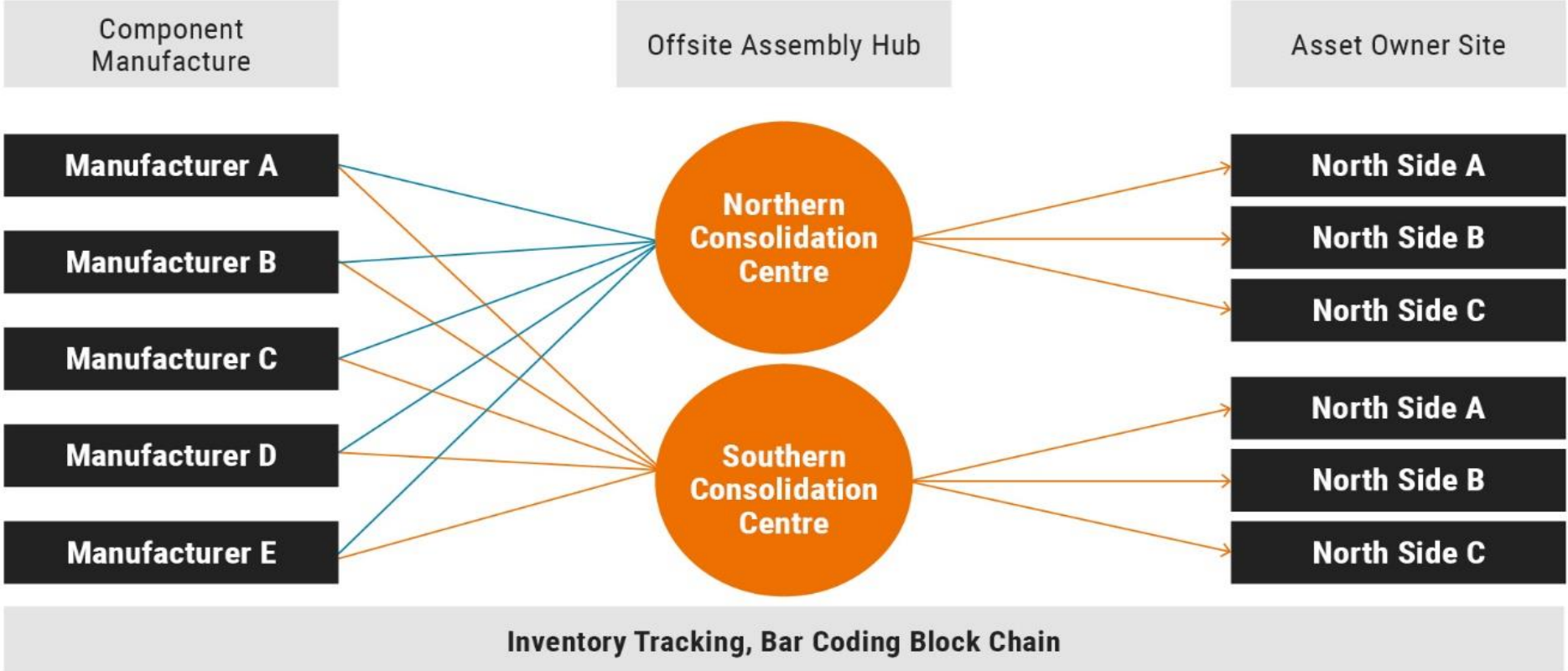
Logistics – Line of Balance Planning

Design Manufacture, and Installation of 10 Units

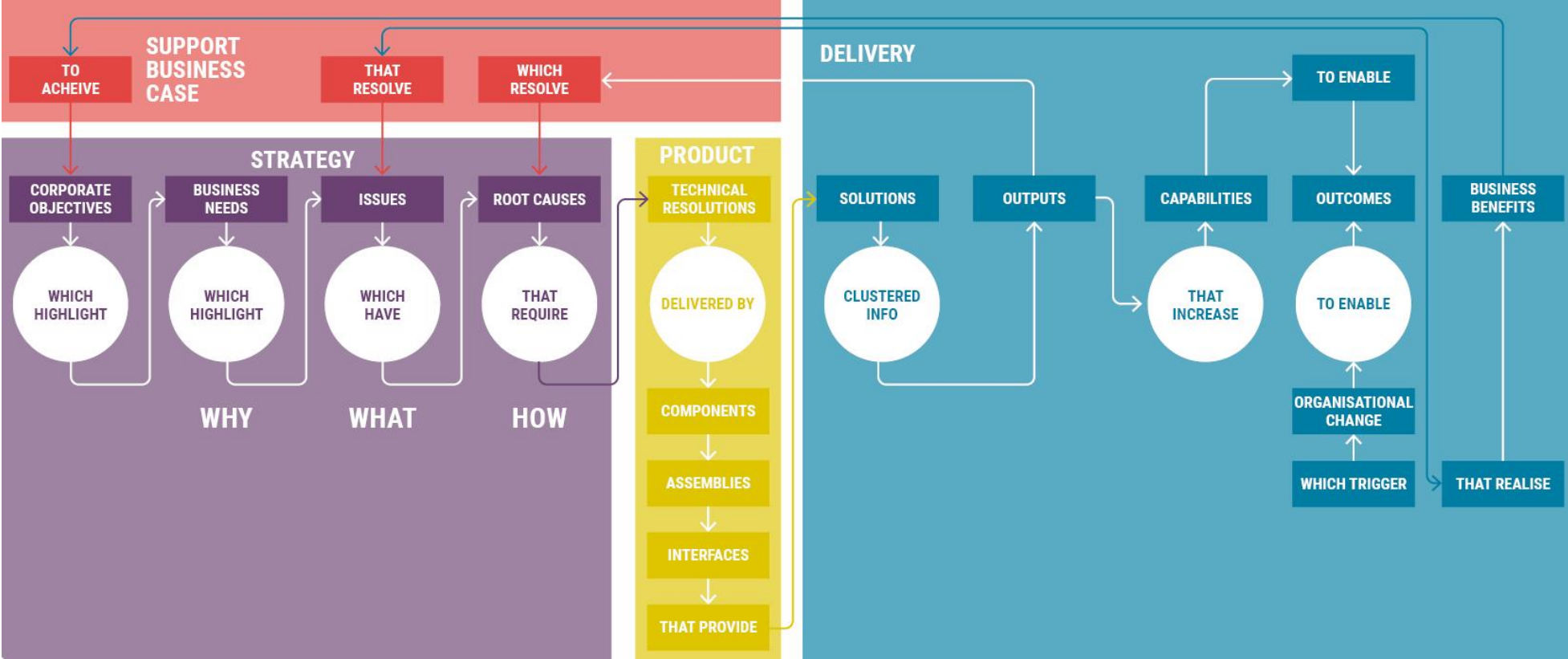
UNITS	Designer can produce 3 units per day	Manufacturer can only make one unit per day	The logistics company can only ship one unit per day or two units every two days	The consolidation centre can hold stock due to slow manufacturing rate	The logistics company states two units per day to be delivered prevents site bottleneck	The construction Site can only hold one unit in storage. Morning and afternoon deliveries required	The site team can install two units per day One in Morning and one in afternoon
DURATION	DESIGN	MANUFACTURE	TRANSIT	CONSOLIDATION CENTRE	TRANSIT	SITE STORAGE	CONSTRUCTION INSTALLATION
	3.5	Lead 1 Day	Lead 7.5 Days	Lead 2.5 Days	Lead 1 Day	Lead 1/2 day	5 Days
	Comp D1	Comp D2	Comp D3	Comp D4	Comp D5	Comp D6	Comp D6
	OPTIMISED DELIVERY CYCLE FOR A SINGLE UNIT						
	Comp D4	Complete D11	Comp D12	Comp D13	Comp D14	Comp D15	Comp D16



Logistics – Consolidation Centres



Common products and trusted vendor supply



Vendor framework for materials, to exploit economies of scale.



Most large scale programmes are heavily reliant on the supply chain so developing an effective relationship model assists delivery with improved forward planning.

Financial Optimisation and Efficiencies

In large scale multi year portfolios and programmes financial management is a critical aspect.

There is a need to be able to balance client funding which could include regulated or government income, against the labour and equipment resource demands of the portfolio or programme.

To this extent a great deal of effort is applied to financial optimisation and specific efficiencies that enable outcomes to be delivered at lower capital and Operational cost.

Risk Tolerance and Totex Models

Capital Investment in many cases is the lowest -risk option to solving a infrastructure business requirement.

Operational Investment in changing processes is in many cases is the lowest cost investment but has a greater risk of failure.

Totex is an optimum blend of a capital and operational solution that provides the asset owner the most efficient option.

Capital Cost

		1	2	3	4	5
SCORE	Pre-defined Financial Range	Very Low	Low	Medium	High	Very High
5	Very High	5	10	15	20	25
4	High	4	8	12	16	20
3	Medium	3	6	9	12	15
2	Low	2	4	6	8	10
1	Very Low	1	2	3	4	5

Asset failure Cost £ - Opex £

Scenario 1 (Early-Y1)	
Capital Cost	£1000000
Operational Cost	£600000
Sub Total	£1600000
Failure Cost	£2000000
Operational Cost	£600000
failure Cost £ - Opex£	£1400000
Risk of failure	25%
Risk Value	£350000
Allowance	£1950000

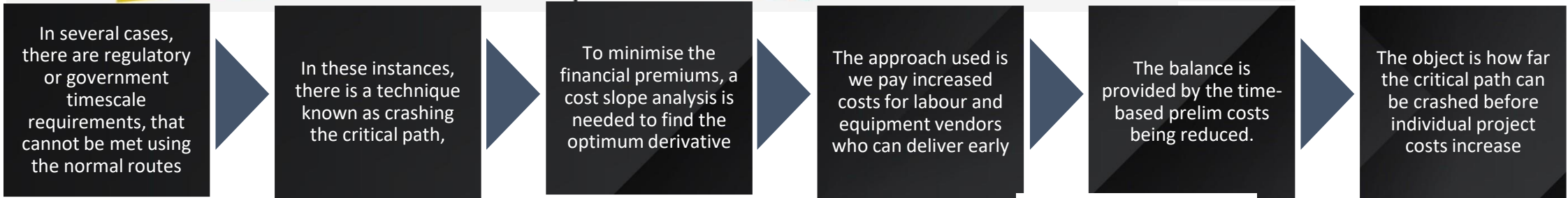
Scenario2 (Mid-Y2)	
Capital Cost	£1000000
Operational Cost	£400000
Sub Total	£1400000
Failure Cost	£2000000
Operational Cost	£400000
failure Cost £ - Opex£	£1600000
Risk of failure	50%
Risk Value	£800000
Allowance	£2200000

Scenario 3 (Late-Y4)	
Capital Cost	£1000000
Operational Cost	£100000
Sub Total	£1100000
Failure Cost	£2000000
Operational Cost	£100000
failure Cost £ - Opex£	£1900000
Risk of failure	75%
Risk Value	£1425000
Allowance	£2525000

Timescale management whilst minimising cost



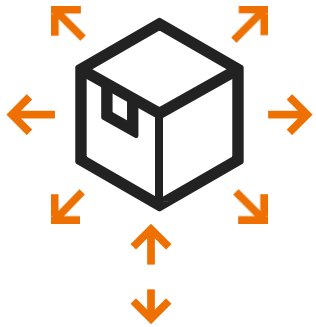
Cost slope derivative – Crashing Critical path on outliers



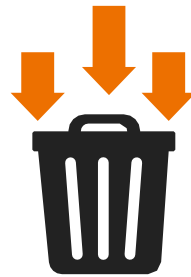
Efficiency Benefits

Introducing efficiency lever mechanisms to a delivery operation ensures a company can bake in the efficiency gains, as well as minimising areas of risks to time cost and quality.

Efficiency and Optimisation Benefits



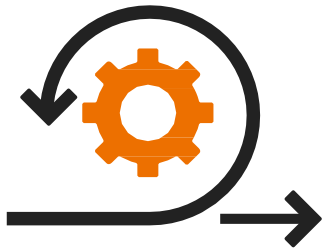
Provides sustainable workload to the supply chain



Reduces waste whether labour / timescale or materials



Continuously checks and reinforces the programmes business case



Encourages innovation and promotes new methodologies towards efficiency



Helps minimise financial overruns



Helps keep the programme within its pre-defined boundaries

Questions

Efficiency Levels





THANK YOU