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Value-based tailored application of Systems Engineering

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SE Practical – Oct 2025

Purpose

This presentation shares ideas targeted at organisations that are new to systems engineering, or that are considering developing their systems engineering function to add greater value.

It should not be considered advice that overrides any legal, safety, security, contractual requirements and processes.

The intention is to share ideas developed from working with organisations and teams new to systems engineering.

Inspiration

Adopting the philosophy is arguably more important than adopting formalities

This doesn't mean formalities are not important or useful, but…

How can we realise the greatest value from SE adoption?

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Context

Formal SE approaches have been developed largely to support development of military/defence systems, and also other complicated systems such as those found in transport and energy.

While rigorous and valuable, these approaches can **appear daunting** and high cost.

Targeted application of SE can provide significant value for smaller teams and organisations, especially in situations where it is not currently being actively applied.

Overview

Understanding your existing system

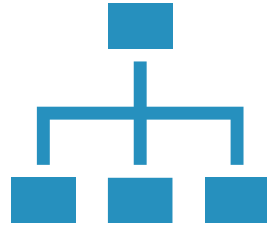Identifying needs, gaps and where to add value

Examples of valuable approaches employed

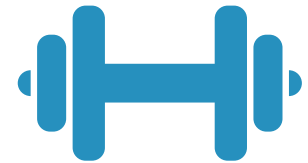SHOAL™

Understand your existing system

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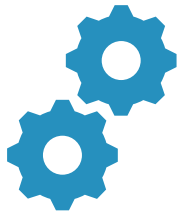# Understand and inquire into your existing system

Consider the systems lifecycle
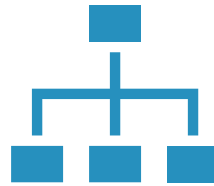
Assess your existing (management) systems

What are your strengths, weaknesses and opportunities?

Identifying needs, gaps and where to add value

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Identifying needs, gaps and where to add value

Engineer your Systems Engineering System
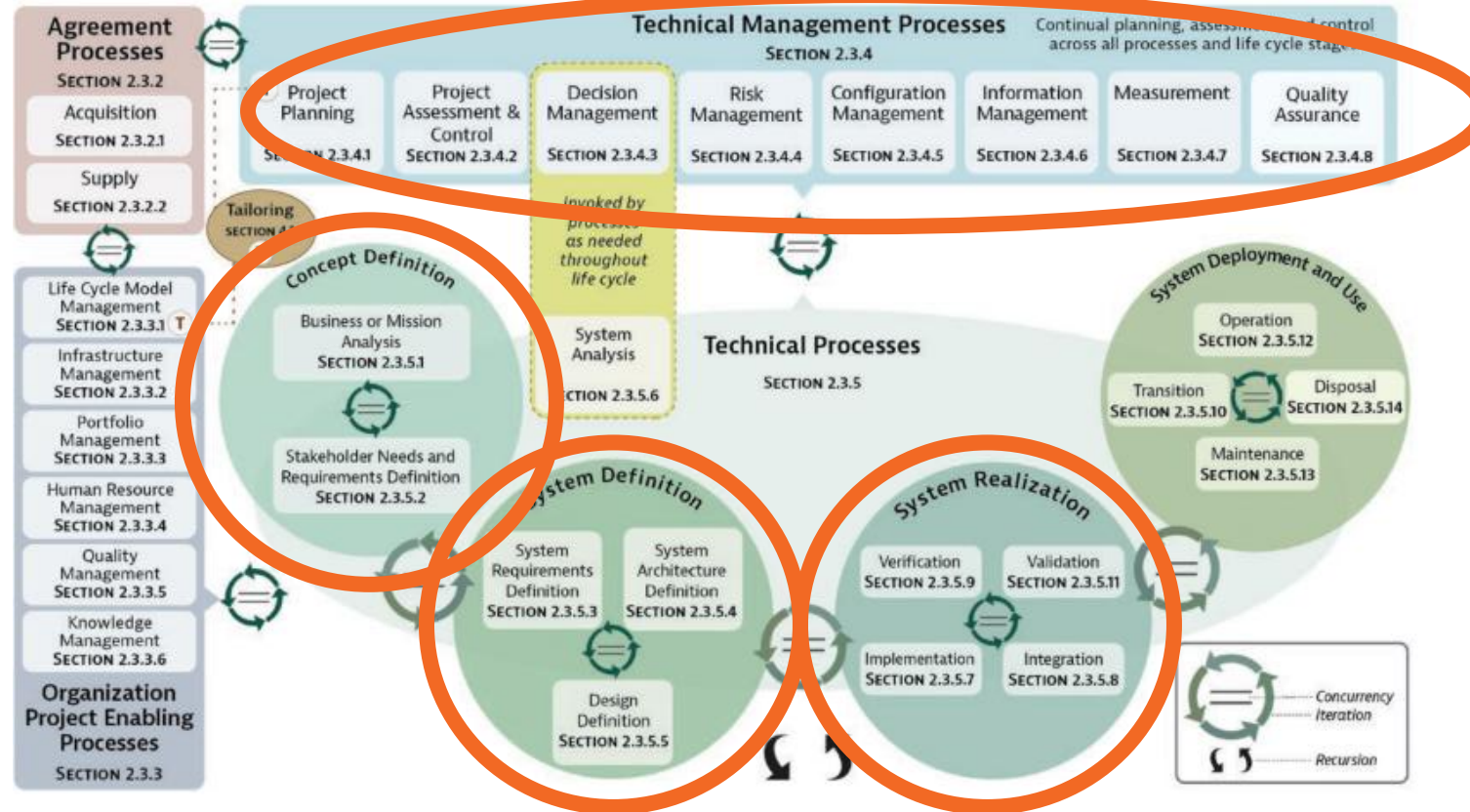
What are the challenges and gaps?

Identify valuable enhancements

Examples of valuable approaches employed

Examples of approaches employed

ISO 15288 Lifecycle Processes (reproduced from SE handbook V5, Figure 2.10, pp 41)

Concept Definition

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Early use of prototypes and user interaction

Greatest value in SE is from early application

Get users interacting with prototypes – earlier the better

Interact with a broad range of users and field testers

Use case exploration

Explore a broad range of use cases
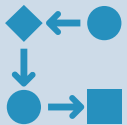
Look at existing and competitor products

Needs capture

Capture needs and their rationale

Agree them with the product stakeholders

Maintain traceability

Change is inevitable, be ready to respond constructively and efficiently

Traceability, rationale and design decision records will make this much easier

Communicating the concept

Communicating the concept and getting stakeholder and user feedback and ultimately buy-in is key

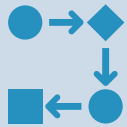Concept pitch often more valuable than detailed concept documentation

Keep the concept and key measures of success front of mind though the lifecycle

System Definition
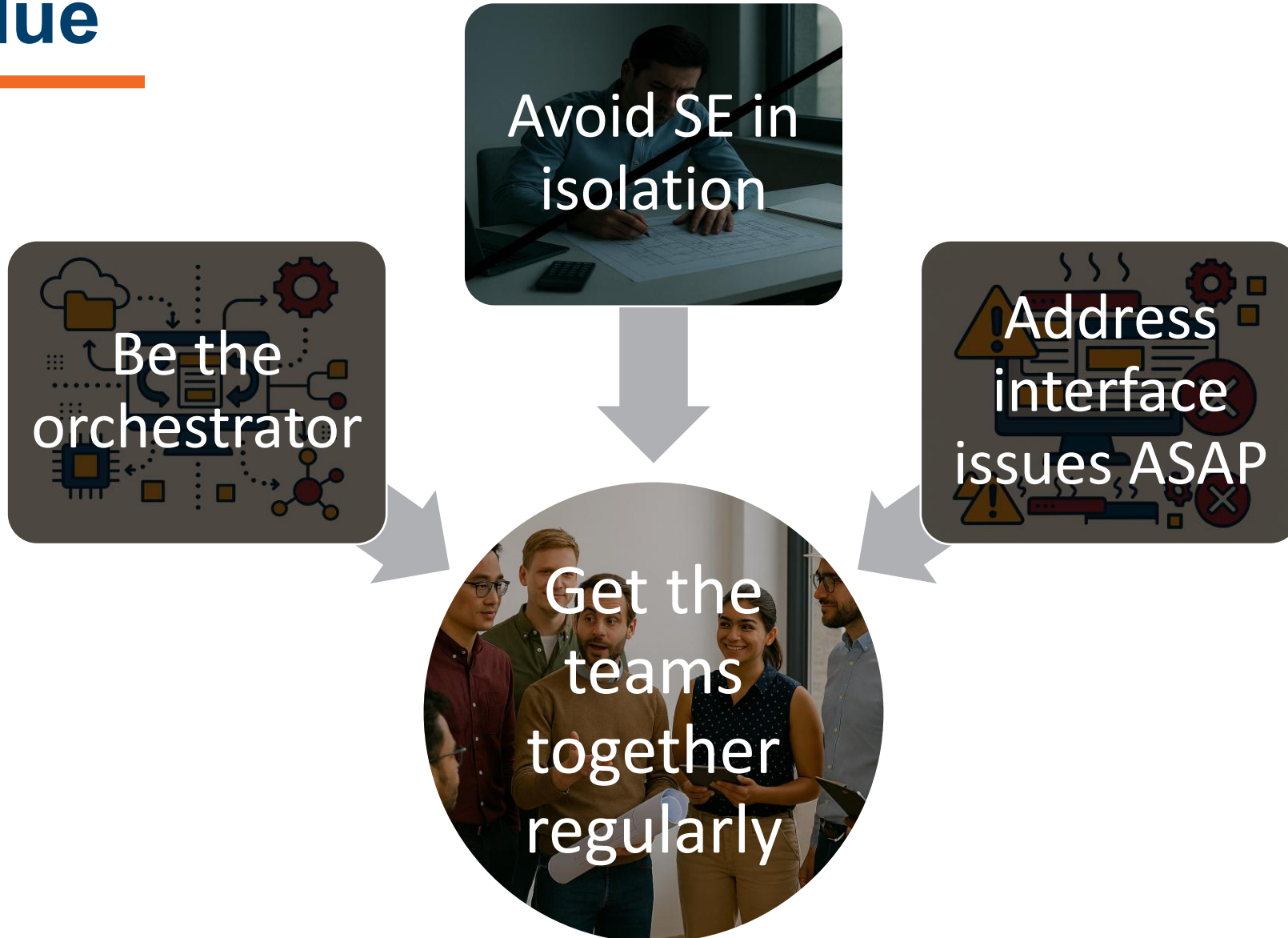
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System Definition

Be the glue

Architecture: collaborate, prototype, iterate

Architecture then requirements

Be the glue

Avoid SE in isolation

Be the orchestrator

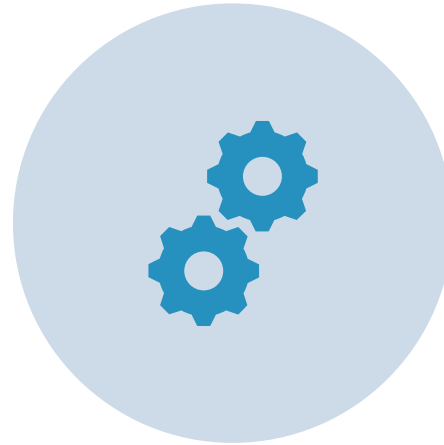Address interface issues ASAP
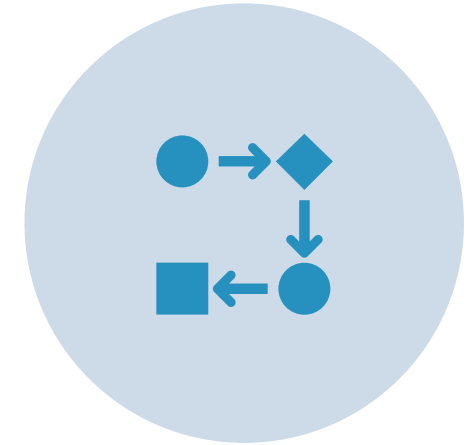
Get the teams together regularly

Collaborative Architecture Definition

Collaborate – get everyone involved

Prototype – test the architecture

Iterate

Develop architecture, then write requirements

System Realisation

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Validation

Early and frequent validation

The value of this can only be realised if a concerted effort is made early and often

Field testing and user feedback

Get the feedback flowing as soon as practical **sooner than practical**

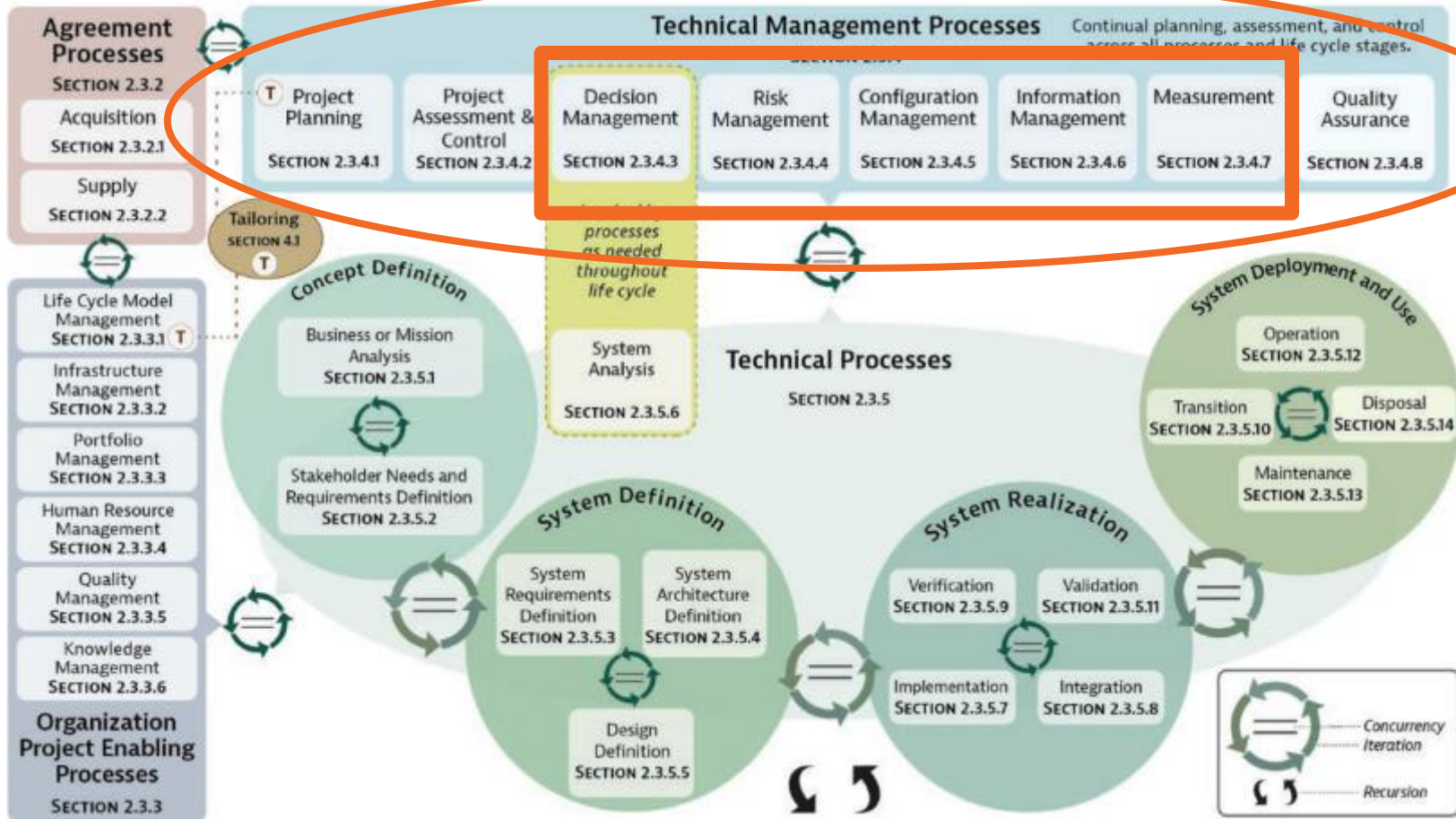Remember simple prototypes – e.g. form only

Will save enormous time in wasted development effort

Always better and cheaper to find issues early

It quickly becomes too late to fully course correct

Technical Management

Technical Management Processes

ISO 15288 Lifecycle Processes (reproduced from SE handbook V5, Figure 2.10, pp 41)

- Typical areas to maintain:
  - **Decision Management**
  - Risk Management
  - Configuration Management
  - **Information Management**
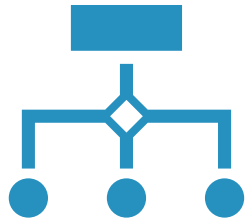 - **Measurement**

Measurement

Why is it important?

To understand design maturity

To track product and project performance

Informs where to focus resources

What practical approaches can be taken?

Keep track of measures – frequent verification and validation

Monitor resource spend and schedule data
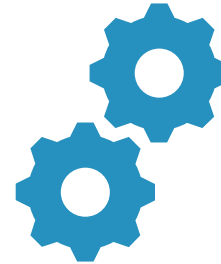
Focus effort and resources where they are needed

Information Management

Why is it important?

Ensures that information is accessible and flows between teams and activities

Example: the results of prototype evaluation being fed into design teams and activities

What practical approaches can be taken?

A level of active curation is needed, particularly as organisations grow

Think beyond data capture, into data consumption – who needs it, what will it inform

Manage capture, curation and distribution accordingly

Decision Management

Why is it important?

Recording your decisions

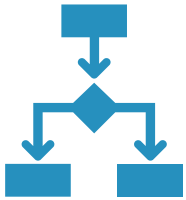**What practical approaches can be taken?**

Recording your decisions

This is not a joke. Enormous time is wasted from unnecessarily revisiting the same decisions over and over.

Other considerations

Tools

Revisit your needs. Where is SE adding value?

What processes are time consuming and difficult to manage?

Who needs to interact with the information

What tool functionality will provide the most value

Summary

Adopt SE philosophy and behaviours, not just formality

Understand your existing organisation (system) and your needs

Determine where more SE can have the greatest value and start there

Be the glue, don't work in isolation

Don't forget technical management

Select and adopt tools to address needs

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Questions and Comments

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