
Systems Engineering for Technical Leaders Training Course: Lifecycle, Requirements and Verification

20 – 24 June 2027
Muscat





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Programme Summary

Systems engineering is the subject of this five-day training course for engineering managers, programme and project leads and technical directors at managerial level, ending in a systems engineering plan for one technical programme. Complex programmes fail most often at the joins between requirements, design, integration and testing, where no single team has oversight. The approach moves from the life cycle and stakeholder needs, through requirements and architecture, to integration and verification, then to a worked plan. Mars Training Centre UK delivers this programme in systems engineering.

The Business Case

When requirements are vague and interfaces are unowned, errors found late cost far more to correct than errors found early. Leaders who insist on traceable requirements, agreed interfaces, planned verification and visible technical risk can detect problems while change is still affordable and can show sponsors why a decision was taken.

- Late Rework: Falls as requirements are agreed, traced and reviewed before design is committed.
- Integration Delays: Reduce as interfaces are owned and verified before components are combined.
- Technical Risk Exposure: Narrows as risks are tied to verification evidence and reviewed at each gate.

Principles and Evidence Base

- ISO/IEC/IEEE 15288: This international standard for system life cycle processes structures the life cycle and process work in Sessions 1 and 4.
- INCOSE Systems Engineering Handbook: Its guide to system life cycle processes and activities informs the requirements, architecture and integration work in Sessions 2 and 3.
- V-model: This model links requirements and design to verification and validation, and organises the test planning in Session 4.

Intended Participants

- Engineering managers who direct multidisciplinary teams delivering a technical system.
- Programme and project leads who plan, baseline and control complex technical scope.
- Technical directors who approve architectures, trade-offs and design reviews.
- Quality and assurance leads who judge whether verification evidence is sufficient.

The programme serves aerospace, rail, energy and infrastructure organisations.



Learning Outcomes

1. Participants will be able to map life cycle stages, decision gates and technical processes for a complex programme.
2. Participants will be able to construct stakeholder needs and requirements that are testable and traceable.
3. Participants will be able to evaluate architecture options through trade studies against stated criteria.
4. Participants will be able to diagnose interface and integration risks before components are combined.
5. Participants will be able to prioritise verification and validation activities by risk and evidence value.
6. Participants will be able to justify a systems engineering plan to a programme sponsor and a technical authority.

Programme Structure

Day 1: Systems Engineering and the System Life Cycle

What does systems engineering add to a programme, and how does the life cycle frame it?

- ISO/IEC/IEEE 15288 Life Cycle Process Map
- Decision Gate and Review Calendar
- System of Interest Boundary Statement
- Systems Engineering Role Charter
- Case Review of Two Sector Programme Failures

Day 2: Stakeholder Needs and Requirements

How are needs turned into requirements that can be tested and traced?

- Stakeholder Needs Register
- Requirement Quality Checklist
- Requirements Traceability Matrix
- Concept of Operations Outline
- Requirement Change Control Rules

Day 3: Architecture, Trade Studies and Interfaces

How is a design option chosen and how are interfaces controlled?

- Functional and Physical Architecture Views
- Trade Study Decision Matrix
- Interface Control Document Outline
- Technical Risk Register
- Technical Baseline Definition



Day 4: Integration, Verification and Validation

How is it shown that the system is built right and is the right system?

- V-model Test Planning Map
- Integration Sequence Plan
- Verification Method Selection Table
- Validation Criteria Statement
- Technical Review Readiness Checklist

Day 5: Applying Systems Engineering to One Technical Programme

Is the systems engineering plan ready for the sponsor and the technical authority to approve?

- Applying the Session 1 Life Cycle Map to the Chosen Programme
- Testing the Session 2 Requirements Against the Quality Checklist
- Checking Session 3 Interface List Against the Architecture Views
- Applying the Session 4 Verification Table to Open Risks
- Completing the Systems Engineering Plan

Methodology

The programme is built around structured exercises and case analysis. Participants work with an anonymised technical programme, sample requirements and interface lists, write and review requirements, compare options and plan verification in small teams, then defend their plan before a simulated technical review board. No engineering design work is required.

- Suggested activity: Rewriting ten weak sample requirements so each can be tested.
- Suggested activity: Scoring three architecture options against weighted criteria.
- Suggested activity: Matching sample requirements to verification methods and test stages.

Capstone Output

Each participant completes a systems engineering plan for one technical programme. It contains a life cycle and gate map, a requirements set with traceability, an architecture and trade study summary, an interface list, a risk register and a verification and validation plan. It is used to brief the sponsor and technical authority and to set the first baseline review.

Frequently Asked Questions

Is systems engineering suitable for managers without a design background?

Yes. Systems engineering is set at managerial level and assumes responsibility for technical programmes or teams, not detailed design, modelling or programming skills.



Which standards does systems engineering rest on in this course?

Systems engineering rests on ISO/IEC/IEEE 15288 for life cycle processes, the INCOSE Systems Engineering Handbook for process guidance and the V-model for verification planning.

How is the plan from systems engineering used at work?

You use the plan from systems engineering to brief your sponsor and technical authority, baseline requirements and interfaces, and schedule verification.

How does systems engineering differ from project management training?

Systems engineering centres on requirements, architecture, interfaces and verification of the technical system, while project management training centres on scope, schedule, cost and delivery governance.