9. QUALITY IN PROJECTS

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9.4 Testing

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Why test?

Prove the output meets the standards and requirements set out in the specification

Reveal hard-to-detect flaws in the output

Meet contractual requirements

Produce evidence to prove the output will help deliver the promised benefits

Understand possible aspects which may cause problems when the output is in service

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Aspects of testing

What to test?
- Components of the outputs
- **Assemblies within the output**
- Interim releases of the output
- **The entire output as an entity**
- The output prior to handover

Types of test
- Conformance test
- **Performance test**
- Technical acceptance test
- **User acceptance test**
- In-service trial

Where to test?
- Own testing facilities
- **Specialist facilities**
- Customer location

Who tests?
- Project team personnel
- **Testing specialists**
- External experts
- **Government regulators**

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Honest testing

There must be no coercion or incentives to skew test results

Testing must be sufficiently rigorous to uncover significant flaws

Team members should be openly encouraged to point out issues with the validity or design of tests

Testing must be well-planned

Test records must be complete and thoroughly documented

Testing equipment and facilities must be appropriate, properly calibrated and in good condition

People conducting tests must be fully-qualified, competent and independent

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No substitute for real life

Evidence from road vehicle development shows that no matter how much testing is done under repeatable controlled conditions, new problems will always occur when the product is put into the hands of real users.

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Quality issues from everyday use

Repairs	Error in making to specification *Misshapen primary mirror of **Hubble Space Telescope** (1993)*
Recalls	Faults with bought-in components lead to fatal accidents *Replacement accelerator pedal units for **Toyota** cars (2010)*
Upgrades	High failures, high fuel consumption and dirty exhaust *New engines for **Inter-City 125** high speed train (1990s)*
Improvements	Failure to meet promised specification *Inadequate speed of **Convair 990** (1961)*

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