Reliability, integrity and technology assurance

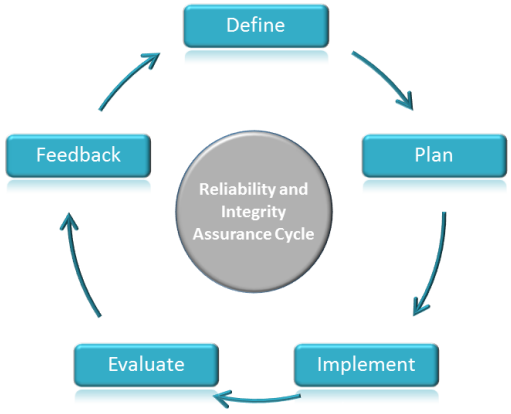
The achievement of a high level of reliability and integrity for subsea systems is essential, particularly for equipment where failure during operation has the potential to cause large adverse safety, environmental or production consequences.

The assurance cycle

Astrimar consultants have been directly involved in the creation of industry practices such as API RP 17N. These recommend the setting of goals, requirements, plans and the provision of risk and reliability assurances on reliability and integrity critical equipment and new (or enhanced) technology.

This forms the basis for an Assurance Cycle comprised of four key engineering steps:

- Defining goals and requirements
- Creating consistent plans to achieve them
- Implementing activities in accordance with the plans
- Evaluating the results against requirements
- Providing feedback and assurance of achievements



The principles are the same for the assurance of reliability, integrity or technology qualification:

	Reliability Assurance	Integrity Assurance	Technology Assurance
Define	RAM goals and strategy Technical risks and uncertainties System scope	Integrity goals and strategy Integrity threats and risks System scope	Qualification goals Technical risks and uncertainties System scope
Plan	Reliability analysis to understand and address technical risks	Inspection, monitoring, testing, maintenance and sparing to address threats and risks	Qualification testing to verify functionality, reliability and robustness
Implement	Planned reliability analysis Reliability improvement and failure mode reduction actions	Planned IMR program Intervention and continuous improvement on identified deterioration/failure	Planned qualification testing and analysis Design improvement and failure mode reduction actions
Evaluate	The results of reliability analysis against the goals to determine the level of achievement	Inspection and integrity monitoring results in operation against acceptance criteria	Results from qualification tests and activities against the project acceptance criteria
Feedback	Collate assurance and evidence of management of identified risks to reliability Feedback lessons learned	Collate assurance and evidence of actions taken to respond to integrity threats and inspection Feedback lessons learned	Collate assurance and evidence of testing carried out to verify functionality and reliability Feedback lessons learned

Data collation

New technology developments often involve complex, socio-technical systems, requiring the integration of data and services from a variety of sources, developed and delivered by diverse teams of designers, engineers, operators and managers. The management and assurance of reliability, integrity and qualification is often a significant challenge for the development, project or operations team.

At the same time, reliability and integrity assurances need to be clearly communicated to stakeholders to give the best possible indication that the system will work.

Assurance evidence

Evidence of assurance may be provided in a variety of forms, for example field and factory test data, qualification tests, reliability analyses, inspection and monitoring data.

Demonstration of close out of actions arising from analysis and testing or implementation of lessons learned is also valuable evidence.

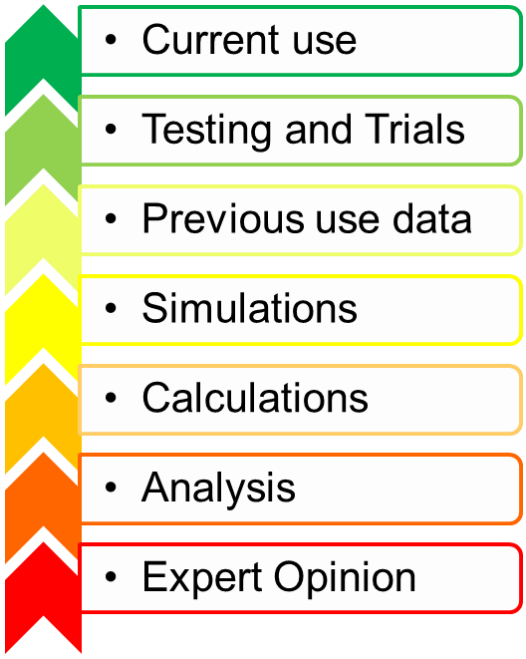
It is important for operators to have a high level of confidence in the assurance claims and to understand the level of uncertainty in the data provided to avoid over reliance on weak evidence.

The highest level of confidence is provided from actual field data but testing and analysis can also yield valuable evidence provided any uncertainties are understood.

Astrimar consultants can support the categorisation of evidence to ensure that there is a sufficient level of confidence in the assurance data.

Factors are reviewed to identify the degree of uncertainty in the evidence provided, such as:

- data sources
- number of replicates
- test environment
- duration
- model validation



Find out more

We run regular free webinars providing an overview of our capabilities and approaches to reliability, integrity and technology assurance best practice. In addition, we can provide a more detailed hands-on one day training courses which include a number of analysis techniques. Details about upcoming webinars are provided on the Training pages of our website together with booking and contact information.

Head Office: +44 (0) 1467 620692
info@astrimar.com