SYSTEM HAZARD AND RISK ANALYSIS (HRA) – MANDATORY

Ref_ID	Type	Unit of Competency	Practitioner
HRA1	Task	Defining the scope of a hazard and risk analysis	Can illustrate, through working notes and minutes of meetings, how the necessary information is collected to correctly define the scope of safety hazard and risk assessments carried out within the organisation or relevant industry sector. Can describe the choices which have to be made in ensuring that hazard and risk analyses are carried out at an appropriate level of detail. Can illustrate, through system block diagrams, how the inter-relationships between elements of a safety-related system, and the interface of the safety-related system with its environment, have been identified and defined.
HRA2	Task	Identifying hazards	Can explain the difference between hazards, accidents and failures. Has participated in hazard identification exercises (e.g. brainstorms) that demonstrate the use of lateral thinking in identifying hazards and, in particular, hazards relating to the operation and maintenance of the system and degraded modes of operation. Can show how information from previous designs, incidents and other sources has been used in hazard identification exercises.
HRA3	Task	Hazard analysis	Can illustrate, through hazard analysis reports, how the relevant hazard analysis techniques have been correctly employed. Can justify the use of selected hazard analysis techniques by correctly referencing relevant standards and information regarding the capabilities of the organization. Has analysed hazardous event sequences using conceptual thinking and can illustrate this by reference to hazard analysis reports and related system documentation. Can illustrate, through hazard analysis reports, how human factors have been addressed in the performance of hazard analysis activities.

Ref_ID	Type	Unit of Competency	Practitioner
HRA4	Task	Risk assessment	Has carried out risk assessments as part of a wider team. Can illustrate, through risk assessment reports, how an accepted method for assessing the risks associated with a safety-related system application has been used. Can illustrate, through risk assessment reports, how the tolerability of risks has been addressed for safety-related projects carried out within the organisation or within the relevant industry sector. Can illustrate, through risk assessment reports, how safety regulatory requirements and associated legal issues have been addressed during risk assessment activities.
HRA5	Task	Eliminating or mitigating hazards	Can illustrate, through working notes, how the capabilities of current technology have been evaluated in considering potential means of eliminating or mitigating hazards.
HRA6	Task	Formation and control of hazard log	Has formed and controlled a hazard log on a project. Can show how a hazard log is used to drive and monitor a development in line with the safety requirements.
HRA7	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual project involvement. Can cite relevant safety assurance standards and can explain the fundamental concepts within them, and can identify differences between them.
HRA8	Attribute	Application domain knowledge	Can illustrate, through hazard identification and brainstorm meeting notes how domain specific safety requirements have been addressed during safety hazard and risk analysis exercises for a safety-related system. Can explain the reasons why hazard and risk analyses are performed and their place in a safety case for a safety related system. Is familiar with the history of the development of safety philosophy and standards for the domain and the way in which previous incidents have influenced that development.

Ref_ID	Type	Unit of Competency	Practitioner
HRA9	Attribute	Systematic approach	Can illustrate, through hazard analysis and risk assessment reports, how systematic techniques have been employed in analysing the hazards and risks associated with a safety- related system application. Typically, a degree in a numerate discipline would be expected. Someone without Tertiary level mathematics or equivalent would be unlikely to have the logical and numeracy skills to undertake or understand the analyses required.
HRA10	Attribute	Systems viewpoint	Can analyse the inter-relationships between system elements of a safety-related system, using for example block diagrams, and has systematically documented assumptions relating to these inter-relationships in requirements analysis reports. Can identify key system elements which relate to the safety of the system in its environment.
HRA11	Attribute	Professional standing	Typically, an engineer with a degree in a relevant discipline. Has had practical safety engineering experience within the relevant industry sector.
HRA12	Attribute	Team-working	Has worked as an effective member of a hazard and risk assessment team. Has made an effective contribution to hazard and risk analysis work as part of a team.

CORPORATE FUNCTIONAL SAFETY MANAGEMENT (CFM)

Ref_ID	Type	Unit of Competency	Practitioner
CFM1	Task	Realisation of a safety management strategy	Has documented parts of a safety management system and can illustrate, using corporate safety management procedures and audit reports, how existing organisation methods and procedures have been incorporated into the safety management system.
CFM2	Task	Allocation of responsibilities	Has participated in the definition of specific roles and their relationships with other roles so as to ensure the effective and robust operation of a safety management system.
CFM3	Task	Promoting awareness	Can illustrate, through training programme course notes, follow-up questionnaires, audit reports etc., how awareness of a safety management system has been promoted within an organisation, how the extent of that awareness has been checked and how corrective actions have been taken to increase awareness.
CFM4	Task	Providing safety advice	Can illustrate, through procedures, memos, e-mails etc. and a process of workplace observation (e.g. sit-in on consultations), how effective advice on matters relating to functional safety has been provided to safety-related projects. Can explain the different methods that have been used and considered for providing advice to safety- related project teams and identify the advantages and disadvantages of each method in relation to the particular requirements of the organisation.
CFM5	Task	Monitoring compliance	Can explain the advantages and disadvantages of different mechanisms for monitoring compliance with a safety management system, backing up the explanation with documentary evidence of the performance of such monitoring. Can show how monitoring has been achieved within an organisation, and how the results of the monitoring process are fed back into the safety management system
CFM6	Task	Handling safety incidents	Has been involved in the follow-up actions after an incident. Has developed appropriate procedures for the investigation and the implementation of recommendations arising from investigations. Can explain how an incident is resolved and how the likelihood of re-occurrence is minimised.
CFM7	Task	Regulatory and legal compliance	Can illustrate, through corporate safety management procedures, how safety regulatory requirements and associated legal issues have been reflected in the organisation's safety management system.

Ref_ID	Type	Unit of Competency	Practitioner
CFM8	Task	Managing resource allocation	Can illustrate, through e.g. estimating sheets, how advice has been provided to safety-related projects with regard to the necessary resource requirements for carrying out the project. Can provide 'rule of thumb' estimates for complex or innovative projects carried out by the organisation.
CFM9	Task	Assuring staff competence	Can illustrate, via the organization's procedures, project safety plans, safety justifications, how a competence justification system is implemented within the organisation for safety-related projects.
CFM10	Attribute	Effective communication	Has made successful formal presentations. Communicates well in a team and in one-to-one situations at most levels within an organisation. Has consistently produced written work of a quality which is well organised, accurate (both technically and grammatically), complete, logical, concise, unambiguous and to the point.
CFM11	Attribute	Eliciting information	Collects and understands the relevant information from personnel at all levels. Can identify more important issues from a wider range of points.
CFM12	Attribute	Organisation systems	Can explain how the safety management system fits in, and relies on the quality management system and the financial/project management systems.
CFM13	Attribute	Functional safety practices	Has worked on a safety-related project relating to the context within which the organisation operates and has gained a knowledge of how safety is addressed within the organisation. Can describe relevant technologies and how they might be used for safety related work in the domain of interest.
CFM14	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual project involvement. Can cite relevant safety assurance standards, explain their fundamental concepts, and illustrate any differences.
CFM15	Attribute	Professional standing and personal integrity	Typically an engineer with a degree in a relevant discipline. Has had practical safety engineering experience within the relevant industry sector. Has defended a judgement when under external pressure to compromise position.

PROJECT SAFETY ASSURANCE MANAGEMENT (PSM)

Ref_ID	Type	Unit of Competency	Practitioner
PSM1	Task	Defining the scope of the project	Can illustrate, through design documents, working notes, minutes of meetings etc., how information has been collected to define the scope, context and safety significance of safety-related projects carried out within the organisation or relevant industry sector.
PSM2	Task	Developing and maintaining a project safety assurance plan	Has contributed to project safety assurance plans for projects carried out within the organisation or industry sector and can describe the advantages and disadvantages of different safety lifecycle models and how these relate to different development lifecycle models. Can illustrate, via project safety assurance plans, how appropriate selections of techniques and measures have been made for safety-related projects carried out by the organisation. Can justify the use of the selected techniques and measures by referencing relevant standards and the capabilities of the organisation. Can illustrate, e.g. via the contents of a project safety assurance plan, how safety-related projects have been organised, how responsibilities have been allocated and described, and how the requirements for independence have been addressed. Can illustrate, via project safety assurance plans, memos, how resource requirements were derived, reviewed and updated in line with the progress of safety-related projects carried out within the organisation or industry sector. Can explain previous situations when resource requirements have been incorrectly estimated.
PSM3	Task	Managing compliance with the project safety assurance plan	Can explain the advantages and disadvantages of different mechanisms for monitoring compliance with a project safety assurance plan, backing up the explanation with documentary evidence from previous projects. Can identify mechanisms to counter monitoring inadequacies.
PSM4	Task	Monitoring the engineering development	Can show how monitoring of engineering development is achieved within an organisation. Can describe ways in which divergence from design philosophy can occur and how safety can therefore be jeopardised.
PSM5	Task	Managing the provision of safety assurance evidence	Can illustrate how sufficient information was collected from a variety of sources to be able to construct a safety argument. Has written a safety argument. Can explain the underlying objectives of a safety case with regard to the current regulatory regime and can describe the contents of a typical safety case.

Ref_ID	Type	Unit of Competency	Practitioner
PSM6	Attribute	Effective working relationships	Has worked as an effective member of a safety-related project team coordinating the activities of a group of individuals and reporting to a project manager within his/her own organisation.
PSM7	Attribute	Effective Communication	Has made successful formal presentations. Communicates well in a team and in one-to-one situations at most levels. Produces written work of a quality which is well organised, accurate (both technically and grammatically), complete, logical, concise, unambiguous and to the point.
PSM8	Attribute	Methodical approach	For whole safety-related projects, can explain how and why particular methods were chosen to perform the different tasks required for the project.
PSM9	Attribute	Safety regulations and standards	Can illustrate, via project safety plans, audit reports, design documents, how the requirements of the relevant safety regulations and standards have been incorporated in safety-related projects carried out by the organisation.
PSM10	Attribute	Organisation systems	Can illustrate, through project safety plans, audit reports, design documents, how the requirements of the organisation's safety management system and the associated methods and procedures have been incorporated in the safety-related project activities carried out.
PSM11	Attribute	Decision making	Given a set of information regarding a hypothetical situation, can identify the key facts and proposes a decision that relates to the identified key facts.
PSM12	Attribute	Influencing and negotiating	Can cite examples from his/her own experience where is has been necessary to exert influence to satisfactorily resolve a situation relating to the safety assurance of a safety-related system.
PSM13	Attribute	Team management	Can illustrate, through the presentation of supporting documentation, how the work carried out by others is supported and checked to ensure that the key objectives of project safety assurance management are met.

SAFETY-RELATED SYSTEM ARCHITECTURAL DESIGN (SAD)

Ref_ID	Type	Unit of Competency	Practitioner
SAD1	Task	Partitioning safety requirements	Understands typical safety-related system safety requirements specifications. Can interpret system safety requirements specifications in preparing safety-related system architectural design specifications. Has decided the levels of independence of different sub- systems, using a standard approach, and documented the results in safety-related system architectural design specifications. Has apportioned elements of a safety-related system to programmable electronics or hardwired circuitry in accordance with a standard approach, and documented the results in safety-related system architectural design specifications.
SAD2	Task	Evaluating solutions	Has compared competing architectures using a standard approach and a pre-defined set of criteria and has documented the results in system analysis reports. In justifying a particular choice of a safety-related system architecture, has taken into account the advantages and disadvantages of alternative diversities in design and technology, and has documented the rationale in system analysis reports.
SAD3	Task	Specifying a safety-related system architecture	Has specified safety-related system architectures, using the relevant notations and convention, in a way that clearly indicates where safety functions are to be implemented and how different sub-systems interact.
SAD4	Attribute	Application domain knowledge	Has consistently reflected relevant domain specific requirements in safety-related system architectural design solutions. Is familiar with the history of the development of safety philosophy and standards for the domain and the way in which previous incidents have influenced that development.
SAD5	Attribute	Systems viewpoint	Has analysed the inter-relationships between system elements of a safety-related system, using for example block diagrams, and has systematically documented any assumptions relating to these inter-relationships in requirements analysis reports.
SAD6	Attribute	Technology	Has reviewed and evaluated different engineering technologies in relation to the selection of optimum architectural design solutions and has document the results in system analysis reports.
SAD7	Attribute	Conceptual thinking and open-mindedness	Has incorporated new technology in the architectural and hardware design for a safety-related system and has evaluated the impact on safety.

SAFETY-RELATED SYSTEM HARDWARE REALISATION (SHR)

Ref_ID	Type	Unit of Competency	Practitioner
SHR1	Task	Interpreting given safety requirements	Has evaluated safety requirements in the context of the current state of available technology, and has recorded the results in working notes, memos or reports.
SHR2	Task	Transposing from requirements into design	Has produced a hardware design for a complex safety- related system. Produces hardware design specifications for safety-related systems using the relevant hardware design notations. Has addressed hardware design constraints for safety- related systems in the preparation of hardware design specifications. Has documented within hardware design specifications, using a standard approach, the relationship between each requirement and the corresponding hardware design features so as to facilitate understanding of the design. Has produced hardware design specifications for safety- related systems which consistently address the requirement for testability.
SHR3	Task	Designing hardware	Has had responsibility for the overall hardware design of safety-related systems. Has consistently addressed the requirements of relevant hardware design standards in designing hardware for safety-related systems.
SHR4	Task	Analysing the hardware design	Can demonstrate that constraint limitations will not adversely affect the safe operation of a system and that the hardware realisation is consistent with the requirements. Has analysed the functional safety of the hardware components of a safety-related system using relevant analysis technique. Has documented the results of analyses in a report that could be used to support a justification that the system will be safe. Typically, a degree in a numerate discipline would be expected. Someone without Tertiary level mathematics or equivalent would be unlikely to have the logical skills to undertake or understand the analyses required.
SHR5	Task	Specifying tests	Has prepared hardware design test specifications, using the relevant test methods and techniques, to demonstrate compliance with safety requirements. Has developed test specifications, and contributed to the development of test rig designs, using a practical and creative approach.
SHR6	Task	Executing tests	Has produced test reports for safety-related systems that clearly identify and highlight, for subsequent action, the side-effects of safety-related system hardware testing activities.

Ref_ID	Type	Unit of Competency	Practitioner
SHR7	Attribute	Hardware safety regulations and standards	Has consistently reflected the requirements of the relevant hardware safety regulations and standards in hardware development plans and design specifications for safety- related systems.
SHR8	Attribute	Application domain knowledge	Consistently reflects relevant domain specific requirements in safety-related system hardware design solutions. Is familiar with the history of the development of safety philosophy and standards for the domain and the way in which previous incidents have influenced that development.
SHR9	Attribute	Team-working	Has worked as an effective member of a hardware development team for a safety-related project, co- ordinating the activities of the team and, where appropriate, reporting to a project manager within his or her own organisation.
SHR10	Attribute	Openness	Is prepared willingly to describe situations in which mistakes have been made resulting from insufficient supervision / monitoring of a hardware development team, the underlying reasons and the lessons learned. Encourages openness in hardware development teams, for example through mentoring and the provision of design review procedures.

SAFETY-RELATED SYSTEM SOFTWARE REALISATION (SSR)

Ref_ID	Type	Unit of Competency	Practitioner
SSR1	Task	Interpreting given safety requirements	Has evaluated sets of safety requirements in the context of the current state of available software technology, and recorded the results in working notes, memos or reports.
SSR2	Task	Transposing from requirements into design	Has written a software design specification for a complex safety-related system. Produces software design specifications for safety-related systems using the relevant software design notations. Has addressed software design constraints for safety- related systems in the preparation of software design specifications. Has produced software design specifications which explicitly document, using a standard approach, the relationship between each requirement and the corresponding software design features so as to facilitate understanding of the design. Has produced source code and associated module design specifications for safety-related systems which consistently address the requirement for testability.
SSR3	Task	Analysing the design	Has analysed software designs for safety-related systems employing software safety analysis techniques and has documented the results in software safety analysis reports. Understands the contribution of software safety analysis in the overall safety assessment process and how the results are used in further verification and validation activities (e.g. determining the required rigour of testing of different areas of the software design).
SSR4	Task	Coding	Has coded complete software sub-systems for typical safety-related systems, using a safe sub-set of the relevant programming language in accordance with a defined coding standard.
SSR5	Task	Analysing the code	Has analysed the functional safety of the software elements of a safety-related system using the relevant techniques, and has documented the results in software analysis reports that could be used to support a justification that the systems are safe. Has taken part in and led code walkthroughs which focus on safety aspects of the code. Typically, a degree in a numerate discipline would be expected. Someone without Tertiary level mathematics or equivalent would be unlikely to have the logical skills to undertake or understand the analyses required.
SSR6	Task	Specifying software tests	Has prepared software design test specifications using the relevant software test methods and techniques to demonstrate compliance with safety requirements. Has developed test specifications, and contributed to the development of test rig designs, using a practical and creative approach.

Ref_ID	Type	Unit of Competency	Practitioner
SSR7	Task	Executing tests	Has produced test reports for safety-related systems that clearly identify and highlight, for subsequent action, the side-effects of safety-related system software testing activities. Has reviewed and approved software test specifications to ensure that software designs are tested fully. Can identify key safety functions in a software design.
SSR8	Attribute	Software safety regulations and standards	Has produced software development plans and software design specifications for safety-related systems which consistently reflect the requirements of the relevant software safety regulations and standards.
SSR9	Attribute	Application domain knowledge	Has consistently reflected relevant domain specific requirements in safety-related software design solutions. Is familiar with the history of the development of safety philosophy and standards for the domain and the way in which previous incidents have influenced that development.
SSR10	Attribute	Team-working	Has worked as an effective member of a software development team for a safety-related project, co- ordinating the activities of the team and reporting to a project manager within his or her own organisation.
SSR11	Attribute	Openness	Is prepared willingly to describe situations in which mistakes have been made resulting from insufficient supervision / monitoring of a software development team, the underlying reasons and the lessons learned. Encourages openness in software development teams, for example through mentoring and the provision of appropriate design review procedures.

HUMAN FACTORS SAFETY ENGINEERING (HF)

Ref_ID	Type	Unit of Competency	Practitioner
HF1	Task	Modelling human behaviour	Has developed human behavior and performance models for safety-related systems, particularly models addressing the influence of humans on the safety of the system in its environment. Can explain how different generic models of human performance are used to develop models to capture causes and effect for specific applications for the particular safety-related system.
HF2	Task	Identification of end-user requirements	Understands how failure adequately to engage the users of a safety-related system might lead to an unsafe situation. Regularly obtains and documents input from users, using standard strategies, during the development of safety-related systems.
HF3	Task	Providing human factors safety input	Has written arguments for the safety performance of a safety-related system based on predicted human performance. Ensures that human factors are brought to the forefront of discussions regarding the development or operation of safety-related systems and are a key element of an organisation's safety culture. Disseminates human factors advice within a project or an organisation through, for example, memos, reports, organisation procedures and training courses.
HF4	Task	Operational analysis	Has assisted in the hazard analysis and risk assessment of safety-related systems through the provision of written hazard analysis and risk assessment reports dealing with the operational and maintenance aspects of safety-related systems. Regularly assesses the environmental conditions under which safety-related systems are developed or operated and has proposed solutions to identified environmental problems in written environmental assessment reports.
HF5	Task	Task analysis	Has analysed the tasks carried out by humans and documented the findings in safety-related system analysis reports and safety requirements specifications. Understands how humans interact with safety-related systems and is aware how detailed changes in system designs can impact day-today operation and maintenance tasks and through life costs.
HF6	Task	Developing procedures	Has developed operation and maintenance procedures for safety-related systems. Has written clear specifications for user tasks. Has developed, or tailored, organisation standards, procedures and style guides for use during the development or operation of safety-related systems.
HF7	Attribute	Effective communication	Has made successful formal presentations. Communicates well in a team and in one-to-one situations at most levels. Produces written work of a quality which is well organised, accurate (both technically and grammatically), complete, logical, concise, unambiguous and to the point.

Ref_ID	Type	Unit of Competency	Practitioner
HF8	Attribute	Multi-discipline systems viewpoint	Has analysed the inter-relationships between the system elements of an overall safety-related system and documented the results with system block diagrams and requirements analysis reports.
HF9	Attribute	Human reliability theory	Has a minimum of three years' experience of the application of human reliability theory to the development and operation of safety-related systems. Has analysed human / system interactions for a safety related system, using relevant analytical, modelling and empirical methods, and has documented the results in system analysis reports.
HF10	Attribute	Regulatory and legal compliance	Knows the relevant functional safety standards appropriate to the industry sector. Is aware of the key principles underlying the relevant regulatory regime, associated legal issues and how these relate to human factors safety issues.
HF11	Attribute	Organisation systems	Has worked on a safety-related project relating to the context within which the organisation operates and has gained a knowledge of how safety is addressed within the organisation. Understands how relevant technologies are used for safety-related work in the domain of interest.
HF12	Attribute	Principles of functional safety assurance	Understands the impact which the principles of functional safety assurance have on human factors safety engineering activities.
HF13	Attribute	Professional standing and personal integrity	Typically, an engineer with a degree in a relevant discipline. Evidence of human factors safety engineering experience within the relevant industry sector. Has defended a judgement when under external pressure to compromise position.

SAFETY-RELATED SYSTEM MAINTENANCE AND MODIFICATION (SRM)

Ref_ID	Type	Unit of Competency	Practitioner
SRM1	Task	Planning for maintenance and modification of safe operation	Has written a maintenance and modification plan and can demonstrate contribution towards the formation of a safe maintenance and modification strategy. Understands the importance of clear responsibilities for maintenance and modification tasks where they relate to safety.
SRM2	Task	Development of maintenance and modification procedures	Has written maintenance and modification procedures which have a direct relationship to safety. Can explain how maintenance and modification procedures ensure safe operation.
SRM3	Task	Handling change	Can illustrate, through analysis reports, how proposed changes to safety-related systems are assessed for their impact on safety and the maintenance and modification procedures.
SRM4	Task	Monitoring compliance	Has contributed to the development of fault reporting, auditing and review systems. Can explain how the monitoring system has been used to effect changes in the system and in its maintenance and modification regime.
SRM5	Task	Handling safety incidents	Has set up or has been involved in the running of a reporting system, and can show how the system is or was used to identify potential incidents. Can cite examples from his/her own experience where it has been necessary to make difficult and fast decisions during an incident involving a safety-related system. Can illustrate, through memos, letters, reports and witness testimonies, how the key facts were uncovered, how decisions were taken and how the decisions were communicated.
SRM6	Task	Managing in-service information	Can illustrate, through incident reports, change documents and reliability growth modelling, how data analysis techniques are used in the provision of evidence of the operational performance of a safety-related system and used to improve its safety performance. Can illustrate, through working notes, data recorder printouts, oscilloscope traces etc., how operational performance information has been collected from a variety of sources and analysed to arrive at a conclusion regarding operational safety.
SRM7	Task	Resource allocation	Can illustrate, through project safety assurance plans and memos, how resource requirements have been derived, reviewed, updated in line with operational experience gained during the use of a safety-related system and updated to meet revised needs after modification
SRM8	Task	Existing system classification	Has allocated safety integrity levels to functions performed by safety-related systems used within the organisation.

Ref_ID	Type	Unit of Competency	Practitioner
SRM9	Task	Influencing new systems	Can describe the key functional safety issues associated with the operation and maintenance and modification of typical safety-related systems developed or operated by the organisation. Can cite examples from his/her own experience where it has been necessary to exert influence to resolve a situation relating to the maintenance and modification of a safety-related system. Can illustrate through memos, letters and witness testimonies, how the necessary influence was brought to bear and how each situation was resolved.
SRM10	Attribute	Report writing	Contrasts reports which are clear and to the point with reports where key evidence is hidden by poor writing or superfluous technical detail. Can show a range of technical reports which he/she has written on maintenance and modification issues.
SRM11	Attribute	Effective oral communication	Has made successful formal presentations. Communicates well in a team and one-to-one situations at most levels.
SRM12	Attribute	Regulatory and legal compliance	Can illustrate through safety plans and maintenance and modification manuals, how safety regulatory requirements and associated legal issues are addressed in the performance of safety-related system maintenance and modification activities.
SRM13	Attribute	Methodical approach	For maintenance and modification tasks, can explain how and why particular methods were chosen to perform them.
SRM14	Attribute	Organisation systems	Can illustrate through operation and maintenance and modification manuals, fault reports and impact analysis reports, how the requirements of the organisation's safety management system and the associated methods and procedures are referred to in the safety-related system maintenance and modification activities carried out by the organisation and to which he/she has been a main contributor.
SRM15	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved, in relation to safety-related system maintenance and modification activities, with reference to examples from actual project involvement.

SAFETY-RELATED SYSTEM OR SERVICES PROCUREMENT (SRP)

Ref_ID	Type	Unit of Competency	Practitioner
SRP1	Task	Incorporating safety requirements in an invitation to tender	Has compiled the technical aspects of an invitation to tender and can illustrate, through safety requirements specifications, how the requirements of safety regulations and standards have been incorporated in safety-related system or services procurement documents. Can illustrate through working notes and safety requirements specifications, how domain specific functional safety requirements have been incorporated into invitations to tender and can explain the reasons behind the key requirements. Has generated safety requirements that are clear and free from implementation bias.
SRP2	Task	Auditing suppliers	For specific safety-related system or services procurement projects, can describe the primary objectives that were identified for assuring functional safety and how, in auditing supplier organisations, potential compliance to these objectives was established.
SRP3	Task	Assessing tender submissions	Has carried out tender assessments. Can explain the method followed in assessing safety-related system tender submissions. Can illustrate, via tender submission assessment reports, how tender submissions have been assessed. Can illustrate through checklists and review comments, how tender submissions have been reviewed to ensure best use of current technology.
SRP4	Task	Letting a contract	Can illustrate, via relevant contract documents, how product liability issues have been addressed in typical safety-related system services procurement contracts placed by the organisation.
SRP5	Task	Managing compliance	Has had day-to-day responsibility for management of systems suppliers or subcontractors. Can illustrate, through examples, safety problems that can arise with suppliers and subcontractors. Can explain the mechanisms (e.g. audits) that have been put in place for specific projects to monitor compliance with safety requirement specifications. Can cite examples from his/her own experience where is has been necessary to negotiate and to exert influence to satisfactorily resolve a situation relating to the procurement of a safety-related system or service and can illustrate, via memos, letters, witness testimonies, how influence was brought to bear in resolving each situation.

Ref_ID	Type	Unit of Competency	Practitioner
SRP6	Task	Obtaining regulatory approval	Has liaised with the relevant regulatory authority. Can illustrate, via e.g. the key elements of relevant safety case documentation, the safety philosophy underlying different safety-related systems and services procured by the organisation and can explain the advantages and disadvantages of different safety philosophies in relation to the principles underlying different regulatory regimes. Can illustrate, via records of correspondence and minutes of meetings, the process by which safety arguments and related evidence for a safety-related system procured by the organisation or a safety-related system for which safety related services have been procured by the organisation, have been obtained from suppliers and presented to and agreed with the relevant regulatory authority throughout the procurement process.
SRP7	Attribute	Business objectives	Can cite examples where issues of functional safety assurance have had an impact on the organisation's business objectives. Can explain the actions that have been taken to ensure that functional safety assurance is seen within projects as a factor which serves the organisation's business objectives
SRP8	Attribute	Effective communication	Has made successful formal presentations. Communicates well in a team and in one-to-one situations at most levels. Produces written work of a quality which is well organised, accurate (both technically and grammatically), complete, logical, concise, unambiguous and to the point.
SRP9	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual procurement projects. Can cite relevant safety assurance standards, explain the fundamental concepts within them, and describe differences between them.
SRP10	Attribute	Organisation systems	Can illustrate, via safety requirements specifications, audit reports and safety case documentation, how the requirements of the organisation's safety management system and the associated methods and procedures are employed in the safety-related system or services procurement activities carried out by the organisation.
SRP11	Attribute	Personal integrity	Has defended a judgement when under external pressure to compromise position.

INDEPENDENT SAFETY ASSESSMENT (ISA)

Ref_ID	Type	Unit of Competency	Practitioner
ISA1	Task	Scope and context appreciation	Can illustrate through design documents, interview notes and minutes of meetings, how the necessary information has been collected to correctly define the scope of a safety assessment. Can explain how issues with scope and context of a safety-related system are important in the performance of an effective independent safety assessment. Can illustrate through system block diagrams, how the inter-relationships between system elements of a safety- related system have been analysed in order to define the scope of the elements of a safety-related system to be assessed.
ISA2	Task	Assessment strategy selection	Can illustrate how the cost-effectiveness of an independent safety assessment has been addressed by, for example, isolating the most important elements of the product and of the development process in relation to safety and deriving an appropriate sampling strategy. Can illustrate through independent safety assessment plans, how appropriate selections of techniques and measures have been made for independent safety assessments. Can justify the use of the selected techniques and measures by referencing relevant standards and information regarding the capabilities of the organisation. Can identify the key resource requirements that need to be addressed for the successful undertaking of an independent safety assessment. Given a typical independent safety assessment scenario, can make a reasonable estimate of the necessary resource requirements.
ISA3	Task	Planning	Presents a safety assessment plan to which the candidate has contributed. Can illustrate through checklists, how technical criteria have been identified and specified in performing an independent safety assessment.
ISA4	Task	Safety auditing	For specific independent safety assessments, can describe the primary objectives that were identified for assuring functional safety and how, in carrying out audits, a conclusion against these objectives was established. Can identify, and can explain the relevance of, key pointers that are usually looked out for when performing functional safety audits. Given a simple fact to be established from the audit, can identify an appropriate line of questioning to obtain the necessary answers from the staff under assessment, which is tenacious and non-confrontational.
ISA5	Task	Reviewing safety documentation	Can illustrate with e.g. review reports, witness testimonies how inaccuracies, omissions and deficiencies have been identified in reviewing safety-related system documentation as part of independent safety assessments. Has successfully performed review work requiring a high degree of conceptual thinking.

Ref_ID	Type	Unit of Competency	Practitioner
ISA6	Task	Assessing safety analysis	Can illustrate, through safety analysis reports, how relevant safety analysis techniques (e.g. fault tree analysis, failure modes, effects and criticality analysis) have been employed in analysing the functional safety of a safety- related system and how the results of these analyses have been used to support a conclusion regarding the level of safety of a safety-related system. Can judge when the scope and depth of safety analyses carried out are sufficient to provide an appropriate level of safety assurance. Can illustrate, using traceability reports, how the individual safety requirements of a safety-related system have been traced through to the design, implementation and test specifications to ensure that all of the safety requirements are adequately discharged. Typically, a degree in a numerate discipline would be expected. Someone without Tertiary level mathematics or equivalent would be unlikely to have the logical and numeracy skills to undertake or understand the analyses required.
ISA7	Task	Forming a judgement	Has constructed and presented an argument to justify a set of conclusions and recommendations arising from the conduct of an independent safety assessment carried out within the organisation or the relevant industry sector and can illustrate this with independent safety assessment reports.
ISA8	Task	Producing assessment reports	Has written a range of assessment reports. Can show how the assessment activities and results are reported and how these are summarised to present a relevant and clear set of conclusions on the safety evidence for a safety-related system.
ISA9	Task	Managing outcomes	Can illustrate, through independent safety assessment reports, how the findings resulting from independent safety assessments have been presented in a positive and constructive manner. Can illustrate, through independent safety assessment reports and associated letters and presentations, how commercial, legal or political issues have been taken into account in presenting the findings of independent safety assessments.
ISA10	Attribute	Methodical approach	Has chosen appropriate methods for safety-related projects, and can explain how and why these methods were chosen to perform the different tasks required for the project.
ISA11	Attribute	Eliciting information	Collects and understands the relevant information from personnel at all levels. Can identify more important issues from a wider range of points.
ISA12	Attribute	Effective communication	Has made successful formal presentations. Communicates well in a team and one-to-one situations at most levels. Produces written work of a quality which is well organised, accurate (both technically and grammatically), complete, logical, concise, unambiguous and to the point.
ISA13	Attribute	Functional safety practices	Can explain the basic functional safety practices (e.g. safe state on power off and basic safety architectures) employed in safety related applications within the industry.

Ref_ID	Type	Unit of Competency	Practitioner
ISA14	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual project involvement. Can cite relevant safety assurance standards, can explain the fundamental concepts within them, and can identify differences between them.
ISA15	Attribute	Professional standing and personal integrity	Defended a judgement when under external pressure to compromise position. Typically, an engineer with a degree in a relevant discipline. Has had practical safety engineering experience within the relevant industry sector.

SYSTEM REQUIREMENTS SPECIFICATION (SRS)

Ref_ID	Type	Unit of Competency	Practitioner
SRS1	Task	Capturing safety requirements	Has participated in the collection of potential safety requirements for safety-related systems developed or operated by the organisation or within the relevant industry sector. Can illustrate, through working notes and minutes of meetings, how the necessary information has been collected. Has had practical work experience within the relevant industry sector and with the relevant safety-related system applications and can explain typical operation and maintenance procedures and modes of operation. Has participated in identification of safety requirements, given identified baseline hazards and risks, and can illustrate with e.g. hazard and risk analysis reports and associated safety requirements specifications. Can give a comprehensive explanation of the level of risk associated with safety-related systems developed or operated by the organisation. Understands how the constraints imposed by available technology have been considered when identifying safety requirements, and can illustrate this through working notes and safety requirements specifications. Can illustrate, through working notes and safety requirements specifications, how requirements of the relevant safety standards, codes or practice and guidelines have been addressed in identifying safety requirements.
SRS2	Task	Evaluating safety requirements	Can describe the techniques (e.g. fault tree analysis, functional failures modes and effects analysis) used as standard within the organisation or the relevant industry sector for analysing the dependencies between safety functions and their individual impact on the overall safety of a safety-related system application in its environment. Can illustrate, through system block diagrams, safety requirements analysis reports etc., how the dependencies between safety functions of a safety-related system, and their impact on the overall safety of the system have been analysed, making reference to the results of any separate hazard and risk analysis activities that have been carried out. Can illustrate, through working notes and safety requirements analysis reports, how safety integrity levels have been allocated to individual safety functions for a safety-related system developed by the organisation, making reference to the results of any separate hazard and risk analysis activities that have been carried out. Can illustrate, through requirements analysis reports, how, in accordance with the relevant procedures, costs versus benefits have been evaluated to arrive at an optimum set of safety requirements for a safety-related system developed by the organisation.

Ref_ID	Type	Unit of Competency	Practitioner
SRS3	Task	Specifying safety requirements	Has made correct use of the relevant notations for specifying safety requirements. Can explain the strengths and weaknesses of different notations and styles of specification, for use in producing design and test specifications. Has produced safety requirements specifications that are clear and free from implementation bias.
SRS4	Attribute	Application domain knowledge	Has written safety requirements specifications, and can illustrate the key safety requirements for a safety-related system within the domain. Can explain how the safety- related system impacts on the wider environment, including operation and maintenance.
SRS5	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual project involvement. Can cite relevant safety assurance standards, explain their fundamental concepts, describe any differences between them and can show how these are reflected in safety requirements specifications.
SRS6	Attribute	Clarity	Has written safety requirements specifications and can explain why the requirements are sufficiently clear and not open to misinterpretation.
SRS7	Attribute	Conceptual thinking and open-mindedness	Has produced requirements specifications which allow radical designs. Is open to different design solutions and understands the importance of innovation for performance and safety.
SRS8	Attribute	Systems viewpoint	Understands the main relationships between subsystems of a safety-related system and how the whole system interacts with the outside environment. Highlights key system issues which affect the overall safety of the system. in its environment.

SAFETY VALIDATION (SV)

Ref_ID	Type	Unit of Competency	Practitioner
SV1	Task	Defining a safety validation plan	Has written a safety validation plan and can demonstrate a contribution towards the formation of the safety validation strategy. Understands the range of validation evidence which can be used to support a safety argument, and how arguments that safety-related systems have met their SIL requirements are constructed. Can give reasoned arguments for the inclusion/omission of validation information with regard to the safety argument for a particular, novel, system. Given a safety argument, can identify deficiencies in the argument and pinpoint areas where safety validation evidence is weak. Can illustrate how appropriate selections of test and analysis methods and techniques and test tools have been made for safety-related projects carried out by the organisation or within the relevant industry sector, and justifies them based on references to relevant standards and information regarding the capabilities of the organisation. Can show how the SIL of the safety-related system relates to the selection of appropriate methods and techniques and understands the practical limitations of performing some of the validation techniques at higher SILs.
SV2	Task	Specifying tests	Can describe the content of typical test specifications and procedures (e.g. initial conditions, safety hazards, space to record results, acceptance criteria) appropriate to the organisation or industry sector and has had recent project experience illustrated by test specifications. Can demonstrate a practical approach in devising means of validating a safety-related system, illustrated by e.g. test rig designs, test specifications. Has shown creativity in devising means of validating a safety-related system, illustrated by e.g. test rig designs, test specifications. Not yet fully aware of a wide range of weaknesses in test specifications and how they are identified.
SV3	Task	Witnessing and executing tests	Can illustrate through site acceptance and factory acceptance test reports, how the significance of side- effects observed during the performance of testing has been assessed. Can illustrate, through examples (real or hypothetical), instances where proposed safety validation tests have, in themselves, been potentially dangerous and can illustrate, through test procedure review records and training course programmes, how actions are taken to ensure that safety is adequately considered during the performance of safety validation activities.

Ref_ID	Type	Unit of Competency	Practitioner
SV4	Task	Analysing test results	Can illustrate, through test reports, how test failures have been analysed and categorised in terms of their potential impact on functional safety and their underlying causes, and can show how important side-effects of safety validation activities have been highlighted and recorded for subsequent action.
SV5	Task	Performing analysis	Can illustrate, through extracts from safety validation reports, how analysis has been carried out to validate the implementation of a safety-related system.
SV6	Task	Documenting safety validation results	Can illustrate, through safety arguments, factory acceptance or site acceptance test reports, how the results of safety validation activities have been summarised in a form that easily enables a judgement to be made on the success of the safety validation activities. Can identify succinct reports which convincingly argue that the system has been demonstrated to meet its safety requirements in a form for inclusion in a safety argument. Can distinguish between key safety validation information and unimportant detail which can be left out.
SV7	Attribute	Application domain knowledge	Can illustrate, through working notes and safety validation plans, how domain specific safety requirements have been addressed during safety validation activities. Is familiar with the history of the development of safety philosophy and standards for the domain and the way in which previous incidents have influenced that development. Can identify and can describe the main hazards associated with the overall operation and the main functional components that make up a safety-related system developed or operated by the organisation. Can identify the main modes of operation of the safety- related system, the key safety functions in relation to the hazards, and the types of failure that could lead to the occurrence of a hazard.
SV8	Attribute	Principles of functional safety assurance	Can explain how safety assurance has been achieved with reference to examples from actual project involvement. Knows the relevant safety assurance standards, can explain their fundamental concepts, and can illustrate any differences between them.
SV9	Attribute	Test and analysis methods and techniques	Has selected appropriate test and analysis methods and techniques for validating a safety-related system within the organisation or the relevant industry sector, and can illustrate by reference to safety validation plans.
SV10	Attribute	Attention to accuracy and detail	Has reviewed, with consistent accuracy, safety-related system documentation as part of safety validation activities.