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Title

E3S Case Chapter 17: Management of E3S and Quality Assurance

Executive Summary

This report presents Chapter 17 of the Rolls-Royce Small Modular Reactor (RR SMR) Environment, Safety, Security and Safeguards (E3S) Case which describes the overarching summary and entry point to the management and organisational arrangements related to delivery of the design and E3S Case for Rolls-Royce Small Modular Reactor (RR SMR).

The evidence demonstrates that arrangements are in place in relation to the management of E3S and quality assurance which enable appropriate standards in support of E3S and quality to be applied throughout all phases of the reactor lifecycle. Rolls-Royce SMR arrangements are developing in line with design maturity and updates will be described in future revisions of the E3S Case.

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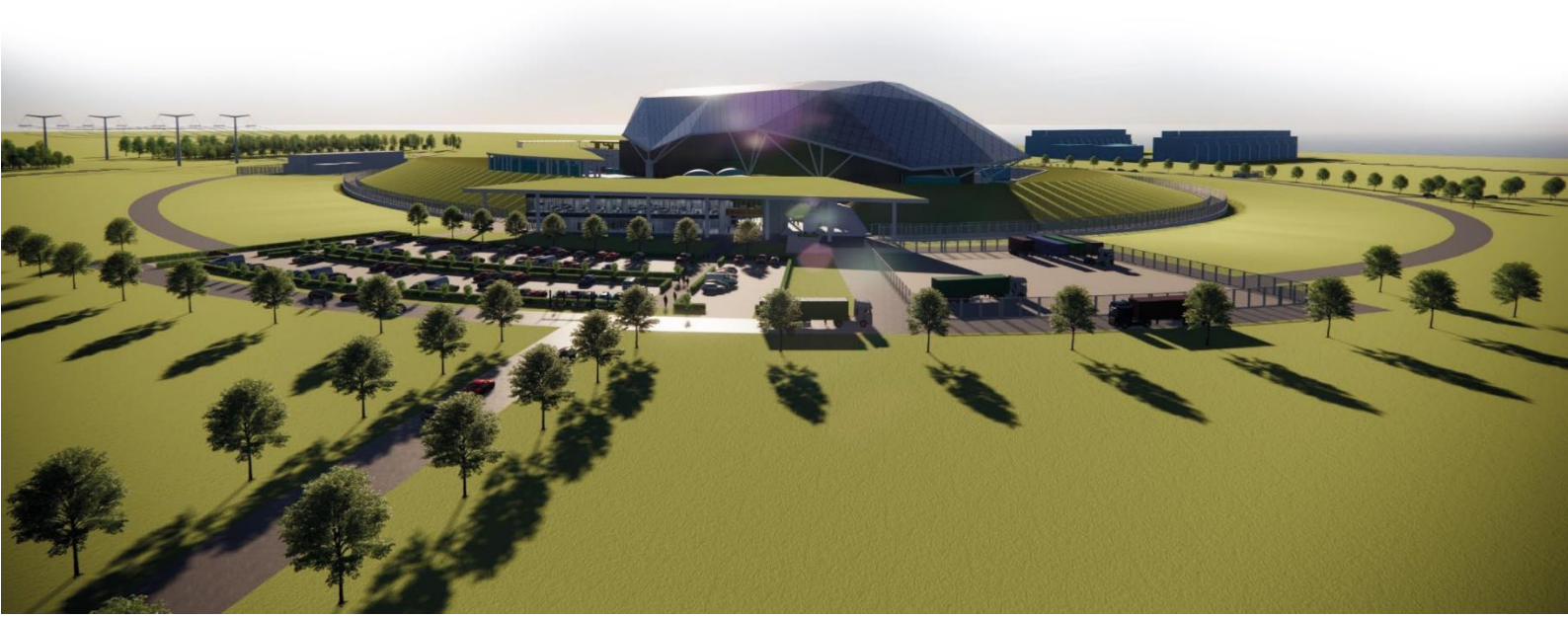

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17.1 Introduction

17.1.1 Introduction to Chapter

This report presents Chapter 17 of the Rolls-Royce Small Modular Reactor (RR SMR) Environment, Safety, Security and Safeguards (E3S) Case. Chapter 17 forms part of the Pre-Construction Safety Report (PCSR) and the Generic Environment Report (GER) and is a supporting reference to the Generic Security Report (GSR), as defined in E3S Case Chapter 1: Introduction [1].

Chapter 17 presents the overarching summary and entry point to the management and organisational arrangements related to delivery of the design and E3S Case for Rolls-Royce Small Modular Reactor (RR SMR).

This chapter demonstrates that Rolls-Royce SMR has implemented and are developing sufficient arrangements to provide appropriate standards of E3S and quality that can be applied throughout all phases of the reactor lifecycle.

The Rolls-Royce SMR policies are described and supported by the Integrated Management System (IMS) which consists of a series of manuals, processes and procedures which are in place to ensure that E3S and quality are maintained throughout the design and build aspects of the project lifecycle.

Generic Design Assessment (GDA) specific arrangements, such as Project Operating Instructions, are included and are important to assuring management of E3S and quality assurance.

17.1.2 Scope

This chapter details the management arrangements required to support the development of the RR SMR. The arrangements are demonstrated at an appropriate level required for the current maturity of the project.

This chapter covers the generic arrangements for:

1. Processes and systems in place to ensure environment, safety (both nuclear and conventional health and safety), security and safeguards (E3S) and quality assurance requirements

2. Quality management of the design and E3S Case production

3. Control of the design and E3S Case

This chapter covers environment, safety (nuclear and conventional), security and safeguards, referred to as E3S for the remainder of the document.

The arrangements presented in this revision of the E3S Case cover the design and build aspect of the project lifecycle. The E3S Case will evolve as the design matures and will be updated in line with the change control arrangements captured within this chapter. Arrangements for future lifecycle stages will be captured in a later revision of this E3S Case.

The arrangements described within this chapter cover business arrangements in place to support delivery of the project.

Specific objectives of this chapter are to describe the management arrangements for processes and systems in place to ensure E3S and quality assurance requirements are achieved including:

1. The maturity and capability of the organisation and personnel appropriate to the stage of the project including:

    a. E3S culture

    b. The provision of competent resources required to fulfil the roles and responsibilities associated with the business processes that comprise the quality management arrangements

    c. The adequacy of competent person resource plans for growth

    d. The establishment of a Quality Assurance Function with appropriate resources, responsibilities, and accountabilities

    e. Arrangements and capability (intelligent customer) for procuring and managing technical services and support.

2. Rolls-Royce SMR quality management arrangements including:

    a. The production, verification, and approval of E3S documentation, including independent and internal challenge, and learning from experience, knowledge management and operational experience and other feedback mechanisms

    b. Transfer and provision of controlled information, including commercial, export controlled and sensitive nuclear information

    c. Management systems standards adopted and intentions with regards to certification.

3. The arrangements for the control of the design and E3S Case including:

    a. Rolls-Royce SMR design development control and design change control arrangements applied to the generic design and E3S Case

    b. Rolls-Royce SMR arrangements for capturing and managing requirements, assumptions and commitments and how these are delivered throughout the project

    c. Rolls-Royce SMR document and record control arrangements.

This chapter will not cover arrangements for E3S management of a future site in accordance with the nuclear site licence and environmental permitting regulations. The responsibility for this will rest with the future dutyholder/licensee. At the current stage of E3S Case development, it is not possible or appropriate to describe all of the arrangements that will need to be in place to manage E3S on a nuclear licensed and permitted site. However, this E3S Case chapter provides the future licensee and operator with a broad understanding of the E3S management arrangements throughout the lifetime of the RR SMR.

***Commitment on Future Dutyholder/Licensee C17.1**: The future dutyholder/licensee shall develop the arrangements for management of E3S and Quality Assurance following the design and build phase of the design lifecycle.*

The Rolls-Royce SMR company vision is to provide "clean affordable energy for all" through the deployment of RR SMR. The RR SMR can play a vital role in enabling the global transition to Net Zero. As a responsible, ethical company, Rolls-Royce SMR must operate as a sustainable business including within offices and future manufacturing sites. Sustainability is important to regulators, investors, customers, and employees. This chapter includes an overview of how Rolls-Royce SMR is building sustainability into its culture and business practices and how sustainability is being included in the design of the RR SMR.

The scope of this document also covers how Rolls-Royce SMR E3S Case and design arrangements support the GDA. In addition to the items already captured above, this chapter includes how Rolls-Royce SMR will manage the Reference Design (RD) and its intentions for integrated design change arrangements thereafter.

17.1.3 Design/Programme Maturity

The arrangements for Management of E3S and Quality Assurance apply to the whole business. GDA specific arrangements are captured as project specific operating instructions.

The arrangements are in place to support the design programme and are also applicable to the design and E3S Case.

The evidence demonstrates that arrangements are in place in relation to the management of E3S and quality assurance, which enable appropriate standards in support of E3S and quality to be applied throughout all phases of the reactor lifecycle. Rolls-Royce SMR arrangements are developing in line with design maturity and updates will be described in future revisions of the E3S Case.

Rolls-Royce SMR are currently working towards certification to International Organization for Standardization (ISO) ISO9001:2015 Quality Management [2], ISO14001:2015 Environmental Management [3] ISO45001:2018 Occupational Health and Safety Management Systems [4] and ISO27001: 2022 Information Security Standard [5].

Rolls-Royce SMR has been recommended for certification to ISO9001:2015.

17.1.4 Claims, Arguments, Evidence Route Map

The Chapter level Claim for E3S Case Chapter 17: Management for E3S and Quality Assurance is:

Claim 17: The Rolls-Royce SMR organisation has suitable arrangements and processes to achieve a strong organisational E3S culture and demonstrate adequate quality assurance

A decomposition of this Claim into Sub-Claims, Arguments, and link to the relevant Tier 2 Evidence is provided in Appendix A. For each lowest level Sub-Claim, the sections of this report providing the Evidence summary are also identified.

The complete suite of evidence to underpin the Claims in the E3S Case will be generated through the RR SMR design and E3S Case programme and documented in the Claims,

Arguments, Evidence (CAE) Route Map [6], described further in E3S Case Chapter 1: Introduction [1].

17.1.5 Applicable Regulations, Codes and Standards

The Rolls-Royce SMR management arrangements are being developed to ensure compliance with relevant codes and standards to ensure adequate arrangements for management of E3S and quality assurance, noting this list is not exhaustive:

1. ISO 9001:2015 - Quality Management Standard [2]
2. International Atomic Energy Agency (IAEA) GSR Part 2: Leadership and Management for Safety [7]
3. ISO 14001:2015 - Environmental Management Standard [3]
4. ISO 45001:2018 - Occupational Health and Safety Management Systems Standard [4]
5. ISO27001: 2022 Information Security Standard [5]
6. American Society of Mechanical Engineers (ASME) ASME NQA-1: Quality Assurance Arrangements for Nuclear Facilities [8]
7. Office for Nuclear Regulation (ONR) Safety Assessment Principles (SAPs) [9] and Technical Assessment Guides [10]

17.2 General Characteristics of the Management System

17.2.1 Business Vision and Mission Statement

Rolls-Royce SMR has developed a business vision and mission statement which are supported by a number of strategic goals, enabling functions and values (See Figure 17.2-1).

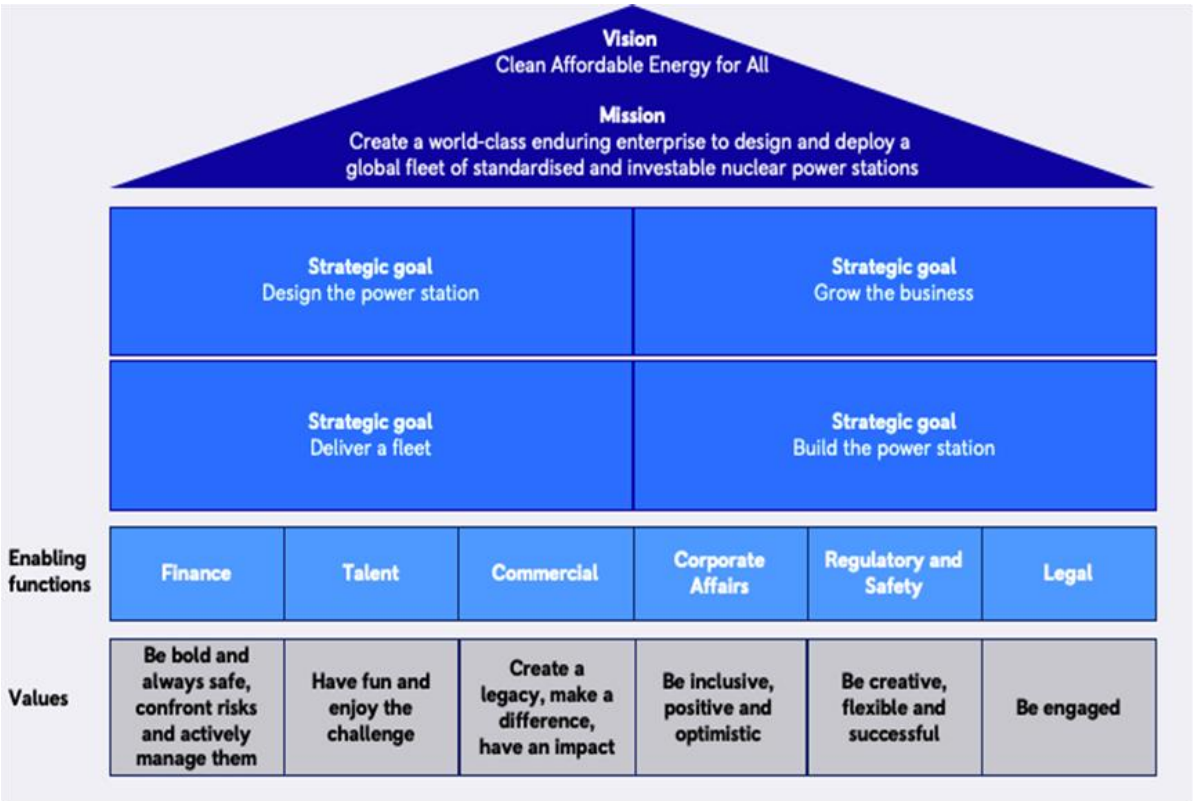

Figure 17.2-1: Rolls-Royce SMR Vision, Mission and Values

The Rolls-Royce SMR values support the embedding of behavioural expectations into a sustainable Rolls-Royce SMR culture for everyone.

17.2.2 Rolls-Royce SMR Policies

Rolls-Royce SMR has developed its Health, Safety and Environment, Quality, Sustainability and Nuclear Safety Culture policies which provide a basis for the integrated management system.

The Health, Safety and Environment Policy [11] sets out the business commitment to take care of the environment as well as the safety, health and wellbeing of our colleagues and those who work with Rolls-Royce SMR. The policy defines key responsibilities for implementation including accountability, high standards and compliance. The policy sets out that Rolls-Royce SMR expect the highest standards of behaviour to protect their own and others, health and safety, and the environment in which Rolls-Royce SMR operates.

The Quality Policy [12] sets out the importance of robust quality that is delivered through processes, to ensure that products and services, including those of suppliers, conform to specification. The policy defines key responsibilities including the importance of understanding individual roles and responsibilities in relation to quality and to participate in the deployment and implementation of the policies, processes and quality programmes. It highlights the need to identify areas for improvement and learning opportunities to drive towards best practice and business excellence. This is supported by the identification of risks and encouragement of challenge in the processes.

The Nuclear Safety Culture Policy [13] highlights the importance of a nuclear safety culture to support the creation of an environment where concerns can be raised, continuous improvement promoted, problems identified and resolved and working processes are planned and controlled.

The Sustainability Policy [14] highlights the importance of being a sustainable business for the purposes of safeguarding the environment and resources, supporting people and the communities in which Rolls-Royce SMR operate and future generations, whilst delivering value for investors and customers. It sets out the aim to develop a long-standing sustainable business through alignment with the United Nations Sustainable Development Goals [15], embedding sustainability in decision making throughout the organisation, measuring ongoing and continuous improvement and ensuring that the approach is applied to future business development.

Through these policies, Rolls-Royce SMR has committed to engaging, communicating clearly and openly with all stakeholders and driving continual improvement and innovation through appropriate targets and goals.

Rolls-Royce SMR believe that high levels of performance are fundamental to doing business with customers, delivering value for investors and supporting the communities in which work is carried out.

Rolls-Royce SMR policies welcome and encourages challenge along with the requirement to report concerns.

These policies demonstrate Rolls-Royce SMRs commitment to support E3S, quality and nuclear safety culture as well as to continual improvement.

17.2.3 Management System Framework

Rolls-Royce SMR has developed a management system to enable the business to fulfil its responsibility for safe delivery and the effective management of its business through the implementation of a Governance and Risk Framework, Policies, Manuals and Business Processes, ensuring compliance to the applicable external legal, regulatory and nuclear industry requirements and expectations.

The IMS is being developed to comply with a variety of international and industry standards listed in Section 17.1.5 above.

The IMS is structured to enable the business values, requirements and expectations to be embedded in the business governance framework arrangements, code of conduct, policies, manuals, processes and procedures (Figure 17.2-2).

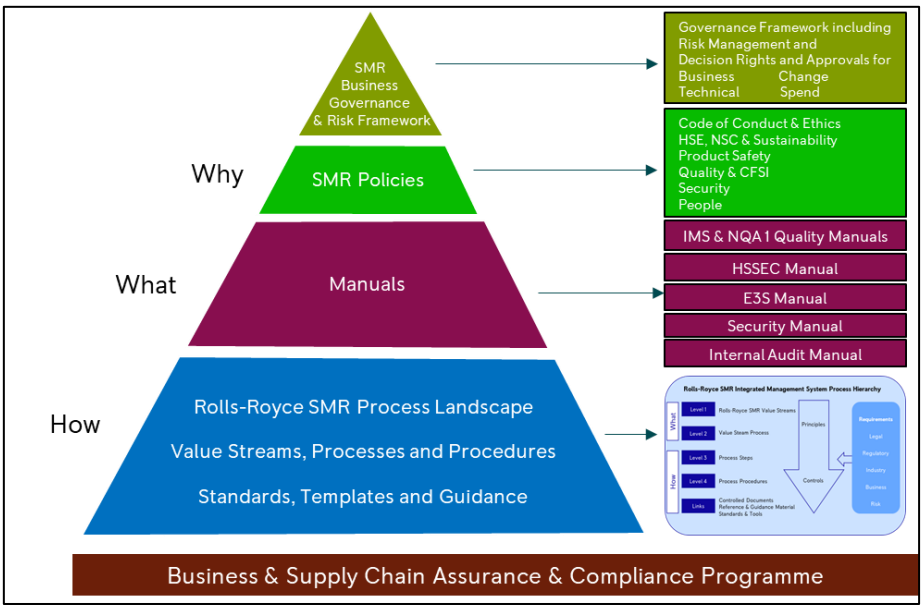

Figure 17.2-2: Rolls-Royce SMR IMS Hierarchy

The Business Process architecture and landscape provides a simple and agile framework of end-to-end value streams, integrated management and functional supporting and enabling procedures, processes and guidance to deliver Rolls-Royce SMR mission, vision, strategy and objectives and provides a foundation for business excellence.

The Business Process Landscape (Figure 17.2-3) is composed of four levels:

1. Level 1 and 2 – Value streams and processes describing 'what' is required.

2. Level 3 and 4 – Process steps and supporting procedures describing the 'how'.

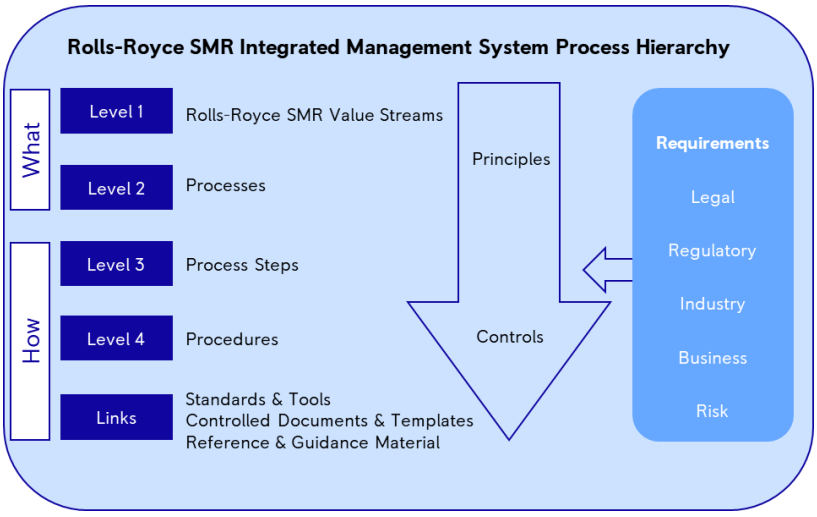

Figure 17.2-3: Rolls-Royce SMR Business Process Landscape

Responsibilities associated with the management system are defined in the IMS Manual [16], and subsequently the Health, Safety, Security, Environment and Culture (HSSEC) Manual [17], the E3S Management Manual [18] and the Security Manual [19].

For Rolls-Royce SMR to deliver its vision and consistently meet customer, regulatory and stakeholder expectations and needs, a set of high-level IMS objectives have been defined and are documented in the IMS Manual [16].

These objectives are reviewed on a continual basis to ensure the IMS meets internal and external requirements and expectations.

Embedding of key activities into the IMS is achieved by a set of defined principles. A principle is a fundamental statement that serves as the foundation for the management system.

Effectiveness of the IMS is carried out through the Rolls-Royce SMR Assurance arrangements (Section 17.3.7) and through periodic business reviews as required by Rolls-Royce SMR procedure - Define Management System requirements [20], which are conducted to assess and evaluate business performance, effectiveness of processes, risks, issues and opportunities.

In relation to the GDA, a Quality Management Plan [21] is in place which captures specific quality arrangements for the project. For the majority, business wide processes and procedures are applied, however there are several project specific requirements which are captured in a series of GDA Operating Instructions.

The IMS and its supporting arrangements will be updated as the business develops and matures. Any changes to these arrangements will be captured in future revisions of this E3S Case as appropriate.

Development of the Design and E3S Case is carried out in line with the IMS Level 3 Process C3 – Develop Solution, and its supporting processes and procedures. Further details are captured is Section 17.4 of this chapter.

17.3 Specific Elements of the Management System

17.3.1 Organisation Arrangements

Organisation Structure and Responsibilities

The high-level structure of Rolls-Royce SMR is shown in Figure 17.3-1.

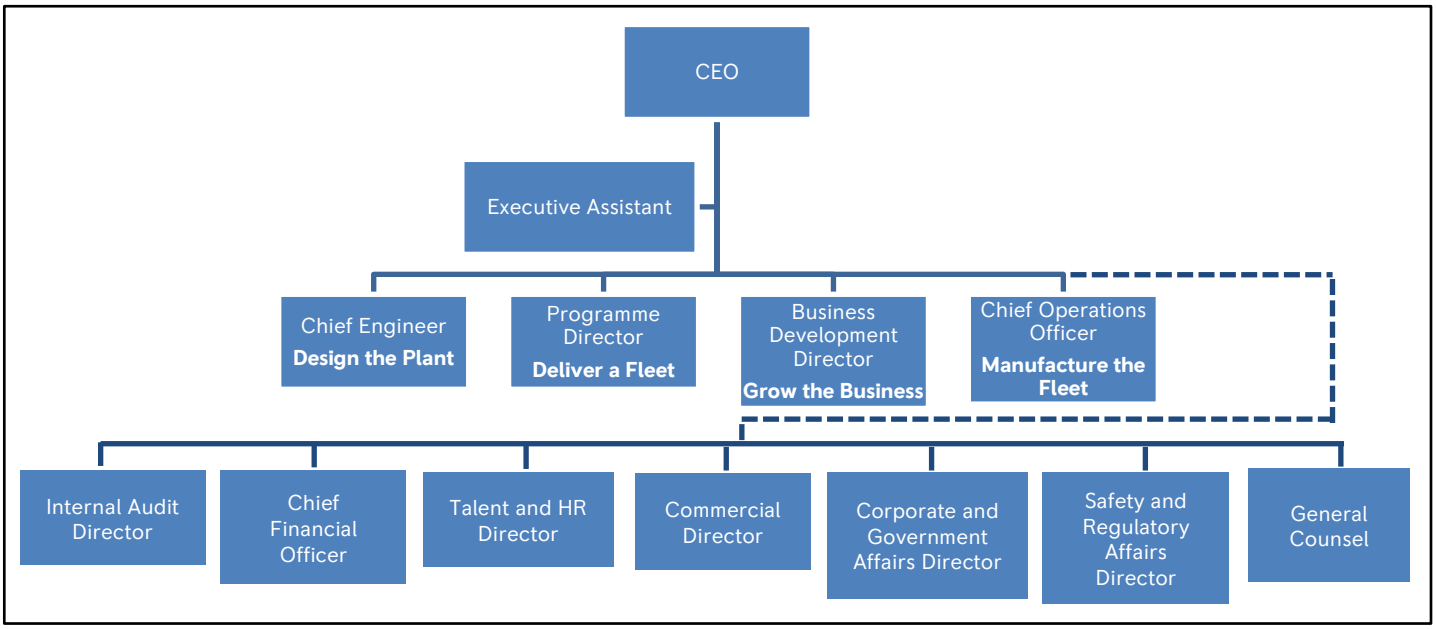

Figure 17.3-1: Rolls-Royce SMR Executive Leadership Team Structure

The Rolls-Royce SMR Board (RR SMR Board), which includes representatives from Rolls-Royce plc as well as other shareholder representation, are ultimately accountable for the management system, ensuring that it is established, implemented, assessed, and improved, and is effective for meeting the business objectives.

The Rolls-Royce SMR Executive Leadership Team (ELT) are accountable and responsible for the day-to-day management and governance of their delivery programmes, or enabling function, setting strategic aims, providing leadership to put these into effect, and supervising the management of the business to ensure effective implementation of business strategic vision, mission and values. These responsibilities are operationally discharged through setting policies, delegation of authority, organisational and management structures, committees and the IMS arrangements described in this document.

The Safety and Regulatory Affairs Director is accountable for the development and implementation of the IMS and its assessment and continuous improvement, along with reporting on IMS progress, performance, health and maturity, including its influence on E3S and nuclear safety culture.

The Safety and Regulatory Affairs Director delegates authority to the Head of Health, Safety, Environment and Quality (HSEQ) and subsequently the IMS Manager, for setting the strategic objectives of the IMS in line with business objectives and external requirements and expectations. The Head of HSEQ also has delegated responsibility for coordinating the

development and implementation of the IMS development and deployment programme, IMS governance, assessment, and continuous improvement.

The HSEQ Organisation is shown in Figure 17.3-2 below:

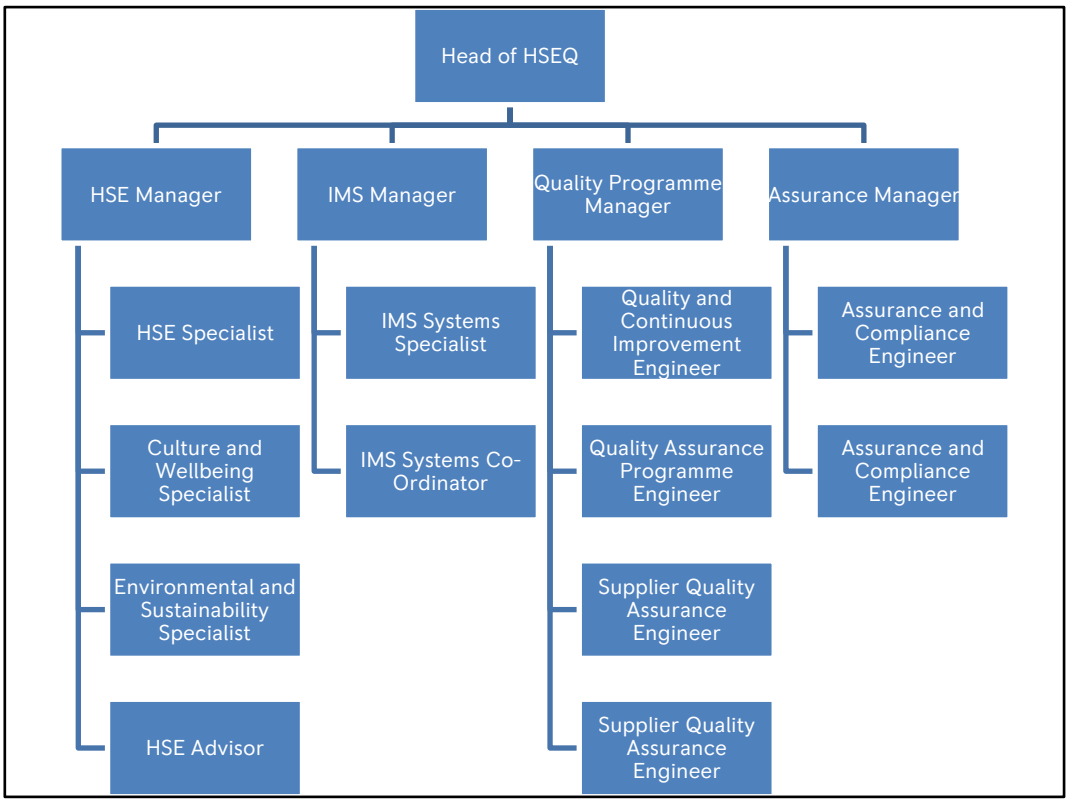

Figure 17.3-2: HSEQ Organisation

In support of the management arrangements for the IMS, a number of key roles and responsibilities have been identified to enable the effective governance, management and continual improvement of the IMS. Process Owners are accountable for the process value stream, providing strategic direction and ensuring processes are aligned with organisational strategies. Process Leads are responsible for the overall design and definition of the value stream steps and procedures and deployment of compliance, risk and controls into the process. Further details on IMS roles and responsibilities are captured within the IMS Manual [16].

Rolls-Royce SMR demonstrates leadership and commitment to the management of E3S through:

1. The establishment and deployment of policies and objectives

2. Clear roles and responsibilities identified and maintained through the Board of Directors, Executive Leadership Team, Safety and Regulatory Affairs Director and the wider Rolls-Royce SMR teams

3. Providing direction and governance on E3S culture through the Nuclear Safety Culture Policy, which encourages safe behaviours throughout the organisation and is aligned with the core values and behaviour traits defined by the World Association of Nuclear Operators (WANO) and International Atomic Energy Authority (IAEA)

4. Optimisation of the design from an E3S Case perspective in accordance with As Low as Reasonably Practicable (ALARP), Best Available Techniques (BAT) and Secure and Safeguards-by-Design approaches

5. Reviewing the deployment of the arrangements on a regular basis through business reviews to ensure continual improvement.

Governance Arrangements

The Business Governance and Risk Framework defines, at the highest level, an overarching view of the business requirements, how these are met and governed by the Rolls-Royce SMR Board and ELT, the accountabilities, and the supporting governance and risk management framework.

By implementing this framework, this supports the achievement of the E3S objective of 'protecting people and the environment from harm' and takes into account the interfaces between environment, safety, security and safeguards.

This framework also supports the delivery of the Rolls-Royce SMR Vision, Mission, Values and Strategy supported by delivery programmes, management plans, a competent and capable organisation, governed by a framework of Delegation of Authority (DoA), committees, procedures and controls.

Key Meetings in Support of Management of E3S and Quality Assurance

A description of the key bodies in support of Management of E3S and Quality Assurance are as follows:

1. The **Rolls-Royce SMR Board** is the primary executive function where major business decisions and directions are sought. The Rolls-Royce SMR Board addresses all aspects of business operations, ensuring that the Business Plan and objectives are being maintained and that all corporate policies are adhered to.

2. The **Executive Leadership Team (ELT) Programme and Change Board**, reviews business performance and where appropriate, makes decisions that will enable the successful future delivery of the overall business strategy and objectives.

3. The **Design, Safety and Environmental Advisory Committee (DSEAC)** provides independent advice to the Chief Executive Officer (CEO) of the business in relation to matters of design philosophy, nuclear safety, radiological environmental protection and security in relation to the proposed design and layout of, and the associated E3S Case developed to support the development of the Rolls-Royce SMR design.

4. The **Health, Safety, Environment and Quality (HSEQ) Committee** reviews, and where appropriate, makes decisions that support and govern the Rolls-Royce SMR HSEQ vision, strategy and delivery programme. The review includes both the HSEQ enablers and business performance to ensure the management arrangements are adequate and continue to be effective in satisfying the Rolls-Royce SMR business stakeholder, industry and HSEQ assurance programme and expectations.

5. The **Audit and Risk Committee** takes place quarterly and its purpose is to ensure the integrity of the financial reporting and audit process and to oversee the maintenance of sound internal control and risk management systems.

These governance arrangements support Rolls-Royce SMR in establishing behavioural expectations to foster a strong E3S culture (See Section 17.6).

Organisational Capability

Rolls-Royce SMR continue to develop an organisation that supports the progression of design maturity, fit for the purpose of delivering an adequate design and supporting E3S justification. The organisation has been sized based on respective organisations, taking account of previous experience in key roles for the maturity of the business. This has involved recruitment in a top-down approach, populating the organisation with competent individuals via an established recruitment process. The transfer in of individuals from Rolls-Royce plc and also the embedding of suitable competent contract supplied resource (Secondee Agreements) into delivery organisations under the control of Rolls-Royce SMR, has supported the development of the organisation.

Managed Service Agreements (MSA) (or Master Vendor Agreements) are also in place for the provision of work under Statements of Work (SoW). The people involved in MSA activity do not occupy positions on the organisational structure and do not manage Rolls-Royce SMR colleagues. MSAs provide a defined piece of work for a defined time period with specific deliverables.

The mixing of diverse talent allows Rolls-Royce SMR to be agile in meeting objectives and accessing the right level of skills in the right way, developing a breadth of knowledge and experience.

Rolls-Royce SMR continue to develop the learning from relevant good practice, for organisational capability. An update on these arrangements will be reported in a future revision of the E3S Case as evidence is developed in line with the CAE Route Map.

17.3.2 Resource Management and Competency

Provision of Resources

Recruitment for Rolls-Royce SMR is carried out in line with the Rolls-Royce SMR process, Manage Recruitment [22] which sets out the requirement to identify competence criteria for the post.

Rolls-Royce SMR senior management are responsible for ensuring that resources that are essential to the implementation of the strategy for the management system and the achievement of the organisations objectives are identified and made available.

Resources are delivered into an Organisational Design and assigned through Work Packages relevant to the delivery of the Programme. As the business develops the Organisational Design will change as a result of Strategic Workforce Planning which enables the business to use its capabilities in the right way as well as develop and retain skills for the future business state.

Rolls-Royce SMR arrangements for intelligent customer capability are captured in the Supplied Products and Services Management Plan [23] which has been developed in line with international good practice and the guidance of ONR Technical Assessment Guides [10]. See Section 17.3.3 for further details.

Learning and Development – Competency Framework

Rolls-Royce SMR utilise a competency framework which is used to assure competent resource in relation to business activities. The competency framework is described in the Rolls-Royce SMR process - Develop Competence Framework [24]. This process requires the development of competencies and agreement of required competency levels which result in the competency framework.

Rolls-Royce SMR take a systematic approach to assessing competence and maintaining core capabilities. The arrangements ensure that all employees and embedded contractors have the required level of competence to safely perform routine and emergency roles, meeting all E3S requirements, including compliance with regulatory and international standards.

Rolls-Royce SMR carry out assessment of individuals against the competency framework in accordance with Rolls-Royce SMR process - Assess Competence [25]. This involves the assignment of individual competencies and review against those competencies to identify any training needs.

On completion of the Competency Assessment, experience and knowledge are reviewed and training needs are identified, and subsequent development training undertaken in line with the Rolls-Royce SMR process - Undertake Training and Evaluation [26]. This process enables individuals to be provided with the knowledge and skills required to enhance their competency, supported by their behaviours and experience.

For third-party contracting partners, Rolls-Royce SMR assess competency in a variety of ways including competency interviews, assessment of Curriculum Vitae (CVs) as well as the use of trusted partners (e.g. MSA contracts and secondee agreements) who implement a similar competency system to Rolls-Royce SMR.

The Competency Framework enables Intelligent Customer competencies to be captured and assigned to individuals to demonstrate Intelligent Customer capability within the business.

17.3.3 Procurement Control

Rolls-Royce SMR have developed a Supply Chain Organisation and supporting strategy to deliver a sustainable, fit for purpose (in line with required quality standards), right first-time products, services and outcomes, on time and in budget whilst demonstrating value for money. It takes into account international good practice and the guidance provided in the ONR Technical Assessment Guides; Supply Chain Management Arrangements for the Procurement of Nuclear Safety Related Items or Services [27] and Licensee Core Safety and Intelligent Customer Capabilities [28].

The organisation has been developed to enable effective partnering within the business, embrace and drive the intelligent customer approach and is meaningful to the supply chain markets.

This organisation will ensure secure resilient supply chains are in place to deliver first of a fleet (FOAF), Rolls-Royce SMR ramp up ambition and steady state operations. In turn this will drive social value through our supply chain and create a positive impact on the communities within which Rolls-Royce SMR operate, in terms of UK growth agenda, economic quality, environment, equal opportunities and wellbeing.

Rolls-Royce SMR have developed a Make vs Buy process to enable assessments to be completed in the support of decision making.

Rolls-Royce SMR will maintain control of procurement activities through compliance with the IMS process, Manage Supplier [29], which captures the arrangements for defining products and services, supplier evaluation, assessment and selection along with the sourcing and contracting of the supplier and subsequent review and release of the product or services.

Rolls-Royce SMR monitor and manage supplier performance in line with the Rolls-Royce SMR process - Monitor and evaluate supplier performance [30], which involves the collection and analysis of supplier performance data.

Rolls-Royce SMR are deploying an intelligent customer framework to ensure it has adequate control over goods and services provided by the supply chain. These arrangements are documented in the Supplied Products and Services Management Plan [23].

The Supplied Products and Services Management Plan [23] includes the arrangements for specification of requirements, oversight of work carried out and an understanding of the implication of results or conclusions.

Intelligent Customer Capability will include anything that has a significance to E3S such as design activity, E3S Case production and the purchase of items with E3S functionality.

Rolls-Royce SMR cascade quality assurance requirement to suppliers of products and associated services as contract appendices via Rolls-Royce SMR Supplier Management Systems Requirement (SMSR) document [31]. This document specifies requirements associated with the supplier and sub-supplier quality and business management system and includes but is not limited to Nuclear Safety Culture, Security, Export Control, Contract deliverables, Counterfeit Fraudulent and Suspect Items (CFSI) Prevention, Lifetime Quality Records, Inspection control, competency of personnel as well as other requirements. These requirements are determined based on safety classification and quality assurance grades determined in technical specifications which describe the contract scope of work.

During the supplier down-selection phase, Rolls-Royce SMR Supply Chain Quality Assurance team conduct an assessment audit against the SMSR [31] to determine the level of quality assurance arrangements established by suppliers and identify any gaps and risks related to supporting the successful delivery of safety classification of works that the supplier is undertaking. Suppliers are expected to demonstrate an appropriate level of compliance prior to any works commencing. To verify that the supplier is maintaining the required level of quality assurance, Rolls-Royce SMR Supply Chain Quality Assurance team utilise a Supplier Audit programme to undertake assessments dependent on assessment audit outcomes, risk levels and contract progress.

Technical service providers supporting the development of the RR SMR are confirmed as competent to undertake contracted scopes of work through the Rolls-Royce SMR supplier qualification process - Evaluate capability of supplier [32].

The arrangements captured in this section support the demonstration of Rolls-Royce SMR Intelligent Customer capability, which has resulted in the recruitment of competent resource who are highly capable in their disciplines, many whom have worked in the nuclear industry for significant periods.

17.3.4 Document and Records Control

Documents are produced, stored and maintained in line with the standard for Management of Documented Information (Records) [33]. All documents and records produced have their 'Retention Category' identified on the document or record.

Engineering documentation is prepared in accordance with the Rolls-Royce SMR Engineering Management Plan [34] and subsequent Technical Checking and Approval Process [35].

Documentation that is produced in support of the E3S Case (Tier 1, Tier 2 or Tier 3) by the E3S Case Team is categorised in line with the E3S Document Categorisation Guidance [36]. The level and type of governance and assurance required is determined by the categorisation of the document and is outlined in the E3S Document Categorisation Guidance [36].

The E3S GDA Submissions Independent Peer Review (IPR) operating instruction [37], which supports the Total Assurance Model detailed in Section 17.3.7, requires an IPR plan to be generated, which uses the output of the application of the categorisation guidance document [36], together with global / holistic considerations and intelligence on areas of concern that are gained by the Independent Nuclear Assurance team, to inform on areas that IPR should focus more on. The implementation of the IPR plan can therefore lead to additional documents being subject to IPR than those identified through the categorisation and guidance document to provide additional levels of assurance.

The arrangements for marking of business sensitive information is captured in Rolls-Royce SMR Marking of Business Sensitive Information Standard [38]. This standard describes the specific markings to be aligned with business sensitive information. This standard is supported by adjacent standards relating directly to the Management of Sensitive Nuclear Information, Management of Export Control Requirements Standards, Commercial Markings Standard, inclusive of third-party artefacts and privacy (described within General Data Protection Regulation (GDPR) and Data Protection Act (DPA) clauses).

17.3.5 Control of Non-Conformance, Corrective and Preventative Action

Rolls-Royce SMR utilise a non-conformance process which controls the management of non-conformance and corrective actions within the business. This is captured in Rolls-Royce SMR process - Respond to Compliance Deviations [39].

This process requires incidents and non-conformances to be reported along with the identification of immediate mitigation or containment actions. Investigations are instigated where appropriate to support the identification of root cause and corrective actions to ensure an effective solution is identified. The process concludes with the requirement to confirm the effectiveness of the resolution and capturing of appropriate lessons learned.

17.3.6 Programme Management Organisation

Programme Management Office (PMO)

Rolls-Royce SMR has developed suitable Project Management arrangements which capture the development of baselines, schedule and interface management, cost management, risk and opportunities management, performance and change management and reporting.

Project Management activities are carried out in line with the IMS Process, Manage Programme and Project [40]. These processes involve the definition of scope and context, planning and feasibility, project delivery, planning and closure of projects.

The organisation in place to deliver Project Management activities is shown in Figure 17.3-3 below:

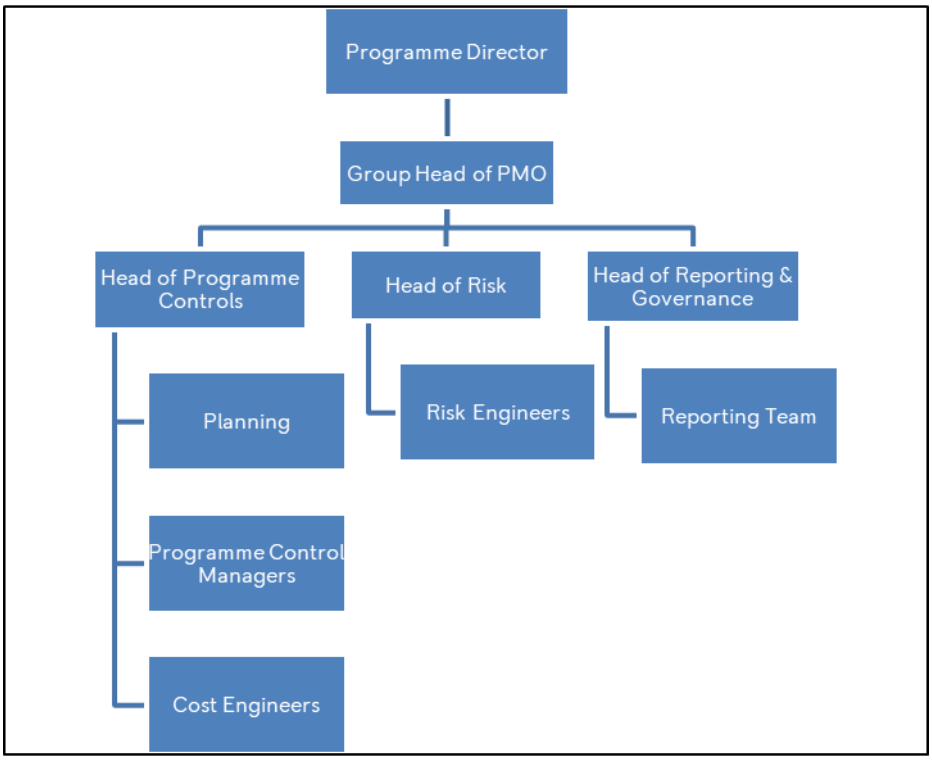

Figure 17.3-3: PMO Organisation

Project Management Plans

Rolls-Royce SMR procedure Plan Project and Ensure Feasibility [41], defines the requirement to capture project arrangements within a Project Management Plan which is supported by individual management plans covering all aspects of the project including governance, assurance, resource, communication and costs.

For GDA activities, a GDA Project Management Plan [42] has been developed which sets out the arrangements and controls for the project and is supported by the GDA Quality Management Plan [21] which identifies the quality assurance arrangements for the project.

17.3.7 Total Assurance Model

Rolls-Royce SMR have developed an integrated assurance programme which is risk informed and operates a 'Total 'Assurance' Model (Figure 17.3-4).

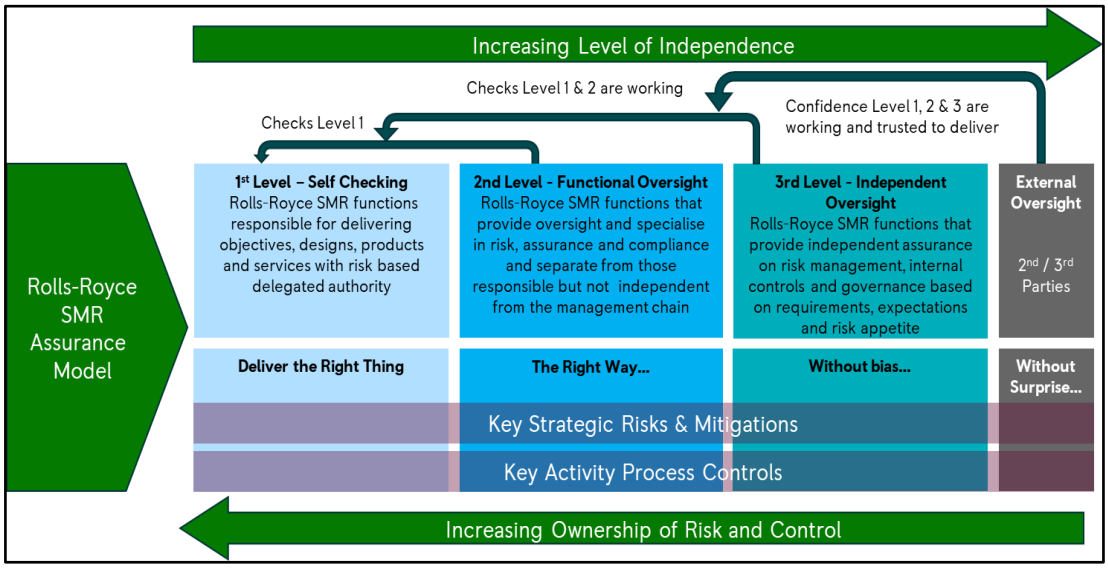

Figure 17.3-4: Rolls-Royce SMR Total Assurance Integrated Programme

This process is implemented in accordance with the Rolls-Royce SMR processes Develop Integrated Assurance Programme [43], Conduct Assurance Activity [44] and Conduct Concurrence [45].

The Total Assurance Model identifies three levels of assurance from self-checking, functional oversight and independent oversight.

Internal self-checking controls and reviews are based on a complementary set of arrangements including delegated authorities and accountabilities, policies, procedures, systems, document templates and value stream reviews. All decision rights delegated authorities / accountabilities are documented and approved.

Functional Oversight involves assurance functions using a risk based, integrated audit and assurance programme to review compliance to procedures and internal controls. The integrated audit and review assurance programme is developed by the Rolls-Royce SMR Assurance Manager (Quality). The development of the programme is supported by all assurance and risk functions, and appropriate Process Owner and Programme Leads. The assurance programme is delivered using suitably qualified and experienced auditors that are independent from those performing the task.

The Nuclear Assurance Team are responsible for providing Independent Oversight (which includes Independent Peer Review) which assures the E3S performance and culture of the business against the standards expected of the nuclear industry and its regulators.

17.3.8 Knowledge Management and Learning from Experience

Knowledge Management (KM) is an important activity as it can reduce the amount of time spent searching for information, reduce rework and encourage collaboration.

Rolls-Royce SMR take learning and relevant good practice from investors (primarily Constellation and Rolls-Royce Group) and the supply chain partners, by bringing in best practices from international standards and regulations (such as International Atomic Energy Agency, Office for Nuclear Regulation, Health and Safety Executive etc.); from external groups (such as World Nuclear Association (WNA), Electrical Power Research Institute (EPRI), Safety Directors Forum Working Groups etc.) and embed this into the development of the E3S Case (including the principles and methodologies), development of the design, the E3S culture, as well as into business working practices. Rolls-Royce SMR also makes every effort to consider learning from other industries as part of this knowledge capture and sharing.

Specifically in relation to GDA, Rolls-Royce SMR are keen to learn from previous GDAs, and as such, are taking learning from available outputs from these through the review of previous submissions, and improvements identified from previous Regulatory Queries (RQs), Regulatory Observations (ROs) and Regulatory Issues (RIs).

Rolls-Royce SMR utilise a structured approach to planning and capturing of knowledge and sharing best practice within the organisation which is presented in the Rolls-Royce SMR Knowledge Management Framework Summary [46]. An update on these arrangements will be reported in a future revision of the E3S Case as evidence is developed in line with the CAE Route Map.

17.4 E3S Case and Design Management Arrangements

17.4.1 E3S Case Strategy

Rolls-Royce SMR are developing a hierarchical E3S Case with three tiers of documentation, structured through a high-level Claims, Arguments, Evidence (CAE) approach, with top level claims identified and decomposed through Arguments into Sub-Claims as appropriate, which point to evidence on lower tiers of the E3S Case.

The content and format of the Tier 1 submissions for each of the E3S discipline areas is captured within the E3S Case Development Strategy [47] and describes how:

1. The E3S Case will be developed with Claims aligned to the E3S Design Principles [48] to demonstrate compliance and achievement of the overall E3S objective to 'protect people and the environment from harm'

2. The Safety Case submission will be aligned to the International Atomic Energy Agency (IAEA)'s standardised chapter approach [49] with top-level Claims established for each chapter, augmented for the United Kingdom (UK) regulatory expectations, and will also include Safeguard

3. The Environment Case submission will align to the Environment Agency (EA) guidance for Requesting Parties (RPs) for the Generic Design Assessment (GDA) [50] and the objectives and principles of the Radioactive Substances Regulation (RSR)

4. The Security Case submission will align to the expectations set out in the Office for Nuclear Regulation (ONR) Security Assessment Principles (SyAPs) [51]

Functional and non-functional E3S requirements (equivalent to detailed Claims on Systems, Structures and Components (SSCs) will be reported across Tier 2 of the CAE structure, including derivation, substantiation, and collation of E3S requirements. These will be summarised in the Tier 1 reports.

E3S requirements will be integrated with the IBM Dynamic Object-Oriented Requirements System (DOORS) requirements management database being used by the Rolls-Royce SMR design teams. Other supporting Evidence for the E3S Case, such as verification activities, may also be contained within DOORS.

The Claims structure and links to suite of Evidence on lower tiers of the E3S Case will be developed in conjunction with relevant technical leads, presented in a CAE document route map. Assurance and Safety Case Environment (ASCE) case management software will be used to facilitate the ongoing development of the E3S Case and presentation of the CAE structure. This software can be used in conjunction with applications such as Microsoft Office and IBM DOORS to either reference to, or extract, information from Tiers 2 and 3 of the E3S Case.

The E3S Case is being developed and will evolve through the lifecycle in line with the Rolls-Royce SMR design programme, including throughout the GDA process.

E3S are key stakeholders in the systems engineering design processes to ensure that the iterative development of the E3S Case evidence supports a demonstration of ALARP, BAT, Secure-by-Design (SybD) and Safeguards-by-Design.

Further details of the E3S Case Strategy are captured in E3S Case Chapter 1: Introduction [1] and within the E3S Case Development Strategy [47].

17.4.2 Configuration and Requirement Management

The Rolls-Royce SMR design is being developed through a combined systems engineering and E3S assessment approach. Rolls-Royce SMR will utilise, where appropriate, a set of systems engineering and robust design techniques in order to ensure that the integrated design solution is optimised to meet all key requirements, including E3S requirements that support demonstration that risks are acceptable and reduced to ALARP.

Reference Designation System - Power Plants

Reference designation for SSCs within the SMR power station scope is implemented in accordance with the Reference Designation System-Power Plants (RDS-PP). RDS-PP is internationally recognised and is referenced within the International Electrotechnical Commission (IEC)/International Organisation for Standardisation ISO 81346 [52] series of standards (industrial systems, installations and equipment and industrial product – structuring principles and reference designations). RDS-PP provides a unique designation for each plant object throughout planning, licensing, construction, operation, maintenance, and decommissioning.

The RDS-PP designation and hierarchy is used to assess relationships and potential change impacts.

Requirements Identification

Requirements are developed for the RR SMR through the design process, a number of which are related to E3S and informed by E3S analysis. As such, E3S requirements are a specific sub-set of requirements that feed into the requirements management process and associated Requirements, Evidence, Design Definition, Verification and Validation (REDV) method detailed in the E3S Case Development Strategy [47]. The types of E3S requirements include:

1. Safety Categorised Functional Requirements: functional requirements on an SSC to deliver a safety function, which are categorised as part of the safety processes. Specific performance requirements or constraints can also be assigned to safety categorised functional requirements

2. Non-Functional System Requirements: ‘transverse’ E3S requirements that specify the architecture or property of an SSC, such as redundancy, segregation, qualification for relevant environmental conditions, reliability, testing intervals etc. They can also be specified at a plant level, such as control room layout, minimisation of waste, access/egress routes etc.

Safety categorised functional requirements are derived from the safety analysis in relation to a fault condition and presented in the Fault Schedule. Performance requirements or constraints assigned to safety categorised functional requirements are informed by the safety analysis, for example, performance (transient) analysis will inform requirements on availability and response times.

Functional requirements to achieve environmental protection functions and security functions will also be derived through their respective analyses following a similar approach to safety categorised functional requirement derivation. This approach is currently being developed and will be described in a future revision of the E3S Case as evidence is developed in line with the CAE Route Map.

A standardised set of non-functional system requirements will be derived from the E3S Principles, as well as other policies from cross-cutting disciplines, such as Chemistry or Human Factors. These are referred to as 'transverse' requirements, which will be systematically applied to relevant plant or SSCs as part of the design development process, noting their application may depend on various factors, such as SSC classification. The specific nature of non-functional system requirements placed on plant or SSCs will be informed by relevant analysis, for example, Probabilistic Safety Assessment (PSA) will inform reliability and diversity requirements, or internal hazards analysis will inform segregation requirements.

Requirements Management

For the Rolls-Royce SMR, requirements are captured in the project's IBM DOORS database, in a structure that aligns to the functional product breakdown structure for Rolls-Royce SMR. As part of the systems engineering approach, requirements are flowed from the programme to power station, to system and then to sub-system/component level in a clear, consistent, integrated and traceable approach. The resultant hierarchical design then undergoes progressive verification and validation to demonstrate evidence-based compliance with the requirements set, and to give confidence that the solution meets the operational needs of the programme/customer.

Requirements management is a continuous process, applicable throughout the project delivery lifecycle. Requirements will be managed such that at each stage of definition or phase of project, there is a clearly defined and agreed set of approved requirements. Any change or addition to these requirements shall be managed and communicated, with clear traceability of the reason for change and the impact of that change on the activity/design definition.

Beyond Final Concept Definition, SSC design changes may occur outside the detailed design development, for example, changes required in response to Regulatory Observations (ROs) or Regulatory Issues (RIs) raised during GDA. Where this results in the need to re-define requirements and design solutions, appropriate configuration management and change control procedures [53] will be followed. These procedures detail how the live E3S Case will be managed with the developing design maturity, including updates to design information (design decision files, analysis etc) that forms E3S Case Evidence.

As Low As Reasonably Practicable, Best Available Techniques, Secure-by-Design, Safeguards-by-Design and Sustainability in the Decision-making process

The following principles seek to ensure that nuclear facilities and associated processes and activities are optimised to ensure maximum protection of workers, members of the public and the environment until such a point that the benefits of implementing further protection measures becomes grossly disproportionate to the cost of doing so.

1. ALARP - a requirement under the Health and Safety at Work Act (1974) [54] to ensure that risks to health, safety or welfare of their employees are kept to a minimum and that persons not in their employment are not exposed to unnecessary or disproportionate risks to their health or safety. ALARP is not prescriptive but goal setting, placing a requirement on the duty holder to demonstrate risks have been minimised; the judgement made, being a balance of risk versus sacrifice weighted in favour of health and safety. The same ALARP principles also apply to the demonstration of the application of BAT, as part of compliance with Environmental Law

2. BAT - demonstrate the use of BAT to minimise the impacts on members of the public (and the environment) arising from radioactive substance activities (and other industrial processes) to levels that are 'As Low As Reasonably Achievable (ALARA)'. Further information is captured in the Optimisation through the Application of BAT report [55]

3. SybD - demonstrate a secure design from theft, sabotage, compromise of sensitive material and protection against diversion of nuclear material from peaceful uses are fundamental precepts underlying the UK nuclear licensing and environmental permitting legislation.

Further detail on principles of ALARP, BAT, secure-by design and safeguards-by design can be found in Chapters 12, 27 and 32 of the E3S Case.

The onus is on the design lead with input from stakeholders such as E3S Teams, to demonstrate that the risk presented by the design to the public, workers and the environment is ALARP and BAT, and that the product is secure by design. Designs are reviewed by the Engineering Interface Team against these principles and their inclusion in the design process demonstrated.

At the concept stage, the link between the design and E3S is essential. The link progresses through the design iterations of optioneering and optimisation, identification of hazards and initiating events and integrated engineering assessments.

The design decision making process is presented in the Rolls-Royce SMR procedure Conduct design optioneering [56]. This process is supported by the Rolls-Royce SMR Decision Record Template [57].

A number of methods and techniques including fault analysis and environmental optioneering, are used during design development that will act as inputs to the E3S Case for the power station. For example, methods and techniques will be used in the identification of hazards in PSA and in environmental impact assessments.

The Decision Record Template [57] is used to capture detailed evaluation of options as well as decision analysis and conclusion which incorporates consideration and justification of ALARP, BAT, secure by design, and sustainability.

The Decision Record template incorporates the Rolls-Royce SMR key assessment criteria related to security, environmental impact, health and safety programme and cost. The United Nations Sustainable Development Goals (SDGs) and the goals of the Wellbeing of Future Generations (Wales) Act have been incorporated into the Decision Record Template through alignment with the key assessment criteria and objectives.

The sustainability of design decisions is demonstrated through the decision record, recording the consideration and balance of social, environment and economic impacts in the decision process. This is summarised in the 'Sustainability' subsection of the Decision Record Template.

Use of decision record template for all design decisions enables consistent approach across the full RR SMR design and ensures that the benefits and disadvantages of all decisions independent of scale and complexity are captured and documented.

17.4.3 Configuration and Change Management for Design and E3S Case

Configuration Management for the Design, E3S Case and Design Reference

The RR SMR is currently in the design phase and the E3S Case is developing alongside it, with safety analysis helping to inform the design.

Rolls-Royce SMR utilises a Master Records Index (MRI) [58] which will, in time, contain all artefacts relating to the design and its justification for the whole power station.

The CAE Route Map outlines all the documents forming the E3S Case.

Rolls-Royce SMR intend to use a subset of the MRI, linked to the CAE Route Map for the E3S Case, to meet the requirements of the Design Reference (DR) as required by GDA, which will identify only those documents which define the Rolls-Royce SMR generic design for GDA and will be submitted to the regulators via the Master Document Submissions List (MDSL) in line with GDA operating instruction, Regulatory Correspondence [59].

The DR is a list of current plant structures, components, and subcomponents, uniquely identified with associated design documentation. This may also be referred to as a Design Reference List.

The DR will be baselined at Reference Designs (RDs) as agreed with the regulators.

Change Management for the Design, E3S Case and Design Reference

Rolls-Royce SMR intend to utilise an integrated change control process to encompass change to the design, the E3S Case and to the Design Reference (for GDA) to increase consistency

and reduce potential errors or omissions. The high-level steps of the integrated change control process are provided in Figure 17.4-1 below.

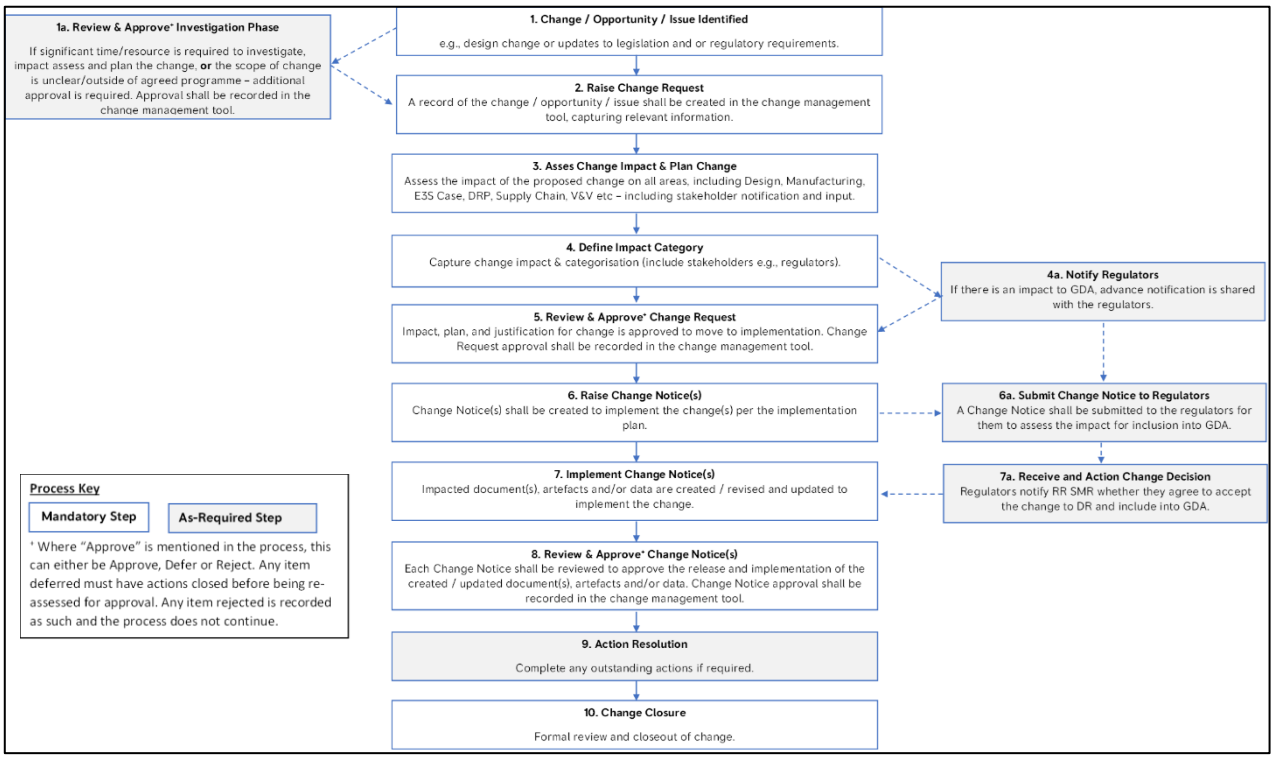

Figure 17.4-1 - Change Control Process Flow

The change control process will enable the identification of resulting document changes that are part of the E3S Case, i.e., those in the CAE Route Map.

The integrated change control process is a process in the Rolls-Royce SMR IMS, Manage Change [60] and accompanying guidance.

The Configuration Management Plan [53] establishes the overall configuration principles for the entire Rolls-Royce SMR power station and the methods that maintain integrated change control between the interfacing parts, assemblies, systems, islands, and the wider civils structures.

The Manage Change Process [60] establishes the change management approach for Rolls-Royce SMR and describes when to introduce change, the types of change and how it is enacted.

The Rolls-Royce SMR Technical Change Review (TCR) is used to assess the impact of proposed changes to the Rolls-Royce SMR design and determine whether the impact would be acceptable or not, then either accept, reject or defer the change as a result.

Formal change control will be implemented when the Certificate of Design for Reference Design 6 (RD6) is issued, against SSCs that have successfully passed appropriate Definition Review gates (largely DR3 design maturity) and support Final Concept Definition (FCD). Following the assignment of RD6, changes must be assessed and categorised based upon their impact upon E3S. The Engineering Management Plan [34] and supporting Configuration Management Plan [53] capture further details on these arrangements.

All changes will be collated and referenced in the MRI [58] and all changes and impacts to E3S documentation will be identified and managed through the integrated change management process defined in the Manage Change Process [60] which incorporates change impact assessment, categorisation, approval authorities and governance arrangements, supported by the use of digital tools.

17.4.4 Environment, Safety, Security and Safeguards (E3S) Management Manual

The E3S Management Manual [18] describes how the Environment, Safety, Security and Safeguards (E3S) principles are delivered across the business, specifically the design and how the management arrangements for the E3S team meets the needs of the Rolls-Royce SMR business.

17.4.5 Assurance

Design Assurance

Engineering documentation is prepared in accordance with the Rolls-Royce SMR Engineering Management Plan [34] which includes four levels of Engineering Governance, the Maturity Review (MR) Process [61], the Definition Review Process [62], the Gated Review (GR) Process [63] and the Technical Checking and Approval Process [35].

Engineering Approval and Delegated Authority

Engineering Approval Authority is an accountability delegated down from the Chief Engineer to individuals via Rolls-Royce SMR process, Delegate Engineering Authority [64].

The Chief Engineer has the accountability for release / approval of all engineering output in the programme and the accountability to ensure the product safety and quality. As such, this is a tightly controlled authority and the Chief Engineer delegates this authority to a limited number of demonstrably competent persons in the business, extending specific accountabilities for engineering approvals and sign-off.

E3S Assurance

Documentation that is produced in support of the E3S Case (Tier 1, Tier 2 or Tier 3) by the E3S Case Team is categorised in line with the E3S Document Categorisation Guidance [65] and is supported by the E3S GDA Submissions Independent Peer Review procedure [37]. The level and type of governance and assurance required is determined by the categorisation of the document and further input from the IPR function.

Governance over E3S activities in Rolls-Royce SMR is provided through the Safety and Regulatory Affairs Director who maintains active line management and oversight of E3S activities and independent nuclear oversight via the Head of Nuclear Assurance. Heads of function within the Safety and Regulatory Affairs Directorate provide governance oversight and technical approval of work undertaken in their defined areas of responsibility.

The Nuclear Assurance team deliver Independent Peer Review (IPR) of the E3S Case as it matures through the GDA process and beyond. This requires documentation of E3S significance to be subject to an appropriate depth and breadth technical review by competent

persons, who are fully independent of those who produced, reviewed and approved them, to provide additional assurance that the document is valid and fulfils its intended purpose.

Design, Safety and Environmental Advisory Committee (DSEAC)

See 17.3.1.

17.4.6 Commitments and Assumptions

Rolls-Royce SMR has developed a process for identifying, recording, and tracking GDA and Licensing Assumptions and Commitments [66]. This process captures the arrangements for the capture and recording of assumptions and commitments in the E3S Case that are placed on future duty holders, and how they are shared with future licensees.

Assumptions and commitments will be raised through the development of the E3S Case and captured in the Tier 1 reports. Each assumption and commitment, along with the corresponding route for identification, tracking and recording, will be recorded in the Assumptions and Commitments (AC) for future Duty Holders Register [67] that is appropriately linked to the E3S Case, noting this will be facilitated by the case management software as described in Section 17.4.1.

17.4.7 Master Document Submissions List and Document List

To support the requirements of GDA, Rolls-Royce SMR has developed combined Master Document Submissions List (MDSL) and Document List (DL) [68]. The MDSL, as defined by the ONR, is a living document that allows ONR to understand and reference precisely what constitutes the latest versions of the GDA submission.

The DL provides details of all Rolls-Royce SMR documents that have been submitted to the regulators, including responses to Regulatory Queries (RQs), Regulatory Observations (RQs) and Regulatory Issues (RIs).

The MDSL is a subset of the DL. Where several versions of a document have been submitted and are part of 'reference submissions', then only the latest version is tagged as belonging to the MDSL, however all versions belong to the DL.

Instructions for the maintenance and management of the MDSL and the DL is captured in Regulatory Correspondence [59]. The MDSL is shared with Regulators on a periodic basis.

17.4.8 Operational Limits and Conditions

Operational Limits and Conditions (OLCs) will be derived through the design and safety analysis processes, which will be captured in DOORS and eventually extracted as appropriate to develop Technical Specifications for RR SMR.

The process managing the flow of OLCs from the design into operational documentation is still in development and will be reported in E3S Case Chapter 16: Operational Limits and Conditions [69].

17.5 Continuous Improvement of Arrangements

17.5.1 Monitoring and Assessment

Rolls-Royce SMR understands the importance of being a learning organisation and of monitoring and measuring the effectiveness of the management system which supports the identification of opportunities for improvement.

As captured in Section 17.2.3, effectiveness of the IMS is carried out through the Assurance arrangements identified in Section 17.3.7 and through periodic business reviews as required by Rolls-Royce SMR procedure, Define Management System requirements [20], which are conducted to understand business performance, effectiveness of processes, risks, issues and opportunities.

Non-conformances are recorded and managed in line with Rolls-Royce SMR procedure, Respond to Compliance Deviations [39]. This process includes the identification of corrective actions to eliminate causes of non-conformance and preventing recurrence.

The Rolls-Royce SMR Total Assurance Process, detailed in Section 17.3.7 of this chapter, details the assurance activities that support the evaluation of the management system in the form of a three-tier process, from self-checking, functional oversight and internal oversight.

Rolls-Royce SMR have developed a process for Continuous Improvement, identified in Rolls-Royce SMR procedure, Deliver Continuous Improvement [70], which provides a structured approach to improvement, based on the Shewhart Cycle of Plan, Do, Check, Act (PDCA), which captures the expectations of knowledge management and lessons learned. See also Section 17.3.8.

17.5.2 Performance Monitoring and Improvement

Rolls-Royce SMR have developed a suite of Key Performance Indicators (KPIs) for the business which are reviewed on a period basis to ensure performance targets are achieved and improvements are identified and implemented.

In support of the IMS arrangements, individual processes identify specific KPIs to support the monitoring of performance and identification of improvements.

The Rolls-Royce SMR Total Assurance process provides oversight and assurance through regular reviews and interactions. See Section 17.3.7 of this chapter.

Rolls-Royce SMR encourage lessons learned sessions to be undertaken, to identify learning and opportunities for improvement.

17.6 E3S Culture

17.6.1 Rolls-Royce SMR E3S Culture Arrangements

Adoption of a robust Nuclear Safety Culture is a fundamental requirement for everyone working within the nuclear industry. Rolls-Royce SMR believe a healthy Nuclear Safety Culture is central to long-term success because the decisions made today will be felt for years to come.

Rolls-Royce SMR Nuclear Safety Culture Policy [13] sets out the commitment for a positive nuclear safety culture. It defines everyone as a leader and ambassador for our Nuclear Safety Culture and commits to speaking on safety, acting safely, focusing on maintaining safety standards, engaging others in our culture and initiatives and recognising and praising colleagues who behave safely.

The development of a Nuclear Safety Culture policy aims to create an environment where our values and behaviours support our collective commitment to ensuring the protection of people and the environment from our activities and the harmful effects of ionising radiation.

Rolls-Royce SMR Nuclear Safety Culture expectations are flowed through to the Supply Chain via the Supplier Management System Requirements document [31]. Rolls-Royce SMR work with suppliers to develop and maintain the knowledge and behaviours necessary for a positive nuclear safety culture.

In support of the deployment of the Nuclear Safety Policy, key deliverables have been identified to implement the arrangements, including development of the approach and the introduction of a Steering Group, supported by a maturity model based on the Nuclear Safety Culture Assessment Framework, which Rolls-Royce SMR will use to assess its maturity in relation to nuclear safety culture thus contributing to the development of a strong E3S culture.

The Rolls-Royce SMR culture programme brings together nuclear safety culture and organisational culture (Figure 17.6-1) enabling commonality and is conducive to developing a learning organisation and working across co-supporting culture streams.

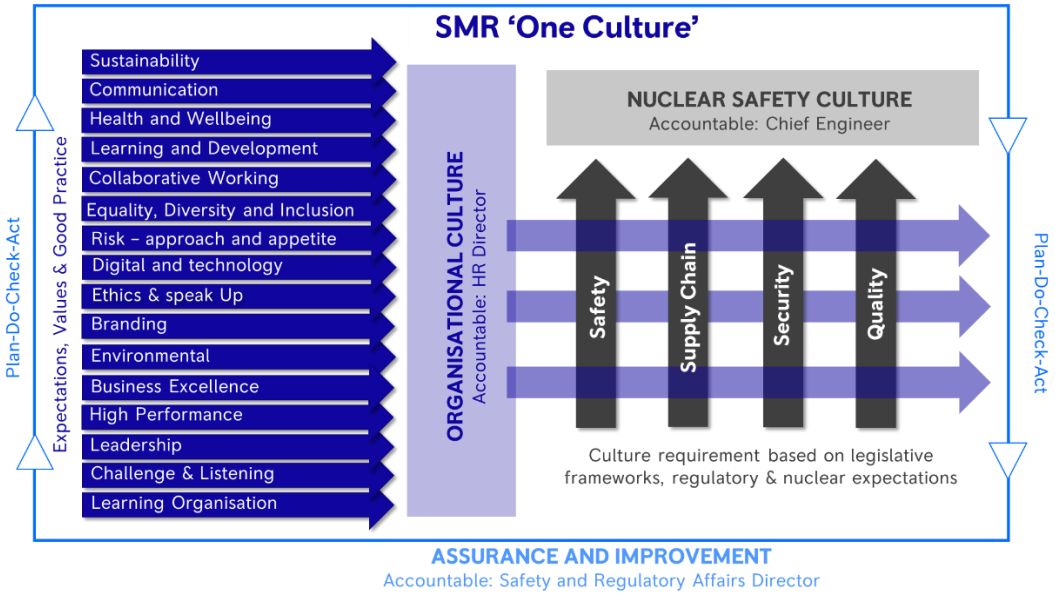

Figure 17.6-1 - Rolls-Royce SMR Culture Programme

The culture programme is based on the IAEA Harmonized Safety Culture Model [71], which defines the traits and attributes observed when a strong safety culture is present and takes into account relevant good practice and operational experience.

The culture programme will evolve, grow, and mature in line with business maturity, experience, expectations, and ambition. However, the programme will remain consistent with the following goals, it will:

1. Develop a programme which enables Rolls-Royce SMR to meet the needs of customers from around the world

2. Establish measures to baseline Nuclear Safety Culture and ensure ongoing assessment and continuous improvement

3. Provide systems, processes and practices that enable and encourage safe behaviours

4. Create a psychologically safe working environment where everyone has a voice.

Rolls-Royce SMR performs several activities to help develop and promote a positive working environment and thriving nuclear safety culture. These include Culture Themes of the Month, leadership engagement tours and workplace inspections, nuclear safety culture benchmarking supported by key performance indicators to ensure continuous improvement, nuclear safety culture campaigns and the delivery of nuclear safety culture training. These activities are key to demonstrating visible leadership and employee engagement to support a strong E3S culture.

The arrangements to support the business's Nuclear Safety Culture approach can be found in the Rolls-Royce SMR Health Safety Sustainability Environmental and Culture Manual [17] which are subject to regular review and assurance activities that are subject to rigorous and robust risk-based audit.

17.6.2 Sustainability

The Rolls-Royce SMR can play a vital role in the decarbonisation of energy production, supporting the global transition to Net Zero. As a responsible, ethical, company we recognise that developing a sustainable product is not enough[1] and that to succeed the operation of the company must also be sustainable. Our sustainability programme is focused on understanding the impact we have on the world, and our ability to support society in achieving higher standards of living through sustainable development.

The United Nations (UN) Sustainable Development Goals (SDGs) were unanimously adopted by all 193 UN Member states and are globally recognised as the most comprehensive, credible set of sustainability goals, aiming to address the key economic, social, environmental and governance challenges of our time. The SDGs provide a common set of global priorities, actions, and language to help consistently communicate the impacts and performance of organisations.

The SDG Compass has been chosen as the framework for the development of the sustainability programme. This framework requires an organisation to develop their understanding of the SDGs and prioritise key areas of focus to maximise positive and minimise negative impacts.

An initial sustainability materiality assessment has been undertaken to prioritise sustainability topics according to the significance of the impact, importance to stakeholders, and the ability of our organisation to influence those topics. The materiality assessment was informed by a series of workshops with stakeholder representatives, mapping the aspects of sustainability across our value chain. The results of the materiality assessment were analysed and aligned to the UN SDGs identifying six key SDGs through which Rolls-Royce SMR can have the greatest influence and contribution towards sustainable development:

1. SDG 7: Clean, Affordable Energy For All – Supported through the development and deployment of the RR SMR which will produce low carbon energy at an affordable price, to power industry and the electrical grid in the UK and across the globe, promoting investment in clean technology. Energy efficiency and use of clean energy will be a focus for all Rolls-Royce SMR facilities

2. SDG 12: Responsible Consumption and Production – Supported through the design development through consideration of resource efficiency and waste minimisation throughout the life-cycle of the Rolls-Royce SMR and our facilities. Partnering with suppliers to cultivate sustainable procurement practices

3. SDG 8: Decent Work and Economic Growth – Supported through the creation of a safe, secure and inclusive working environment for all. Development of a Supply Chain Strategy that supports creation of decent jobs and the growth of small to medium sized businesses whilst respecting and promoting human rights

4. SDG 11: Sustainable Cities and Communities – Supported through the localised production of affordable, clean energy to support decarbonisation of industry, and the electrical grid. The design of facilities and the RR SMR will minimise adverse impacts on the environment and local communities and seek to maximise beneficial impacts

[1] See section 17.4 for details of how sustainability is integrated into design processes.

5. SDG 13: Climate Action – Supported through the deployment of the RR SMR to decarbonise energy which will support the development of a more resilient and adaptive energy supply. The design of Rolls-Royce SMR manufacturing facilities and the RR SMR will account for climate adaptation measures. Improvement of education and awareness of sustainable development and climate change mitigation, adaptation and impact reduction will be supported internally and externally

6. SDG 16: Peace, Justice and Strong Institutions – Supported through Rolls-Royce SMR commitment to conduct ourselves fairly, transparently, and in compliance with legal and regulatory requirements and operate a zero-tolerance approach to corruption in all its forms. These values will be reinforced through collaboration with our supply chain partners.

The materiality assessment will be continually reviewed, to allow us to continuously improve, and ensure we meet the evolving expectations of our stakeholders.

To develop and drive our sustainability programme a Sustainability Network has been formed with the support of our Executive Leadership Team. The network consists of a group of sustainability advocates that sit across the business functions to collaborate and lead on sustainability in their area. The network aims to support the promotion and integration of sustainability across all aspects of our business and help measure and communicate our progress.

A Sustainability Policy [14] has been developed, with the support of the Sustainability Network, which sets out the company's commitment to sustainability, including environmental, social and governance commitments. The policy outlines accountability for sustainability and promotes learning and continuous improvement, as well as pressing the importance of collaboration with our partners, value chain and local communities. The approval of our sustainability policy demonstrates a commitment to developing a sustainability programme to integrate sustainability into our day-to-day operations and decision making through a balanced consideration of environmental, social, and economic impacts.

To support the implementation of the sustainability policy the following aspects are under development:

1. Understanding of the existing environmental, social and governance baseline

2. Defining what sustainability means to Rolls-Royce SMR and key business functions

3. Establishing aspirations, objectives and KPIs

4. Strategies to support these objectives

5. Training materials and internal and external communication plans to raise awareness and understanding

6. One culture programme.

Our sustainability programme is supported by an assurance programme which utilises a maturity model to monitor performance and support continuous improvement.

17.7 Conclusions

17.7.1 Conclusions

Preliminary evidence is presented to support the overall claim that 'The Rolls-Royce SMR organisation has suitable arrangements and processes to achieve a strong organisational E3S culture and quality assurance', which contribute to the overall E3S objective to protect people and the environment from harm, and the demonstration that risks are reduced ALARP.

The evidence demonstrates that arrangements are in place in relation to the management of E3S and quality assurance which enable appropriate standards of E3S and quality to be applied throughout all phases of the reactor lifecycle. Rolls-Royce SMR acknowledge that some arrangements are in their infancy and work is ongoing to develop and deploy these arrangements. The integrated assurance programme (See 17.3.7) will enable review of compliance and internal controls for these processes, to enable Rolls-Royce SMR to continually improve.

For those areas, where arrangements are less mature, further information will be presented in future revisions of this report as evidence in the CAE Route Map [6] is developed.

17.7.2 Assumptions and Commitments on Future Dutyholder/Licensee

Table 17.7-1: Assumptions and Commitments on Future Dutyholder/Licensee

Assumption/Commitment	ID	Description
Commitment	C17.1	The future dutyholder shall develop the arrangements for management of E3S and Quality Assurance following the design and build phase of the design lifecycle.

17.8 References

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[25] RR SMR, S1.3.1-1, “Assess Competence,” 2022.
[26] RR SMR, S1.3.2-1, “Undertake Training and Evaluation,” 2022.
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17.9 Appendix A: CAE Route Map

17.9.1 Chapter 17 Route Map

A preliminary Claims decomposition from the overall Chapter 6 Claim is summarised in Table 2, including the Tier 2 Evidence supporting the Claim (at this revision), and section of this report where the Evidence is summarised.

Table 17.9-1: CAE Route Map

Level 1 Claims	Level 2 Claims	Level 3 Claims	Arguments	Evidence Summary within Chapter 17	Underpinning Tier 2 Evidence (*at PCD)	Underpinning Tier 2 Evidence (*to be developed)
Rolls-Royce SMR have a strong E3S Culture	Rolls-Royce SMR have implemented a robust operating model across the business, with an appropriately rigorous governance framework in place.	-	-	Section 17.2.1	Vision and Mission Statement	-
		-	-	Section 17.2.2	Policies – Quality, Health Safety and Environment and Nuclear Safety Culture	-
		-	-	Section 17.2.3	IMS Manual [16]	-
		-	-	Section 17.3.8	Rolls-Royce SMR Knowledge Management Framework Summary [46]	Knowledge Management Plan
	Rolls-Royce SMR have developed an	-	-	Section 17.3.1	Organisational Design	Organisational Design (revised)

Level 1 Claims	Level 2 Claims	Level 3 Claims	Arguments	Evidence Summary within Chapter 17	Underpinning Tier 2 Evidence (*at PCD)	Underpinning Tier 2 Evidence (*to be developed)
	organisation designed to meet the strategic objectives of the company with appropriately competent personnel in place Rolls-Royce SMR have a performance culture within the business that drives us to succeed in the manner expected by the international nuclear industry	-	-	Section 17.3.2	Develop Competence Framework [24]	-
		-	-	Section 17.3.2	Undertake Training and Evaluation process [26]	-
		-	-	Section 17.3.2	Manage Recruitment Process [22]	-
		-	-	Section 17.3.3	Supplied Products and Services Management Plan [23]	-
		-	-	Section 17.6.1	Nuclear Safety Culture Policy [13]	-
Rolls-Royce SMR have strong Quality Assurance (QA) Arrangements	Rolls-Royce SMR have implemented a robust integrated management system across the business, with an appropriately rigorous governance framework in place	-	-	Section 17.2.2	Quality Policy [12]	-
		-	-	Section 17.2.3	IMS Manual [16]	-
		-	-	Section 17.3.8	Rolls-Royce SMR Knowledge Management Framework Summary [46]	Knowledge Management Plan
		-	-	Section 17.3.6	PMO Process [41]	-

Level 1 Claims	Level 2 Claims	Level 3 Claims	Arguments	Evidence Summary within Chapter 17	Underpinning Tier 2 Evidence (*at PCD)	Underpinning Tier 2 Evidence (*to be developed)
	Rolls-Royce SMR have developed a robust project management organisation, with an appropriately rigorous governance framework in place	-	-	Section 17.3.6	GDA Project Management Plan [42]	-
		-	-	Section 17.3.6	GDA Quality Management Plan [21]	Quality Management Plan [21] (revised)
	Rolls-Royce SMR have developed a Total Assurance Model which enables a systematic, disciplined approach to comprehensively review compliance to internal and external standards.	-	-	Section 17.3.6	GDA Quality Management Plan [21]	GDA Quality Management Plan [21] (revised)
		-	-	Section 17.3.7	IMS Manual [16]	-
Rolls-Royce have strong control of	E3S Cases are generated and	-	-	Section 17.4.1	E3S Case Development Strategy [47]	-

Level 1 Claims	Level 2 Claims	Level 3 Claims	Arguments	Evidence Summary within Chapter 17	Underpinning Tier 2 Evidence (*at PCD)	Underpinning Tier 2 Evidence (*to be developed)
their design and E3S Case	governed in a way that allows us to confirm the Rolls-Royce SMR design has reduced risk from all sources so far as is reasonably practicable, is Secure by Design, Secure-by-Safeguards and has used Best Available Techniques to demonstrate the impact to the environment has been minimised	-	-	Section 17.4.4	E3S Management Manual [18]	-
	Changes to design are generated and governed in a way	-	-	Section 17.4.3	Engineering Management Plan [34]	Engineering Management Plan [34] (revised)

Level 1 Claims	Level 2 Claims	Level 3 Claims	Arguments	Evidence Summary within Chapter 17	Underpinning Tier 2 Evidence (*at PCD)	Underpinning Tier 2 Evidence (*to be developed)
	that ensures design change is managed through a clearly defined engineering organisation, which make use of a variety of technical and engineering methods and governed through appropriate engineering governance.	-	-	Section 17.4.3	Configuration Management Plan [53] Manage Change Process [60]	Manage Change Process [60] (revised)

17.10 Acronyms and Abbreviations

AC	Assumptions and Commitments
ALARA	As Low as Reasonably Achievable
ALARP	As Low as Reasonably Practicable
ASCE	Assurance and Safety Case Environment
ASME	American Society of Mechanical Engineers
BAT	Best Available Techniques
CAE	Claims, Arguments, Evidence
CEO	Chief Executive Officer
CFSI	Counterfeit, Fraudulent and Suspect Items
CV	Curriculum Vitae
DoA	Delegation of Authority
DL	Document List
DOORS	Dynamic Object-Oriented Requirements System
DPA	Data Protection Act 2018
DR	Design Reference
DSEAC	Design, Safety and Environment Advisory Committee
E3S	Environment, Safety, Security and Safeguards
EA	Environment Agency
ELT	Executive Leadership Team
EPRI	Electric Power Research Institute
FCD	Final Concept Definition
FOAF	First of a Fleet
GDA	Generic Design Assessment
GDPR	General Data Protection Regulation 2018
GER	Generic Environment Report
GR	Gated Review

GSR	Generic Security Report
HSEQ	Health, Safety, Environment and Quality
HSSEC	Health, Safety, Security, Environment and Culture
IAEA	International Atomic Energy Agency
IEC	International Electrotechnical Commission
IMS	Integrated Management System
IPR	Independent Peer Review
ISO	International Organization for Standardization
KM	Knowledge Management
KPI	Key Performance Indicator
MDSL	Master Document Submissions List
MR	Maturity Review
MRI	Master Records Index
MSA	Managed Service Agreement
OLC	Operational Limits and Conditions
ONR	Office for Nuclear Regulation
PCSR	Pre-Construction Safety Report
PDCA	Plan, Do, Check, Act
PMO	Programme Management Office
PMP	Project Management Plan
PSA	Probabilistic Safety Assessment
QA	Quality Assurance
RD	Reference Design
RDS-PP	Reference Designation System - Power Plants
REDV	Requirements, Evidence, Design Definition, Verification and Validation
RI	Regulatory Issue
RO	Regulatory Observation

RP	Requesting Party
RQ	Regulatory Query
RR SMR	Rolls-Royce Small Modular Reactor (Design)
Rolls-Royce SMR	Rolls-Royce Small Modular Reactor (Organisation)
RSR	Radioactive Substances Regulation
SAP	Safety Assessment Principle
SDG	United Nations Sustainable Development Goals
SoW	Statement of Work
SMSR	Supplier Management System Requirements
SSC	Structure, System and Component
SyAP	Security Assessment Principle
SybD	Secure-By-Design
TCR	Technical Change Review
UK	United Kingdom
UN	United Nations
WANO	World Association of Nuclear Operators
WNA	World Nuclear Association