The purpose of a Technical Report is to fully demonstrate that an applicant has gained the same level of knowledge and understanding as an applicant with exemplifying academic qualifications.

Applicants will first be required to submit a synopsis of their proposed report which must set out clearly how they intend to demonstrate technical knowledge and understanding. If the Chair of the Membership Committee approves the synopsis, a suitably qualified mentor is appointed to support the report writing process. The Technical Report should be a critical exposition of some aspect of nuclear engineering or science and the associated nuclear safety principles. It must define the technical problems involved and show how these have been solved through the application of engineering and scientific principles and knowledge of nuclear engineering/scientific fundamentals.

**Content**

The completed report will usually include a **written explanation, diagrams** and **calculations** which together show the candidate's understanding of fundamental engineering or scientific principles in a nuclear context. Some or all of the following are likely to feature in it:

* **mathematical** aspects and calculations
* use of appropriate **software** to solve problems and reach engineering or scientific solutions
* application of **new and innovative technologies** relevant to the subjects of the project
* application of **analysis and modelling**
* evaluation and exploitation of **sustainable technologies** in a nuclear engineering or scientific context
* establish **fitness for purpose** using reliable quantitative methods
* solution of **practical problems**
* **scientific knowledge** of properties of materials and components, and of physical processes
* selection and use of relevant **materials, equipment, tools, processes or products**
* use and apply **information from technical knowledge resources**
* **application of engineering/scientific practices** and processes e.g. commissioning, design, maintenance, repair, refurbishment, adaptation
* analysis of the **economic, social and environmental contexts** of the work being described

The Technical Report must be the result of the candidate's **own original thoughts and work**. If background materials such as printouts from using calculations software, or the products of others’ work are included, these must be attributed and included as appendices and not in the main body of the Report.

**Structure**

The Report should be in English, framed with an **introduction, aim, discussion** and **evaluation.** It should be self contained, and not rely on other papers unless they are provided in appendices. It must have a logical structure. The Report might be organised as follows:

**TITLE**

**INTRODUCTION** – what the Report is about

**AIM** – what is the aim of the project or investigation?

**BACKGROUND** - setting the scene. Where does the project lie in relation to the total picture?

**TECHNICAL CONTENT AND DESCRIPTION** – to draw out the fundamentals underlying the subject(s) the candidate is writing about. The report must not simply show that the candidate has applied the relevant codes and standards, but must illustrate the candidate’s understanding and application of fundamental engineering or scientific principles. Include mathematical analysis where appropriate.

**CONCLUSIONS** – in relation to the application of engineering or scientific principles, what were the successes and failures of the project or investigation?

**EVALUATION AND REFLECTION** – what lessons have been learned? What evaluation criteria has the candidate used to assess the success or failure of the project/subject being investigated? Include own critical comments, again linking them to fundamental engineering/scientific principles. What commercial and other risks were inherent in the project, and how were they tackled?

Supporting documents may include:

**APPENDICES** – information to support and provide background for the main report. Explain where they have come from and how they are relevant.

**DIAGRAMS AND DRAWINGS** – preferably these should be positioned close to the text they refer to.

**REFERENCE SOURCES** – a clear listing of the information sources the candidate has used such as books, journals, guides, websites etc., in preparing the Report

NB: Where software, modelling techniques, standards, codes of practice or other predetermined methods of solution have been used the candidate must demonstrate adequate understanding of the basis for such methodology e.g. provide a first principles calculation, or reasoning, for that part of the work being completed.

**Length**

The Technical Report may be between 7,000 and 10,000 words in length, and should be suitably illustrated. It must be based on the candidates experience and demonstrate a **knowledge and understanding of fundamental engineering or scientific principles.**

**Assessment of individual route using technical report**

The completed Technical Report will be assessed against the following fundamental criteria in the key areas as follows:

**Engineering Council**

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| ***Chartered Engineer (CEng)*** |
| **1. Underpinning science and mathematics and nuclear engineering**  **disciplines,** will normally include |
| 1. understanding of the scientific principles of the candidates own specialisation and related disciplines |
| 1. awareness of developing technologies related to your own specialism |
| 1. knowledge and understanding of mathematical and computer models relevant to nuclear engineering and an appreciation of their limitations |
| 1. understanding a wide range of concepts, including some outside engineering, and the ability to apply them in engineering projects |
| **2. Engineering analysis,** will normally include |
| 1. ability to use fundamental knowledge to investigate new and emerging technologies |
| 1. ability to apply mathematical and computer-based models for solving problems in engineering, and the ability to assess the limitations of particular cases |
| 1. ability to extract data pertinent to an unfamiliar problem, and apply solutions using computer-based engineering tools where appropriate |
| **3. Design awareness,** will normally include |
| 1. knowledge and understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations |
| 1. ability to generate an innovative solutions for products, systems, components or processes to fulfil new needs |

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| ***Incorporated Engineer*** |
| **1. Underpinning science and mathematics and associated nuclear engineering disciplines,** will normally include |
| 1. knowledge and understanding of the scientific principles underpinning relevant current technologies, and their evolution |
| 1. knowledge and understanding of mathematics necessary to support application of key engineering principles |
| **2. Engineering analysis,** will normally include |
| 1. ability to monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement |
| 1. ability to apply quantitative methods and computer software relevant to nuclear engineering, frequently within a multidisciplinary context |
| 1. ability to use the results of analysis to solve engineering problems, apply technology and implement engineering processes |
| 1. ability to apply a systems approach to engineering problems through know-how of the application of the relevant technologies |
| **3. Design awareness,** will normally include |
| 1. knowledge and understanding of problems, constraints, solutions and adaptations to meet user needs 2. ability to ensure fitness for purpose (operation, maintenance, reliability etc) |

**Science Council**

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| ***Chartered Scientist (CSci)*** |
| **1. Deal with complex scientific issues, both systematically and creatively, make sound judgements in the absence of complete data and communicate their conclusions clearly to specialist and non specialist audiences** |
| a. Use a combination of general and experiential knowledge, understanding and skills to be able to optimise and engage in the application of existing and emerging science and technology |
| b. Use theoretical and practical methods in the analysis and solution of problems |
| c. Communicate effectively |
| **2. Exercise self direction and originality in solving problems, and exercise substantial personal autonomy in planning and implementing tasks at a professional level** |
| a. Plan and organise projects effectively |
| b. Work effectively in a team |
| c. Use effective influencing and negotiation skills |
| **3. Continue to advance their knowledge, understanding and competence to a high level and demonstrate a commitment to CPD, Health and Safety and Codes of Conduct** |

**Overall assessment of candidates for registration through the Technical Report Route**

If the assessors consider the Technical Report to be satisfactory, the candidate will be invited to attend a ***Technical Interview (TI)*** at which the candidate will be invited to make a brief presentation on what they have written, followed by a Q&A session to determine their level of understanding of engineering or scientific principles and fundamentals relating the report contents.

If the candidate is successful at Technical Interview, a separate ***Professional Review Interview (PRI)*** would follow. This is carried out separately from the TI, but is usually conducted back to back on the same day. Applicants who are asked to attend a TI will need to satisfy the technical interviewers that they have gained the appropriate overall level of knowledge and understanding before proceeding to the PRI.

For more information on the PRI interview, please see the Interview Guidance.

If the applicant has not demonstrated the required level of knowledge and understanding in their application and/or the TI, the applicant will be advised of the best way forward to achieve such competencies to continue with the application at some stage in the future.

Lastly, the application with assessment report is sent to the Membership Committee. If the application is approved, this results in membership of the Nuclear Institute at the appropriate level and registration of the candidate with the Engineering or Science Council. If the application is not approved, the Institute will provide advice on how the applicant will reach the required level.