ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

Training and Mentoring Guide for Professional Categories

R-04-T&M-GUIDE-PC

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ENGINEERING COUNCIL OF SOUTH AFRICA
Tel: 011 607 9500 | Fax: 011 622 9295
Email: engineer@ecsa.co.za | Website: www.ecsa.co.za

ECSA

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DEFINITIONS

Applicant: A person applying to ECSA for registration in a professional category.

Benchmark Route is the normal process to apply for the attainment of registration that consists of the completion of an accredited, recognised or evaluated substantially equivalent qualification that is a well-structured and effectively executed programme of training and experience for the category of registration.

Candidate: A person who is registered with ECSA in a Candidate Category of registration.

Competency indicator: The typifying guide to evidence indicating competence that is not normative.

Continuing Professional Development means the systematic maintenance, improvement and broadening of knowledge and skills and the development of personal qualities necessary to execute professional and engineering duties through a person's engineering career. It is the learning and development that takes place after completion of relevant engineering studies and refers to activities through which registered persons maintain and develop competencies to continue to perform their role ably and efficiently.

Competency Standard is a statement of competency required for a defined purpose and in a specific category, expressed in the form of generic baseline competencies that all professionals in the category must demonstrate to be deemed eligible for registered status, irrespective of their discipline.

Dublin Accord: An International Agreement establishing the required educational base for Engineering Technicians. It specifically focuses on the mutual recognition of academic programmes/qualifications that underpin the educational base for Engineering Technicians.

Engineering Practitioner: Engineers before or after professional registration in general are referred to as practitioners of engineering who invent, design, analyse, build and test equipment/machines, complex systems, structures, components and material to fulfil the functional objective and requirements, while considering the limitations imposed by practicality, regulation, safety and cost.

Engineering Problem: A problematic situation that is amenable to analysis and solution using engineering sciences and methods.

Engineering Science: A body of knowledge based on the natural sciences and using mathematical formulation where necessary that extends knowledge and develops models and methods to support its application, solve problems and provide the knowledge base for engineering specialisations.

Integrated Performance: An overall satisfactory outcome of an activity requires several outcomes to be satisfactorily attained. For example, a design will require analysis, synthesis, analysis of impacts, checking of regulatory conformance and judgement in decisions.

Initial Professional Development is the systematic participation in the activities typical of Continuing Professional Development but completed prior to professional registration.

Level Descriptor: A measure of performance demands at which outcomes must be demonstrated in accordance with Degree of Responsibilities (DoR). Level descriptors are applicable to the registration category defined within complex (CEA), broadly defined (BDEA) and well-defined (WDEA) Engineering work / activities / tasks / projects.

Mentee: A person who is under the guidance of a mentor.

Mentor is a professionally registered person who guides the competence development of a candidate in a concomitant category.

Outcome: A statement of the performance that a person must demonstrate to be judged competent at the professional level.

Practice Area: A generally recognised or distinctive area of knowledge and expertise developed by an Engineering Practitioner by virtue of the path of education, training and experience followed.

Professional Development: refers to continuing education and career training after a person has entered the workforce in order to help them develop new skills, stay up to date on current trends, and advance their career.

Referee is a mentor registered with ECSA or a supervisor who can attest to the competence of a person applying for professional registration in a concomitant Category and Discipline, and thus eligible to sign off on evidentiary reports submitted by the applicant.

Specified category: A category of registration for persons who are licensed through the Engineering Profession Act or a combination of the Engineering Profession Act and external legislation as having specific engineering competencies at NQF Level 5 relating to an identified need to protect the public safety, health and interest or the environment in relation to an engineering activity.

Supervisor: A person who directs and oversees the work activities of a mentee or applicant.

Sydney Accord: An international agreement between the bodies responsible for accrediting engineering technology academic programmes.

Washington Accord: An international accreditation agreement relating to undergraduate academic degrees in professional engineering between the bodies responsible for accreditation in its signatory country and region.

ABBREVIATIONS

Abbreviation	Definition
Adv Cert	Advanced Certificate
Adv Dip	Advanced Diploma
AIET	Agreement for International Engineering Technicians
B Eng	Bachelor of Engineering
B Tech	Bachelor of Technology
BSc	Bachelor of Science
C&U	Commitment and Undertaking
CPD	Continuing Professional Development
Dip Eng Tech	Diploma in Engineering Technology
DSTG	Discipline-Specific Training Guideline
DoR	Degrees of Responsibilities
ECSA	Engineering Council of South Africa
EIT	Engineer-in-Training
EMF	Engineering Mobility Forum
EPA	Engineering Profession Act, 46 of 2000
ETMF	Engineering Technologists Mobility Forum
GCC	Government Certificate of Competency
IA	Individual assessment
IPD	Initial Professional Development
MEA	Mutual Exemption Agreement
NDip	National Diploma
NEC	New Engineering Contract
PCE	Professional Certificated Engineer
PE	Professional Engineer
PGDip	Postgraduate Diploma
PN	Professional Engineering Technician
POE	Portfolio of Evidence

PT	Professional Engineering Technologist
QE	Qualifications Evaluation
RPS	Research, Policy and Standards
TEO	Training and Experience Outline
TER	Training and Experience Report
TES	Training and Experience Summary
VA	Voluntary Association
WIL	Work Integrated Learning

APPLICABLE DOCUMENTS

A-01-POL	Training Academy Certification and Accreditation Policy
A-03-PRO	Training Academy Certification and Accreditation Process
A-05-MS&C-GUIDE	Training Academy Mentors/Supervisors and Candidates Guide
E-17-PRO	Criteria and Processes for Recognition of Educational Qualifications and Individual Assessment for Professional Categories
E-02-PE	Qualification Standard for Bachelor of Science in Engineering (BSc(Eng))/ Bachelors of Engineering (BEng): NQF Level 8
E-22-PE	Qualification Standard for Master of Engineering: NQF Level 9
R-01-POL-PC	Registration Policy in Professional Categories
R-02-STA-PE/PT/PN	Competency Standard for Registration in Professional Categories PE/PT/PN
R-02-STA-PCE	Competency Standard for Registration as a Professional Certificated Engineer
R-03-PRO-PC	Process of Application for Registration of candidates and Professionals
R-04-TM-GUIDE-SC	Training and Mentoring Guide for Specified Categories
R-05-xxx- PE/PT/PN	Discipline-specific Training Guideline and Requirements
R-08-CS-PE/PT/PN	Guide to Competency Standards for Registration in Professional Categories
R-08-CS-PCE	Guide to the Competency Standards for Registration as a Professional Certificated Engineer
R-11-PRO	Process for training engineering candidates towards professional registration under a Commitment and Undertaking

DOCUMENT CUSTODIAN

The Research, Policy and Standards (RPS) Division is the custodian of this document and is responsible for the development and review of the document.

BACKGROUND

The illustration below defines the documents that comprise the Engineering Council of South Africa (ECSA) system for registration. The illustration also locates the current document.

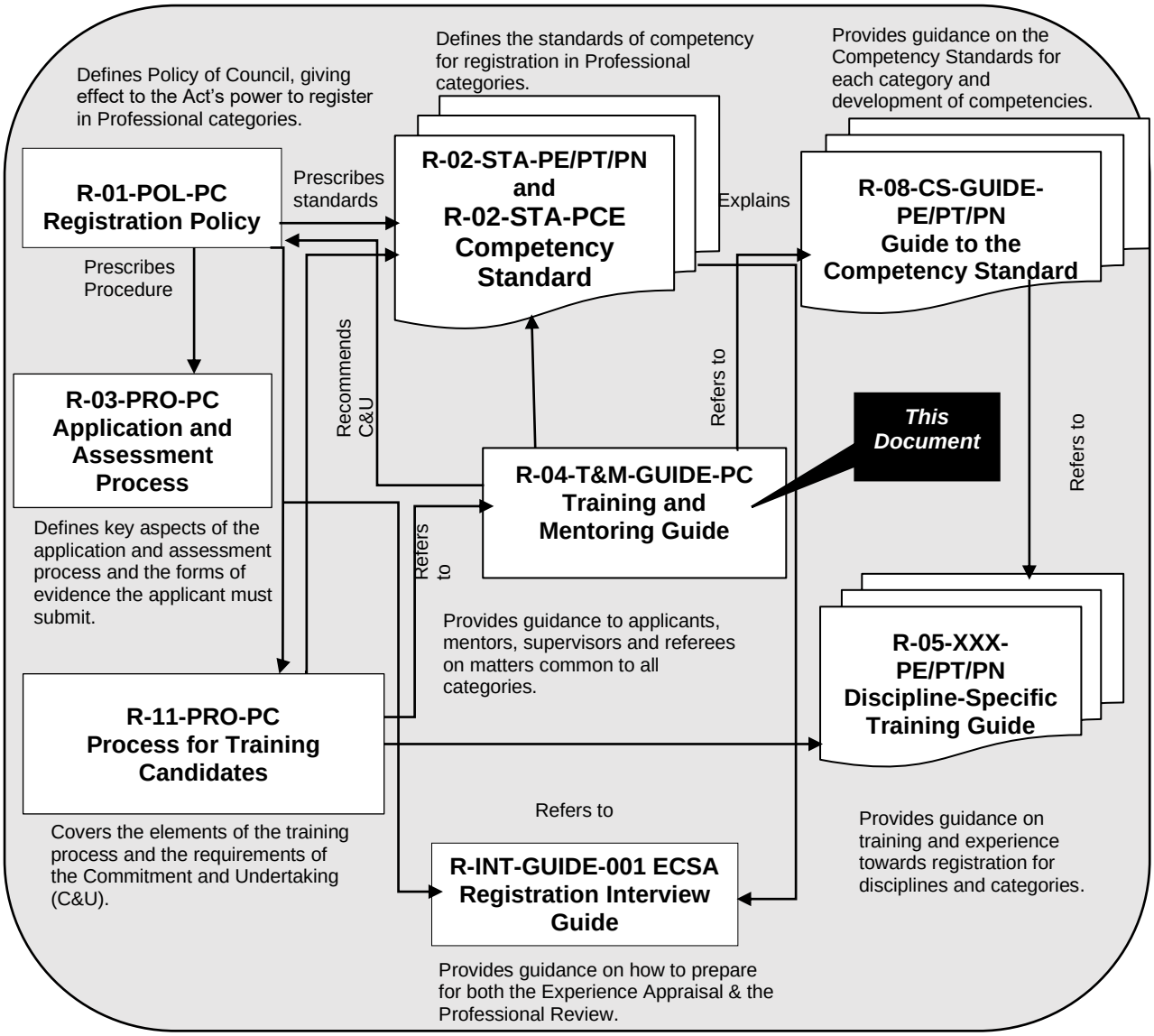

Figure 1: Documents Defining the ECSA Registration System

1. PURPOSE OF THIS DOCUMENT

This Training and Mentoring Guide describes the process of training mentees towards registration and the requirements that must be met for professional registration in the different professional categories. It provides a guidance for developing a structured engineering training and mentoring programme which is set at appropriate levels as defined in the standards, as well as defining engineering activities necessary for proper development of the mentees that allow for an increase in responsibility and accountability during the training period.

The document additionally defines the roles and responsibilities of a mentee and a mentor, as well as providing guidance for supervisors, mentors, referees and individuals intending to register with the ECSA within a professional category.

The ECSA places a high emphasis on applicants undergoing a structured training and mentoring programme as the preferred method for gaining experience and preparing for professional registration as well as applicants/mentees training under a mentor. Applicants who have not undergone such training and mentoring programme can, however, still apply for registration. Similarly, candidates/applicants who meet the required competencies and experience can register in any professional category regardless of whether they have a mentor, although having a mentor is recommended.

This document also provides guidelines on how to structure a mentor-mentee agreement, and also proposes developing an effective **Training and Mentoring Programme Process** tool or technique to monitor training progress as illustrated in **Figure 7**. Refer to section **6.1** for further details.

In each professional category (i.e., Professional Engineer, Professional Engineering Technologist Professional Engineering Technician and Professional Certificated Engineer), this document is supplemented by a Competency Standard for Registration in Professional Categories (documents **R-02-STA-PE/PT/PN** and **R-02-STA-PCE)** and a guide relating to the professional competencies for the category (documents **R-08-CS-GUIDE-PE/PT PN** and **R08-CS-GUIDE-PCE**). In addition, within a category, each discipline may provide further guidance on the training and registration requirements in the form of a Discipline-specific

Training Guide (documents **R-05-XXX-PE/PT/PN/PCE** and **R-05-XXX-PCE**). The Training and Mentoring Guide for Specified Categories is discussed in **R-04-TM-GUIDE-SC**.

2. ROLES AND STAKEHOLDERS

This document is directed towards prospective mentees (i.e., graduates, candidates and applicants) who wish to apply for professional registration, as well as for mentors and supervisors who support and guide training of prospective applicants. This guideline is intended to facilitate the development and execution of a structured mentoring approach for prospective mentees to gain experience incorporating good practice elements.

Unless the context requires otherwise, the term ‘candidate’ is used throughout this guide to define any engineering professional in training. After graduation an unregistered person performing engineering work is referred to as a ‘mentee’ (for those who have a mentor or a ‘candidate’ for those who are registered under the Engineering Profession Act, 46 of 2000 (EPA). When the unregistered person reaches the stage of readiness for application for registration under a specific professional category, the term ‘applicant’ is used. For the sake of this document, the terms are used interchangeably to define an unregistered person undergoing training with the aim of registering as a professional engineering practitioner.

2.1 Overview of roles in training and or mentoring

The objective of this is *Training and Mentoring Guide* is to provide information that aims to assist mentees to develop their competency to a level where they can consistently demonstrate competence at the required Level of Responsibility and to take responsibility for work performed. Three key players are involved in training mentees to reach a desirable Level of Responsibility: supervisors, mentors and referees. The roles of these key players in training mentees are outlined in **Table 1** below. The roles are presented in a descriptive manner, as an individual may fulfil multiple functions.

Table 1: Roles in training of mentees and supporting roles

Role	Supervisor	Mentor	Referee	Mentee
Function	• Supervises the work of the mentee, directly or through an intermediary. • Takes responsibility for engineering work/activities/ projects. • Supports mentee's accelerated/fast tracked career growth.	• Guides and facilitates the Guide and facilitates the mentee's professional development, guides timing and preparation of application for registration. • Evaluates and advises on the mentee's identified list of industry projects to better fit the exposure and experience necessary to meet the ECSA competencies and outcomes. • Takes ownership of the training and mentoring programme via a signed mentor-mentee agreement. • Continuously reviews and rates the mentee's progress using the Effective Mentoring Programme Tracker / Tool.	• Gives opinion of applicant's competency against standards and integrity from knowledge of mentee's work performance and gives opinion of competency against standards and integrity. • Must have knowledge of the mentee's professional competencies over a reasonable period of time, extending to sufficient duration aligned with the professional descriptors.	• Takes ownership of the training and mentoring programme. • Keeps consistent records across the various periods and modes of training. If possible, retains the same mentor if the employer or mode of training changes. • Takes responsibility for achieving competence in the set of 11 outcomes at the level defined within complex, broadly defined and well-defined engineering activities with the guidance of the supervisor and mentor.
Reporting	• Signs training reports (TEOs & TERs).	• Together with mentee signs mentor-mentee agreement. • Updates mentoring programme.	• Completes and signs referee reports.	• Completed TEOs & TERs. • Signs complete mentor-mentee agreement; updates mentoring programme tracker.

Role	Supervisor	Mentor	Referee	Mentee
Registration*	Supervisor registered in terms of s18(4) of the EPA. Intermediaries preferably registered.	Must be registered	Must be registered (see Table 2).	
Location	Employer organisation	Employer organisation or external.	Employer organisation or external.	
Multiple Roles	An individual may fulfil more than one roles			
** Registration of mentors, supervisors, referees in the category of the mentee unless otherwise agreed by ECSA*				**Includes candidate & applicants*

2.2 Mentee

A mentee is a trainee or prospective applicant or a candidate seeking guidance and support from an experienced registered professional practitioner (i.e., mentor) while working towards ECSA registration as an Engineering Professional. The role of a mentee or protégé includes, but is not limited to the following:

- Being familiar with the latest ECSA's Policy standards (**R-01-POL-PC**), Competency Standards (**R-02-STA-PE/PT/PN** and **R-02-STA-PCE**), Guide to Competency Standard (**R-08-CS-GUIDE-PE/PT/PN** and **R-08CS-GUIDE-PCE**), and Guide to Specific Discipline Competency Standard (**R-05-XXX-PE/ PT/PN** and **R-05-XXX-PCE**), etc.
- Identifying an ECSA professional registered person to be the mentor and compile the mentor-mentee agreement (refer to section **6.1**) for discussion, acceptance and signing with mentor. ECSA's website has a list of mentors that may be considered by a mentee.
- Setting goals that align with the objectives of the training and mentorship programme and collaborating with the mentor to establish SMART goals for professional development using an effective training and mentoring programme, process, tool or technique that meets the needs of the mentee.
- Identifying industry projects that the mentee will discuss with the mentor in search of a tailored exposure and experience that will help them meet the ECSA competencies and outcomes.
- Activity tracking progress in accordance with ECSA competencies and outcomes.
- Working with the mentor to seek resources for learning and identify people and information that might be useful.
- Sharing with the mentor identifying skills, knowledge and/or goals the mentee aims to achieve.
- If the mentor is not the mentee's supervisor, the mentee communicates the mentor-mentee agreement with the supervisor to ensure that the work assigned to the mentee aligns with the objectives outlined in the training and mentoring programme and engineering work / activities / tasks / project.
- Actively engaging in the learning process, demonstrating a genuine commitment to improving skills and knowledge.

- Maintaining open and effective communication with the mentor, including being receptive to feedback, asking questions and seeking clarification when needed.
- Participating in practical experiences and assignments related to the training and mentoring programme and seeking opportunities to apply gained knowledge in real-world scenarios.
- Seeking guidance and advice when facing challenges or uncertainties.
- Tracking activities and progress in accordance with ECSA competencies and outcomes and keeping consistent records across the various periods and modes of training.
- Taking responsibility to achieve competence in the 11 outcomes at the level descriptor applicable to the registration category defined within CEA, DBEA and WDEA Engineering work / activities / tasks / projects with the guidance of the supervisor and mentor.
- Developing an Initial Professional Development (IPD) Plan.
- Taking ownership of own learning journey and being proactive in seeking resources, attending training sessions and staying up to date with industry developments.
- Showing respect for mentor's time, expertise and coaching, as well as maintaining a professional demeanour in all interactions.
- Being open to receiving constructive feedback / critique and using it as a tool for improvement and making efforts to implement suggested changes.[1]

2.3 Mentor

A mentor is an experienced professional practitioner registered in an appropriate category (or in another category, if specifically agreed to by the ECSA in the particular case), who is willing to share with a mentee valuable knowledge about their own career path in a particular engineering professional category / level descriptor.

[1] **Note 1**: If mentees experience difficulties with their training, they should attempt to resolve them through the normal channels via their mentors and relevant engineering institutions / institutes / bodies and organisations regulated by the Engineering Profession.

The mentor's responsibility is to guide, coach and facilitate the professional development of the mentee. In agreeing to assist a mentee, the mentor commits to the following:

1. Participate in the planning and advising on the suitability of the training and mentoring programme process as part of the mentee's training and experience.
2. Evaluate and advise on the mentee's identified list of industry projects to better fit the exposure and experience to meet the ECSA competencies and outcomes.
3. Plan training tasks and Degree of Responsibility (DoR) Levels to ensure that the mentee develops the competency required for registration in the applicable category.
4. Ensure the mentee is increasingly exposed to problem solving, management, risk assessment and impact with mitigation plan in addition to ethical issues, judgement and responsibility.
5. Provide an oversight role of supporting and monitoring the mentee's completion of training and mentoring programme as agreed.
6. Review the outcomes achieved in view of the set objectives as presented in a report prepared by the Mentee on completion of each agreed task or DoR Level; and,
7. Assists the mentee in deciding on readiness to apply for registration and thereafter, assisting with the application.

The responsibilities of a mentor include but are not limited to the following:

- Being familiar with the latest ECSA Policy standards (**R-01-POL-PC**), Competency Standards (**R-02-STA-PE/PT/PN** and **R-02-STA-PCE**), Guide to Competency Standard (**R-08-CS-GUIDE-PE/PT/PN** and **R-08CS-GUIDE-PCE**), and Guide to Specific Discipline Competency Standard (**R-05-XXX-PE/ PT/PN** and **R-05-XXX-PCE**), etc.
- Agreeing to transfer valuable information to the mentee for the application process by signing a mentor-mentee agreement.
- Providing guidance on developing relevant working skills to achieve progression in levels of responsibility in engineering work activities/tasks/project and DOR as defined in this document's **Table 5** and ensuring that progress is reviewed and tracked.

- Aligning with mentee's professional development training and mentoring plan with an activity schedule tracking progress during the road to registration to achieve the ECSA competencies and outcomes.
- Assisting the mentee to identify relevant industry projects that can facilitate development of competence for the mentee's project list to gain experience and career growth in.
- Reviewing and advising the mentee during preparation of the IPD Plan.
- Providing the mentee with support and motivation.
- Advising the mentee on navigating the engineering industry ecosystem and networking to gain more experience and valuable source of knowledge to prepare to meet the engineering professional competency outcomes.
- Providing constructive feedback and unbiased opinion to the mentee.

2.3.1 External mentor

Should the services of an internal mentor be unavailable within the organisation where the mentee works, the employer may use the services of an external ECSA Professional Registered Mentor through one of the relevant engineering institutions/institutes/bodies. The appointed external Mentors should therefore be accommodating of limitations that the employer may set in given situation.

2.3.2 ECSA professional registered mentor

To become an ECSA registered mentor and to be listed on the ECSA Mentor-Mentee Database, a mentor has to:

- attend initial training for ECSA mentors or attend Road to ECSA Registration Campaigns to familiarise themselves with ECSA policies/standards/guidelines changes
- be in good standing with regards to ECSA professional registration status
- be professionally registered with ECSA in an appropriate category and discipline
- have not been subject to any misconduct or found guilty of any offence
- have not been refused registration on any grounds stated in Section 3 (i–vi) of the EPA
- have not had their registration cancelled as contemplated in Section 20 of the EPA
- be compliant with all the ECSA registration requirements as a professional
- demonstrate that they abide by ECSA's Code of Conduct and Code of Practice

- attend annual refresher training to align with ECSA policies and standards changes.

The benefits of the ECSA Professional Registered Mentor database include:

- providing an “inclusive” pool of mentors who are “accessible” to all engineering mentees intending to register with ECSA
- providing a “fair and equal training and mentoring platform” for all engineering mentees intending to register with ECSA
- providing effective mentoring that is informed by the same body of knowledge to reduce registration backlog
- providing guidance for persons who are committed to registering with ECSA
- promoting candidacy programmes as the preferred method of training towards supervision
- providing mentors who cater for all categories, namely: Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer and Professional Engineering Technician.

2.3.3 Benefits of mentor database/programme for employers

The benefits of the mentor database/programme for organisations include the following:

- Ability for employers to source graduate engineers (EIT), technologists and technicians for recruitment and employment purposes.
- An updated list of graduate engineers, technologists and technicians for recruitment and employment.
- Ability to establish graduate programmes such as: Engineer-in-Training (EIT), secondment, Training Academies, etc.
- Facilitation of ECSA candidacy registration.
- Ensuring candidates/applicants are assigned to an appropriate mentor.
- Ability to network with relevant mentors.
- Increased team performance and productivity from the experienced and knowledgeable employee.
- Fast tracked/accelerated career growth.

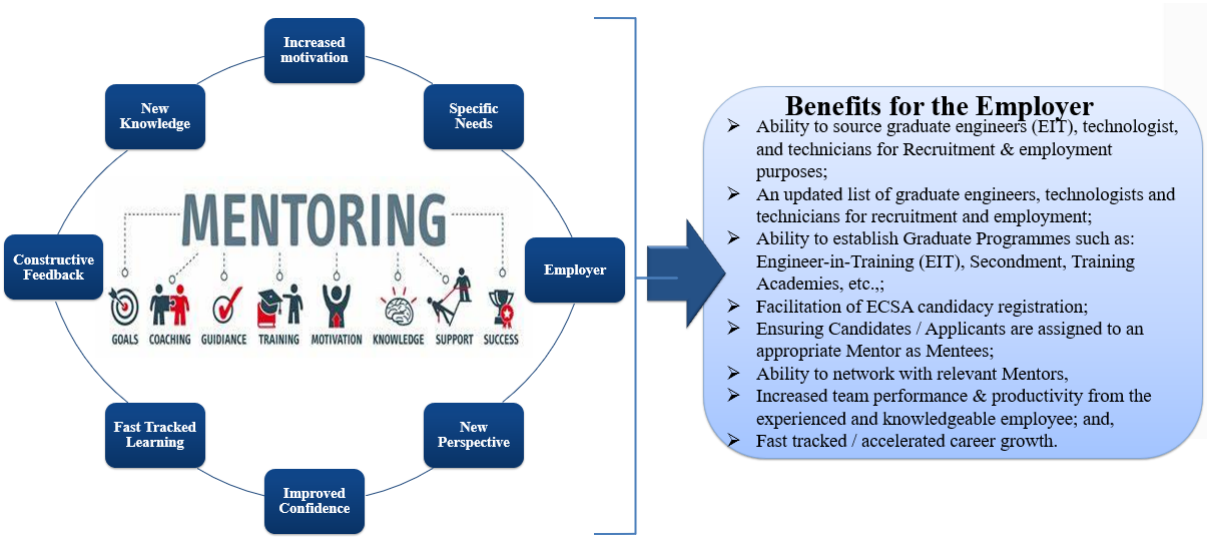

Figure 2: Benefits of mentoring

2.4 Supervisor

A supervisor is an individual who is responsible for overseeing and guiding the work of a mentee. They provide mentorship, guidance and oversight to engineering practitioners in training as they work towards achieving their professional registration.

The supervisor directs and controls the mentee's engineering work / activities / tasks / projects and takes responsibility for the work in terms of section 18(4) of the EPA. In accordance with document **R-11-PRO-PC**, supervision that is not direct must be performed on an adequately informed base. Intermediaries between the mentee and the supervisor should preferably be professionally registered but if they are not, they must have adequate engineering competence. The supervisor, together with the mentor and mentee, is expected to plan the training tasks to develop the mentee's competence and thereafter monitor and review the achievements from each task.

Although ECSA prefers a supervisor to be registered, a supervisor does not have to be professionally registered.

Supervisor as a mentor

A supervisor who is professionally registered may also fulfil the role of a mentor.

2.5 Candidate

A candidate is a person who is registered in terms of section 19(2)(b) of the EPA. It is the candidate's responsibility to ensure that the training received will culminate in the competency as defined in the ECSA standards. The ECSA places emphasis on candidates training under a professional registered mentor, and following a training programme under a structured training and mentoring programme that has been professionally registered as recommended by ECSA in this document.

ECSA recommends that mentees register as a candidate in the relevant category in the early stage of the training process, preferably after graduation from an accredited or recognised educational programme. As discussed in section 4.1.2 ***Registration as a candidate***

which explains the registration process and Training and Mentoring Programme Process Stage 2, there are different routes to apply for registration, therefore any mentee can follow the Training and Mentoring Programme. Refer to Document **R-11-PRO** for detail on the candidate training process under a Commitment and Undertaking (C&U).

2.6 Referee

Referees are Professionally Registered persons who have first-hand experience of the mentee's engineering activities, particularly those indicative of the mentee's professional competency. Referees assess the mentee's competence as a professional and can confidently attest to their ethical analysis. The eligibility and preferred capacity of referees for mentees in various categories are shown in **Table 2**.

Through the Referee Report, a referee provides ECSA with an evaluation of the mentee's experience and capabilities based on personal knowledge thereof. A referee must have knowledge of the mentee's professional competency over a reasonable period of time. Referees can be a mentor, colleague at a higher/senior or same level involved in the mentee's work, immediate or indirect supervisor, employer or client who has personal knowledge of the

mentee's professional performance and engineering experience. Referees must be registered with ECSA as a Professional in the relevant category / descriptor. If a mentee has been trained under a C&U, one of the referees must be a mentor, who is registered against the C&U.

Table 2: Referee requirements

Category	Number of referees	Registration	Order of preference
Engineer	2	Engineer (at least one) Foreign Registered Engineer Technologist Certificated Engineer	• Mentor • Immediate supervisor • Indirect supervisor • Employer colleague (not more than 1) same or higher level, involved in work, not involved in work • Client
Engineering Technologist	2	Engineer Technologist Certificated Engineer Technician	
Engineering Technician	2	Technologist Engineer Certificated Engineer Technician	
Certificated Engineer	2	Certificated Engineer (at least one) Professional Engineer	Senior to the applicant/mentee

2.7 Mentee distinctive responsibilities of a mentor, mentee, and supervisor

To meet Professional Competency Standards, an effective structured training and mentoring programme is vital, whereby a mentor must have a distinctive role to play in the training and mentoring programme compared to the influential role of the mentee's supervisor as stipulated in **Figure 3** below.

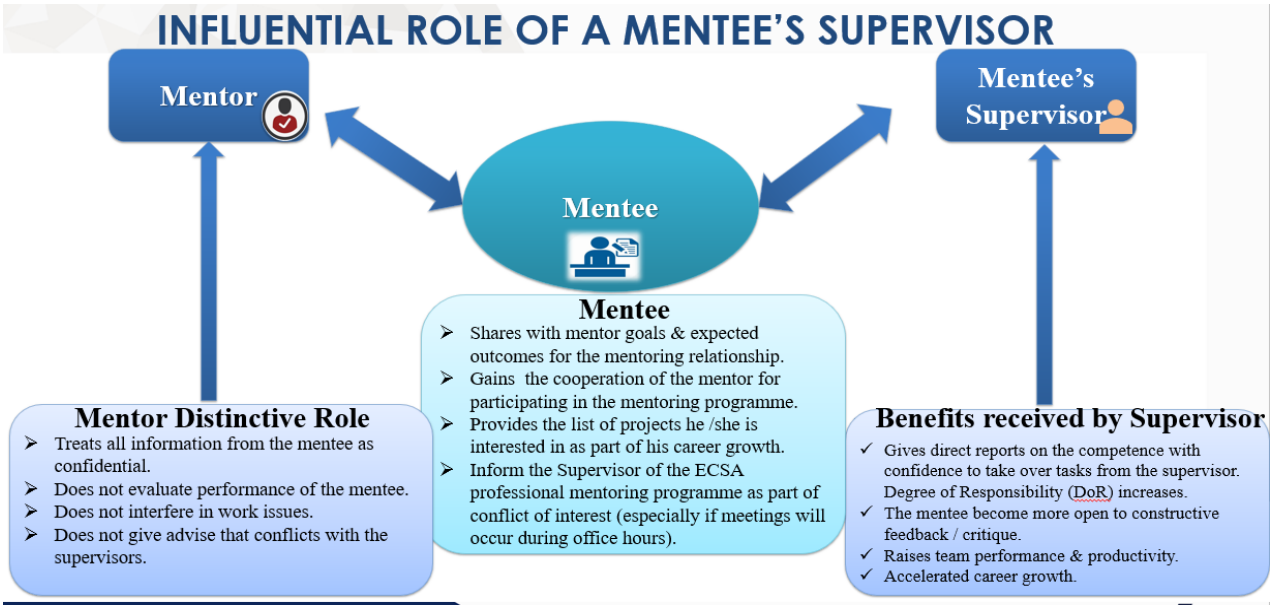

Figure 3: Influential responsibilities of a mentee's supervisor and mentor distinctive role

Characteristics of a mentor and benefits received by a mentee

A number of measures need be taken to ensure that the mentee benefits from the effective training and mentoring programme and to ensure that the mentor matches the required characteristics, refer to **Figure 4**.

The characteristics of a mentor include, but are not limited to the following:

- Integrity, to ensure mentee that information will be confidential.
- Showing genuine interest in their protégée/mentee as a person.
- Sharing of experience and insights (i.e., knowledge).
- Asking open questions to encourage reflections (support).
- Offering positive (constructive) feedback/critique (i.e., coaching).
- Offering solicited advice (i.e., coaching and guidance).
- Celebrating and acknowledging achievements (i.e., success).

Mentee benefits include, but are not limited to the following:

- Improved confidence
- Increased motivation
- Gaining experience and insights
- New perspective and knowledge
- Learning from constructive feedback/critique
- Fast-tracked learning
- Celebrating professional registration in a timely period.

Figure 4: Mentee benefits of mentoring programme

3. TRAINING AND EXPERIENCE

3.1 Process for mentoring as part of training and experience

Training is the process of attaining specific practical knowledge, skills, attitudes and values under the direction of competent persons/professionals. Training may be supported by formal courses and other learning activities.

Experience is the process of gaining competence by active involvement in the work environment. A major part of training involves mentees spending time on hands-on engineering work / activities / tasks / projects to obtain proficiency, knowledge and skills to gain skill in a real-life working environment.

The process of training and experience generally consists of phases or substantial tasks that form convenient units for planning the training and assessing performance. The objective of training and experience is to develop competence as specified by the outcomes in the standard and the required level of performance.

3.2 Overview of competency outcomes for professional registration

The outcomes required for professional registration as outlined in the Competency Standard, document **R-02-STA-PE/PT/PN**, are summarised in Section Stage 2e. The goal for training and experience is for the Engineering professional competence that is more than satisfying a linear list of outcomes. Section 4.1.2, in **Stage 2e: Demonstrate professional competency and Competency Standards for** registration, summarises and groups the competencies that must be demonstrated in the assessment process when the mentee/applicant applies for registration. **Figure 5** presents a visualisation of how the set of 11 outcomes that are evidence of engineering competence are interconnected.

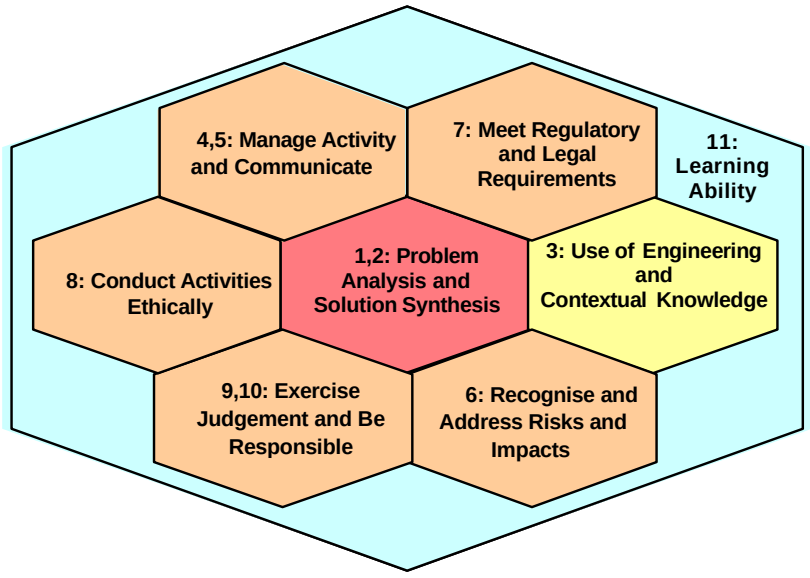

Figure 5: Visualisation of the interconnectedness of the engineering outcomes

Details of competency outcomes requirements for each professional registration category from Group A to E can be found in documents **R-08-CS-PE/PT/PN** and **R-08-CS-PCE**. The Competency Standards documents, **R-02-STA-PE/PT/PN** and **R-02-STA-PCE**, describe the outcomes as not stand-alone elements but as performance of the outcomes that must be integrated successfully.

As depicted in **Figure 5**, the problem-solving (analysis and synthesis) is seen in the central position, with competencies represented by other outcomes as supporting roles. The core activity of engineering is problem-solving – i.e., bringing about change from an initial state to a final state and overcoming the barriers involved to achieve a result that is useful to people, enterprises and society. During this process, knowledge that is based on Engineering Science and principles/methods/techniques is applied while accounting for the impacts of engineering activities, the legal and regulatory factors and ethics. Responsible, judgement-based decision-making and management of the process is essential to achieve engineering goals. Competent engineering practitioners underpin their activities by continuous learning, both formally and informally.

Problem-solving also refers to the systematic process of identifying, analysing and finding solutions to technical challenges and issues encountered in the field of engineering. It is a fundamental aspect of engineering practice and is crucial for designing, developing and maintaining various systems, products and processes. Some key elements of problem-solving involve problem identification, analysis and understanding of the problem's underlying principles and factors, generation of alternative solutions which vary in terms of feasibility, safety, cost-effectiveness, legal and regulatory requirements, and ethics and performance evaluation. The most suitable option is selected through a process of responsible, judgement-based decision-making and management of the process. Designs are conducted using engineering knowledge and principles to produce engineering drawings, plans, specifications and processes.

Problem-solving further involves testing and validation to ensure that the chosen solution meets the desired specifications and performance criteria.

3.3 ECSA documents defining the registration system

ECSA's registration system is defined in various documents, namely policies, standards and supporting documents. This document is a guide for persons who aspire to register as a candidate or a professional and who wish to apply for registration. The main applicable documents and their relationships are shown in **Figure 1**.

The registration policy applicable to all categories of registration and to all applicants who are proceeding by different routes is defined in ECSA document **R-01-POL-PC**. This policy governs the registration of professionals in specified categories and the corresponding candidate categories.

The Competency Standard applicable to the category must be consulted; these documents define the outcomes that applicants must demonstrate for registration and the level at which applicants must perform (documents **R-02-STA-PE/PT/PN** and **R-02-STA-PCE**).

The procedures for processing candidates' and professionals' registration applications are contained in document **R-03-PRO-PC**.

This training and mentoring guideline (document **R-04-T&M-GUIDE-PC)** provides guidance for persons who perform critical work of an engineering nature that has a direct impact on public safety and health but is not registered as a professional.

Further guidelines for persons proceeding to registration in professional categories are available in documents **R-08-CS-GUIDE-PE/PT/PN** and **R-08-CS-GUIDE-PCE**.

Guidelines specific to individual disciplines (where these exist) are available in the following documents:

- **R-05-XXX-PE/PT/PN:** Discipline-specific Training Guide for Candidate Engineers Engineering Technologists Engineering Technicians
- **R-05-XXX-PCE:** Discipline-specific Training Guideline and Requirements for Candidate Certificated Engineers.

4. DEVELOPMENT PROCESS AND MENTORING STAGES OF ENGINEERING PROFESSIONALS

The development of an Engineering Professional has three main stages (see Figure 6), namely:

- **Stage 1: Accredited Programme** – Meeting standard for engineering education
- **Stage 2: Training and Experience** – Meeting the professional competency requirements for registration
- **Stage 3: Practice** – Maintaining competency through CPD and observing the code of conduct.

This Training and Mentoring Guide applies to Stage 2 of the development of an Engineering Professional, where professional competency is developed after graduation with an accredited or recognised qualification and before application for registration as a professional in an applicable category.

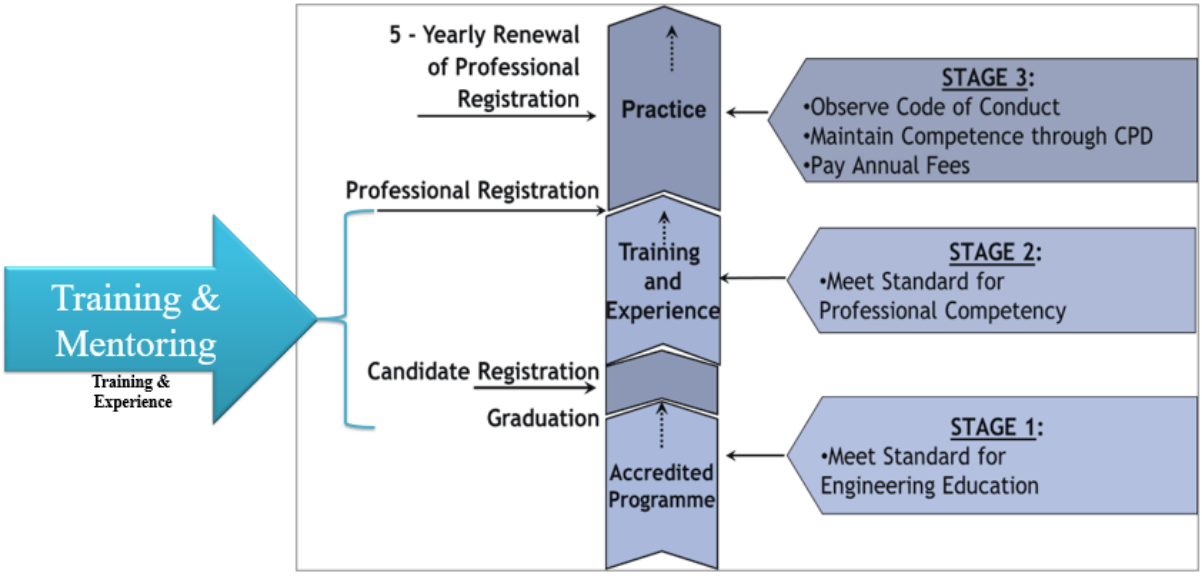

Figure 6: Engineering professional development stages

In **Stage 1**, a student/undergraduate undergoes training to meet the engineering educational requirements of an ECSA accredited programme or qualification. This is the first critical stage towards the development of the competency necessary for registration as a professional. Registration as a candidate in the relevant category is recommended after graduation (completion of Stage 1).

During **Stage 2**, graduates commence gaining experience and developing components as they participate in engineering projects with a gradual increase in DoR. A programme of training and experience called a ***Training and Mentoring Programme*** is developed to guide the mentee through the relevant training and experience while achieving the required DoR levels. Although registration as a candidate is optional, training through a structured training programme is strongly advised as a method of developing competencies for registration. This document proposes a ***Training and Mentoring Programme Process*** aimed at guiding the mentee or applicant to meet the professional competency requirements for registration in Stage 2 of the development of an engineering professional (see **Figure 7**).

An engineering practitioner, who is not registered as a candidate or one who is following alternative route in accordance with ECSA Competency Standard documents **R-08-CS-PE/PT/PN** and **R-08-CS-GUIDE-PCE**, who meets registration requirements but is not registered as a candidate, may also follow a ***Training and Mentoring Programme Process*** as outlined in **Figure 7**.

In **Stage 3**, the engineering practitioner is now registered as a professional under a particular category. The requirement in this stage is that competency is maintained through CPD and both the ECSA Code of Conduct and the Code of Practice are observed. Registered professionals pay annual fees and renewal of professional registration occurs every 5 years.

The objective of integrating Engineering Professional Development stages 1 to 3 as part of the *Training and Mentoring Programme Process* is illustrated in **Figure 7** below.

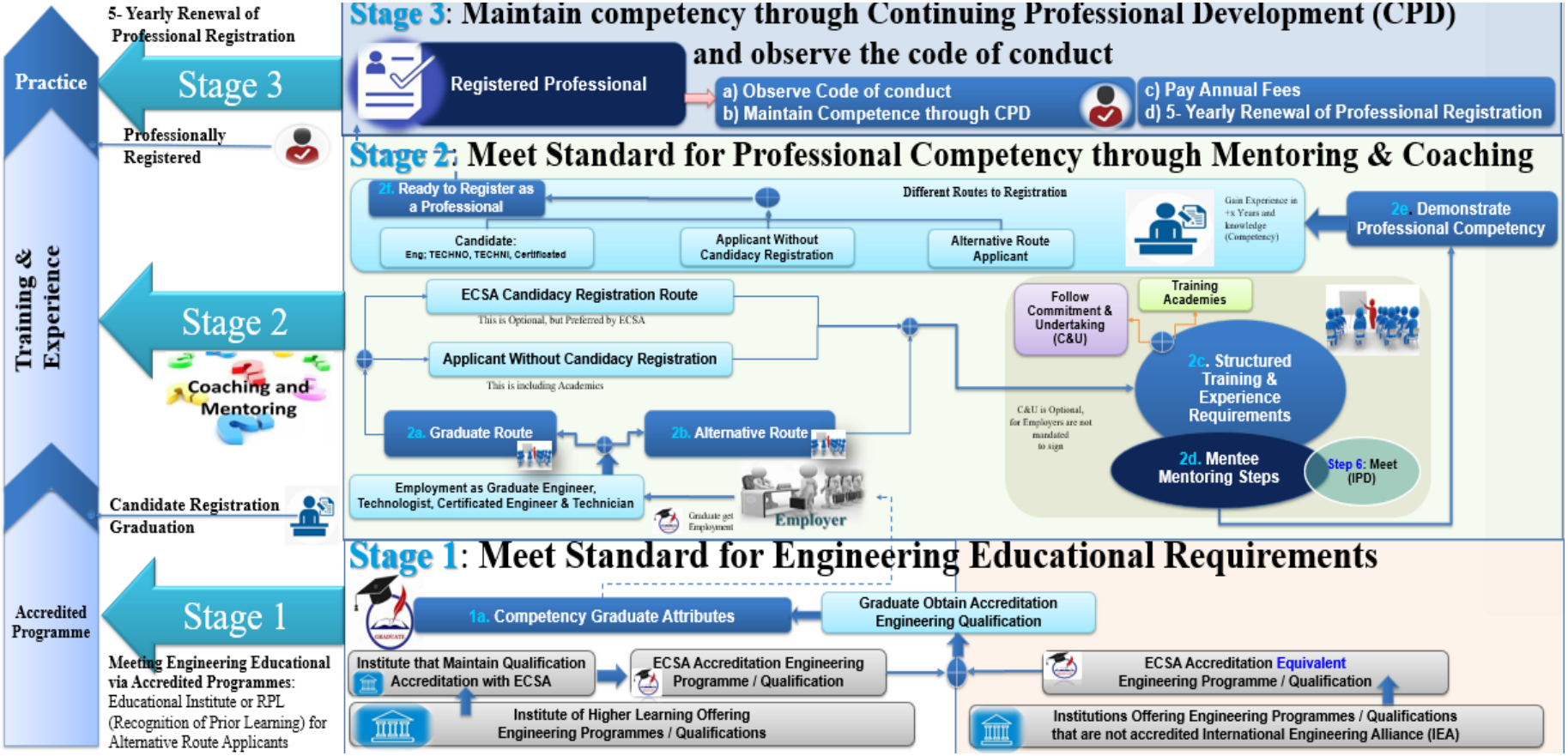

Figure 7: Training and mentoring process

4.1 Training and Mentoring Programme Process stages

4.1.1 Stage 1: Accredited Programme – Meeting Standards for Engineering Educational Requirements

The educational requirements are defined in the standards for accredited qualifications in each category. In the case of recognised and evaluated qualifications, it is ECSA's policy that substantial rather than exact equivalence is required. Several routes are available to meet the educational requirements, as detailed in the sections below.

Stage 1a: Competency graduate attributes

To demonstrate competency in graduate attributes and in accordance with **E-17-PRO**, a candidate must meet educational requirements for the category by the following:

- Holding an ECSA accredited qualification or an acceptable combination of accredited qualifications prescribed for the category.
- Holding a qualification or a combination of qualifications recognised under an international agreement (i.e., the Educational Accords under the auspices of the International Engineering Alliance (IEA) relevant to the category).
- Holding a qualification or a combination of qualifications that have been determined by case-by-case evaluation to satisfy criteria for substantial equivalence to an accredited qualification for the category by:
    - the qualifications being awarded in a jurisdiction or by a provider that has a record of quality or a quality assurance system known to the ECSA; or
    - examination of detailed documentation on the qualifications reflecting substantial equivalence.
- Presenting a combination of evidence determined by ECSA for the category that indicates an individual level of educational achievement against criteria demonstrating that it is substantially equivalent to an accredited qualification. Evidence may include:
    - qualifications or credits towards qualifications not presented under above point;

- completion of examinations or other forms of assessment set or prescribed by Council;
- Portfolios of evidence of work and other outputs presented for assessment; or
- Other evidence for recognition of prior learning (RPL) presented for assessment.

ECSA-accredited engineering programme/qualifications

ECSA accredits engineering education programmes and the qualifications that are needed to meet the educational requirements for registration in candidate and professional categories. There are no accredited qualifications for Certificated Engineers; a Government Certificate of Competency (GCC) is required for registration as a candidate or professional under the certificated category.

The lists of ECSA-accredited programmes are presented below in Table 3:

Table 3: ECSA-accredited programmes

Registration Category	ECSA-accredited programmes
Professional and Candidate Engineers	• BEng/BSc(Eng)/BIng-type programmes (document **E-02-PE**) listed on the ECSA website • MEng programme (document **E-22-PE**) (with cognate BEng Tech (Hons)/PGDip plus BEng Tech as prerequisites) listed on the ECSA website
Professional and Candidate Engineering Technologists	• BTech programmes (Discontinued), with a cognate NDip (Nated-aligned) as a prerequisite listed on the ECSA website • BEng Tech programmes (document **E-02-PT**) and Adv Dip Eng programmes (document **E-05-PT**) BEng Tech (Hons) (document **E-09-PT**) or PGDip (document **E-09-PGDip**) listed on ECSA website
Professional Certificated Engineers	• Obtain one of seven GCCs, (document **R-02-STA-PCE**)
Professional and Candidate Engineering Technicians	• NDip programmes (NATED-aligned) listed on the ECSA website • Dip Eng programmes (document **E-02-PN**)/Adv Cert (Eng Prac) programmes (document **E-21-PN**)/Adv Cert (Eng) programmes (document **E-06-PN**)

Note: Higher educational equivalent qualification that follows alternative route requirements for registration in accordance with document **R-08-PE-PT-PN** for Guide to the Competency Standards for Registration in Professional Categories

Qualifications recognised under international agreements

The substantial equivalence of qualifications accredited by other signatories to international agreements is verified and monitored by mechanisms provided in the agreements for the various categories.

- **Professional and Candidate Engineers:** Holders of qualifications from programmes accredited (singly or in combination) by a Washington Accord Signatory
- **Professional and Candidate Engineering Technologists:** Holders of qualifications from programmes accredited (singly or in combination) by a Sydney Accord Signatory
- **Professional and Candidate Engineering Technician:** Holders of qualifications from programmes accredited (singly or in combination) by a Dublin Accord Signatory

The Washington Accord, Sydney Accord and Dublin Accord have full signatories that are national accrediting bodies that enjoy recognition under the agreements. The accords also have provisional signatories that are national accrediting bodies working towards becoming signatories but have not yet proven that their standards and processes meet the accepted level of the Accord. Qualifications accredited by bodies holding provisional status in an Accord are, therefore, not recognised by other signatories. Applicants holding qualifications from countries with provisional status that were completed while or before the body had provisional status must apply for educational evaluation.

To determine whether a qualification is accredited by a signatory, the website of the signatory should be consulted to locate the database or list of accredited qualifications. Holders of qualifications accredited by a signatory that were awarded before the country's accession to the Accord must also apply for educational evaluation.

Educational evaluation for qualification accreditation

Meeting the educational requirements for a category is the first step towards registration in a professional category and the sole requirement for registration in a candidate category (except in the case of Candidate Certificate Engineers where the GCC is required). Applicants for registration who do not hold a qualification from an accredited programme or who are not recognised through international agreements must have their educational achievements evaluated.

ECSA's policy (document **R-01-POL-PC**) does not require qualifications to meet the exact requirements for an ECSA-accredited qualification for the category, but they must be *substantially equivalent* according to the criteria defined in document **E-17-PRO**. Appropriately worded criteria for substantial equivalence of qualifications and individual achievement are defined for Engineers, Engineering Technologists and Engineering Technicians in document **E-17-PRO**. The criteria broadly follow the criteria for accredited qualifications. Criteria that cannot readily be evaluated and that are covered at the registration level are omitted.

4.1.2 Stage 2: Training and experience – meeting standards for professional competency requirements for registration

Stage 2a: Graduate route: Training and Mentoring Programme

Once employed, graduates who have attained a ECSA accredited or recognised education attributes are eligible to register as candidates in terms of section 19(2)(b) of the EPA. Graduates may therefore begin their training and experience stage while registered as a candidate or they may opt not to register as a Candidate. Refer to document, **R-11-PRO-PC** for further information. Some graduates can gain experience and training without being registered as a candidate.

Graduate route: training through an ECSA candidacy registration programme

As outlined in document **R-11-PRO-PC**, a candidacy programme normally commences when the trainee graduates from an accredited or recognised programme, registers as a candidate and enters employment with an employer who is committed to training persons towards registration. For Certificated Engineers, a letter of appointment as the responsible person is an additional requirement.

The programme's objective is to attain the level of competence for registration through training, experience, IPD and work performance to provide evidence of that competence. Although they have similar activities to CPD (refer to **ECPD-01-STA**) that are undertaken post registration, IDP activities are carried out before registration for professional development to enhance engineering knowledge and skills, and to remain globally competitive.

The duration of a candidacy programme is typically at least 3 years but can vary as it is highly dependent on the specific category in which the mentee/applicant wishes to register. The final level of competence must be as defined in the standard for the specific category.

This guideline applies to candidates proceeding via candidacy programmes. It is recognised that an individual candidate may experience a combination of training in and outside a candidacy programme and that training may be carried out with different employers. The result must, however, always be the same, i.e., the applicant should be able to perform at the required level of competency and to be responsible for the work that is performed and required for registration in the chosen category. Mixed-mode training requires extra planning and management effort on the part of supervisors, mentors and the candidate.

Registration as a candidate

Each professional category has a corresponding candidate category for which the educational requirements must be met, namely:

- Candidate Engineer
- Candidate Engineering Technologist
- Candidate Certificated Engineer
- Candidate Engineering Technician.

Registration as a candidate is intended for persons who have completed their engineering education and are training towards registration. It serves several purposes:

- It signals the person's intent to seek registration.
- It confirms that educational requirements have been met.
- It provides access to mentoring, information and advice.
- It provides the opportunity to incorporate discipline-specific requirements in the training for registration
- It provides an environment for planning and monitoring the candidate's training and experience.
- It clarifies the position of the yet unregistered person with respect to performing identified engineering work / activities / tasks / project.

While most candidates are likely to have attained an accredited or recognised qualification, persons proceeding by alternate routes may find it prudent to seek formal recognition by ECSA of having met educational requirements.

Registration as a candidate may benefit the engineering practitioner's training as stipulated in document **R-11-PRO** for further details.

Graduate route: training for applicants without candidacy registration

This document may be used as a guideline for applicants who do not undergo a candidacy registration. Despite the route of training and experience that a graduate follows towards registration, the final level of competence must be achieved as defined in the standard for the specific category being applied for.

A training and mentoring programme normally commences when the mentee graduates from an accredited or recognised programme, enters employment with an employer who will be able to provide the mentee with training experience to align the mentee/applicant with ECSA degrees of responsibility (DoR); these range from Level A to Level E. It is mentees' responsibility to ensure they meet the degree of responsibility requirements during training experience.

Additionally, through training, experience and IPD, mentees are able to attain the level of competence for registration and through work performance to provide evidence of competence. IPD activities are carried out before registration as a professional and are similar to CPD activities undertaken post registration.

The duration of a training experience varies, and it is highly dependent on the specific category in which the mentee/applicant wishes to register.

Stage 2b: Alternative route – training and mentoring programme

The term 'alternative route' refers to a mentee/graduate who aspires to become registered in a Professional Category but does not have the accredited or recognised qualifications and who proposes to meet the educational requirement through further study and assessment. Refer to **E-17-PRO** for actual years of experience required for a professional to register via the alternative route. Furthermore, the following should noted:

- Alternative route qualifications do not apply for registration as a Candidate.
- All qualifications listed in **E-17-PRO** require an extended period of actual engineering years' experience and DoR experience, except where qualifications are substantially equivalent to the present benchmark qualifications.
- In conjunction with actual engineering years of experience and DoR, alternative route qualifications are required to be at the broadly defined level of problem-solving or at the well-defined level of problem solving for Technologists and Technicians, respectively.
- The benchmark qualifications for registration of Technologists and Technicians must demonstrate exit-level problem-solving at NQF level 6 and NQF level 7, respectively.

Refer to document **E-18-PRO** for registration via the alternative route.

Stage 2c: Structured training and experience programme

ECSA recommends a structured mentoring mechanism to meet training and experience requirements. This can be achieved through but is not limited to the following:

- Employer with structured training and mentoring programme and C&U
- To meet IDP requirements through Training Academies (i.e., Recognised Educational Institutions)
- Review and evaluation of mentees' progress from the Certified Training Academies (refer to ***Review and evaluation of progress of mentees from the certified training academies***
- section 4.1.2)
- Other methods that the employer may consider include the following:
    - Engineer-in-Training programmes (EIT) including **rotation to expose graduate engineers to various aspect of engineering aligned with the 11 exit level outcomes** as prescribed in the competency standards policy document **R-02-STA-PE/PT/PN** or **R-02-STA-PCE**.
    - EIT programme can be undertaken under C&U or ECSA accredited Candidate Training Academy

- **Secondment** of Engineering practitioners by employers to service providers such as consulting engineering firms or construction firms for exposure and skill development / transfer
- **Exchange programmes / bilateral collaboration** with research institutes, academia, and international employers/ engineering firms for skill transfer
- **Fast-tracking of engineering development program** during the early stages of their career.

Employer with structured mentoring & training programme and C&U

Refer to document **R-11-PRO** for details on the candidate training process under C&U. Where applicable, the candidate will be trained under the C&U programme. A C&U is an agreement between the employer and ECSA, in which the employer commits to train engineering candidates to the standard required for registration. The training process may involve structured activities that include induction and training courses on specific skills or technologies. The candidate also participates in self-initiated IPD activities.

By training candidates in a structured manner with the 11 outcomes in mind, candidates generally attain the level of competence required in a shorter time than their peers who are not trained in a structured manner.

An employer who signs a C&U gives its employees the assurance that it is committed to quality training. By signing a C&U, management and mentors are in the ECSA database and will be notified of any changes in the registration process. In addition, the ECSA assessors and reviewers are given assurance that candidates have been through a structured process, overseen by mentors who understand what is required, theoretically making applications easier to assess.

Training Academies

An Academy is an organisation that aims to promote and maintain standards in the engineering field through a structured training programme evaluated to meet the relevant criteria. ECSA identifies and signs a memorandum of undertaking with a potential organisation that wishes to establish a Training Academy. The organisation is then used as a pilot project to determine the effectiveness of such an Academy.

An accredited Academy is an academy whereby ECSA has assessed its structured training programme and found that it meets all the relevant criteria for an academy and its resources. The Academy's objective is to upskill the Engineering Profession and address the scarce and/or critical skill shortage in the country by ensuring appropriate training is given at the correct level.

The Academies train engineering professionals/practitioners that have registered with ECSA as a candidates who have an accredited, recognised or assessed equivalent qualification, graduates that require Work Integrated Learning (WIL) to complete their relevant qualification and experienced engineering practitioners who are not professionally registered.

The desired outcome of the training is for the candidates/mentees is to achieve all 11 professional competency outcomes in preparation for professional registration.

The six groups of key training areas are:

- Engineering problem solving
- Managing engineering activities
- Impacts of engineering activities
- Exercise judgment, take responsibility and act ethically
- Initial professional development
- Relevant legislation, standards & codes of practice.

Training is guided by a mentor who facilitates mentees' rotation to maximise training and minimise project impacts. The benefits of a Training Academy for the employer and mentee include both employer and candidate benefits:

Employer benefits:

- Mentees trained by experienced mentors
- Quicker registration
- Employer has sight of graduates' progress.

Candidate benefits:

- They become well rounded registered candidates

- Stage 1 of the professional registration process is addressed
- Incremental log training and track percentage completed.

Review and evaluation of progress of mentees from the certified training academies

Review and evaluation of progress for the mentees from the certified Training Academies determines if mentees meet the necessary outcomes for professional registration as defined in the Competency Standards (**R-02-PE/PT/PCE/PN**) and policies (documents **R-01-POL-PC** and **R-01-POL-SC**).

Mentees submit their Training and Experience Reports (TERs) and Engineering Reports (ERs) to their mentors for review and evaluation. The ER should indicate which outcomes the mentee has met.

The mentee's progress is reviewed and evaluated on an ongoing basis by both the supervisors and the mentors using the training record for documentation. The tool to review and evaluate mentees' progress by the mentors is provided in section **6**: and in the process document **A-03-PRO**.

The benefit of following this process is that once the mentee, who is now an applicant, has demonstrated competence against all outcomes and once the TERs and ERs have been assessed by the ECSA assessors according to the registration policy (document **R-01-POL PC/SC**), the applicant proceeds to Professional Review (PR). Guide document **A-05-MS&C-GUIDE** provides detailed guidelines for training and mentoring candidates by ECSA accredited and certified Training Academies which supports the Training Academy Certification and Accreditation Policy (**A-01-POL**) and its supporting documents that govern Training Academies.

Applicants are required to submit the relevant TERs and ERs 3 years post obtaining their benchmark qualification for assessment by ECSA assessors.

ECSA assesses the individual TERs and ERs against each outcome as defined in documents **R-02-PE/PT/PCE/PN**, with the relevant guidance for each outcome given in document **R-08-PE/PT/PN/PCE**.

Stage 2d: Mentee mentoring steps to meet professional competency standards

There are 6 mentee mentoring steps on how to meet professional competency standards (as stipulated in **Figure 8**) as part of mentoring and coaching stage. The distinctive role played by the mentor on the *Training and Mentoring Programme* process compared to the influential role of the mentee's supervisor must be considered, as depicted in **Figure 3**.

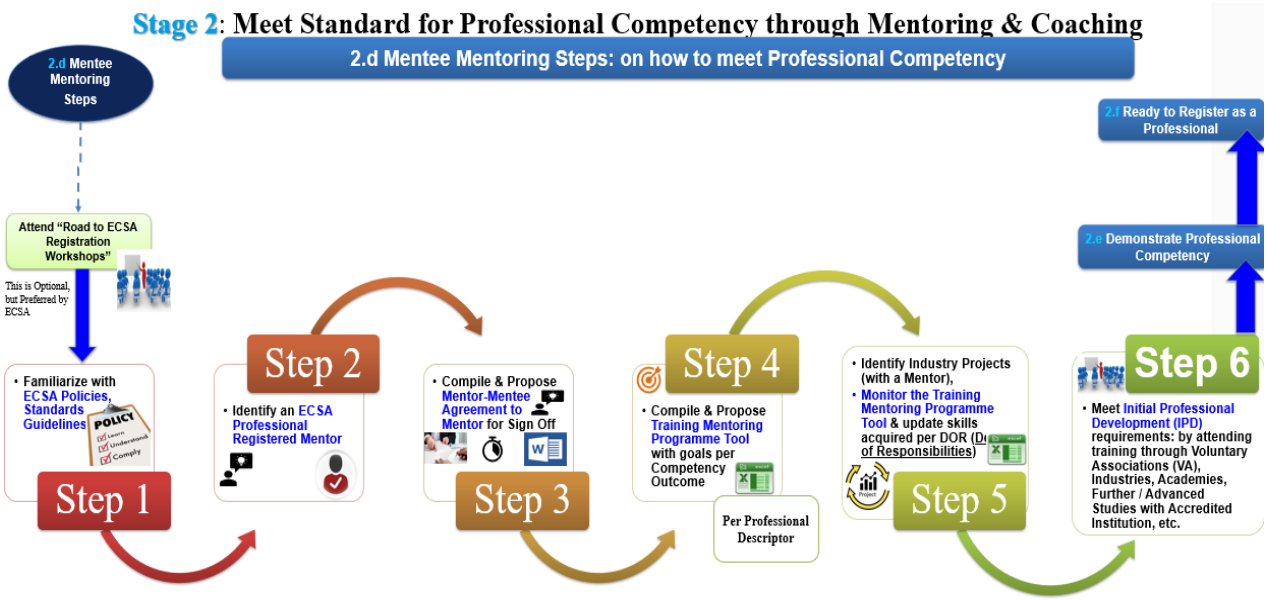

Figure 8: Mentoring Steps: on how to meet Professional Competency

Mentoring and Coaching (Steps 1 to 6: Mentee steps)

The following steps are recommended for the mentoring and coaching stage that align with **Figure 8** and should be read in conjunction with mentor and mentee roles and responsibilities as stipulated in Section **2**:

Step 1:	• Familiarise with ECSA policies, standards & guidelines.
Step 2:	• Identify an ECSA professional registered mentor.
Step 3:	• Compile & propose mentor-mentee agreement to the mentor for sign off

Step 4:	• Compile & propose training and mentoring programme process tool or technique with goals per competency outcome.
Step 5:	• Identify industry projects (with a mentor). • Monitor the **Training and Mentoring Programme Process tool** or technique and update skills acquired per DOR.
Step 6:	• Meet IPD requirements by attending training through Voluntary Associations (VAs), industries, Academies, further/advanced studies with Accredited Institutions, etc. • Outcome 11 requires providing evidence for attaining IPD requirements which consist of identified professional development activities aimed enhancing applicants' engineering knowledge and skills before registration as a professional. Additionally, through training, experience and IPD, the applicant is able to attain the level of competence for registration and through work performance to provide evidence the competence. IPD activities are carried out before registration as a professional and similarly, CPD activities, which are undertaken post registration, are required to maintain professional competency. Refer to document **ECPD-01-STA** for CPD. Activities listed below or combinations thereof constitute professional development and hence, IPD: ○ Attending courses, seminars, congresses and technical meetings organised by engineering institutions/institutes, universities, other professional bodies and course providers. ○ Actively participating in conferences, serving on technical or professional committees and engaging in working groups. ○ Undertaking structured self-study (i.e., using textbooks with examples). ○ Taking correspondence courses and studying other supervised study packages. ○ Enrolling for formal postgraduate studies (limited credits). ○ Writing technical papers or presenting papers or lectures at an organised event. ○ Reading of technical papers such as white papers or peer-reviewed articles. ○ Conducting research and literature reviews that are part of the engineering design and synthesis process. ○ Taking in-house training courses offered by companies. ○ Undertaking accredited CPD activities through VAs, industries, Academies, further/advanced studies with Accredited Institutions, etc. ○ Taking credit-bearing courses at higher education institutions that directly complement the individual's engineering-related knowledge.

Advanced / Further study while a candidate / mentee / applicant

In a competency-based system, various means can be used to enhance competency and present evidence of competency. Advanced study may contribute to learning and providing

evidence against the professional outcomes (including educational outcomes for persons without accredited or recognised qualifications). For example, the design of novel equipment during a research degree may be considered evidence against problem-solving – Outcomes 1 and 2. Completing a research degree may provide evidence against the educational Outcome 5: Experimental Work and Investigation. Because the assessment for registration is competency focused, the previous policy of considering a reduction in the length of the candidacy programme falls away.

Stage 2e: Demonstrate professional competency and Competency Standards for registration

Professional competence means having the necessary attributes to perform the activities within the profession to the standards expected in independent employment or practice. The ECSA registration process uses a competency-based approach to registration. The EPA subsection 19(2)(a)(1) stipulates that the ECSA *must register applicants in a professional category who have demonstrated competency against standards determined by the Council for the category.* This statement embodies the notion of standards of competency and demonstration of competency.

What is a Competency Standard?

Competence of an Engineering Professional in a category is defined as having the necessary attributes to perform the activities within the professional category to the expected standards. The standard of competency or the Competency Standards define a number of outcomes that a person must achieve. To be judged competent to register in a category, the outcomes must be achieved at the level stated. Eleven outcomes are defined, and these are conveniently grouped into five sets. The stem of each outcome is the same in the standards for the Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer and Professional Engineering Technician.

The standards are differentiated by the insertion of level descriptors. These level descriptors are defined for the four professional categories in the Competency Standards defined in documents **R-02-PE/PT/PCE/PN**. The candidate or prospective applicant for registration

should be familiar with the requirements of the applicable standards for the category. See Table 4 below.

Table 4: Competency standards and related outcomes

Competency Standard	Outcomes
Group A: Knowledge-based engineering problem solving	• **Outcome 1:** Define, investigate and analyse [level] engineering problems. • **Outcome 2:** Design or develop solutions to [level] engineering problems. • **Outcome 3 (Pr Eng):** Comprehend and apply advanced and local knowledge of the widely applied principles underpinning good practice that is specific to the jurisdiction in which the Engineer practices. • **Outcome 3 (Pr Techno Eng):** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems and ,methodologies that is specific to the jurisdiction in which the Engineering Technologist practices. • **Outcome 3 (Pr Techni Eng):** Comprehend and apply knowledge that is embodied in established engineering practices that is specific to the jurisdiction in which the Engineering Technician practices.
Group B: Manage Engineering Activities	• ***Outcome 4:*** Manage part or all of one or more *[level]* engineering activities. • ***Outcome 5:*** *Communicate clearly using multiple mediums and collaborate inclusively. with a broad range of stakeholders in the course of engineering activities.*
Group C: *Impacts* of Engineering Activity	• ***Outcome 6:*** Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of *[level] engineering activities seeking to achieve sustainability.* • ***Outcome 7:*** *Meet all legal, regulatory and cultural requirements and protect the health and safety of persons during all engineering activities.*
Group D: *Exercise* Judgement, Take Responsibility and Act Ethically	• ***Outcome 8:*** Conduct engineering activities ethically. • ***Outcome 9:*** Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of *[level] engineering activities.* • ***Outcome 10:*** Be responsible for making decisions on part or all of *[level] engineering activities.*
Group E: Professional Development (IPD)	• ***Outcome 11:*** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to

Competency Standard	Outcomes
	adapt to emerging technologies and the ever-changing nature of work.

Outcomes 1 and 2 require a level descriptor for the level of *problem-solving*. This descriptor considers the knowledge that is required for the analysis and design or development of solutions, the degree to which the problem is defined, factors that may make the solution difficult and the uncertainty and consequences of the problem and solution.

Outcomes 4, 6, 7, 9 and 10 also require a level descriptor for the demands of the engineering activity for the relevant category.

The competency indicators and range statements for all 11 outcomes for the four professional categories per level descriptor are defined in the Competency Standards in documents **R-02-PE/PT/PCE/PN**.

How is competency demonstrated?

According to Figure 6, the first stage towards demonstrating competency is the attainment of an educational qualification; this is an important foundation. During the training and experience phase, the candidate progressively performs more demanding work and assumes more responsibility. At Stage 2, the mentee should be working at the level expected of a person who has newly graduated but is still under the supervision and control of a registered person.

While working at Stage 2, the mentee will undertake work that requires problem analysis and solution, accounting for impacts and regulation, managing processes to ensure that the engineering goals are met, behaving ethically and exercising judgement in decision-making, with the supervisor taking full responsibility for the work completed. Effective performance of this work is, therefore, evidence of competence. The mentee as an applicant must document this evidence for the registration application and must undergo documentary interactive assessment by engineering professionals who judge the demonstrated competency against the defined standards.

Detailed guides are available regarding the Competency Standards for each professional category in documents **R-02-STA-PE/PT/PN** or **R-02-STA-PCE** and Guide to the Competency Standards for Registration in Professional Categories **R-08-CS-GUIDE-PC**.

Demonstrating sound judgement, responsibility and ethics

The competency standards require not only the demonstration of technical and engineering management proficiency but also the ability to exercise sound judgement, take responsibility and act ethically in making engineering decisions. In this regard, the outcomes the applicant must demonstrate are outcomes 8, 9 and 10 (Group D). The requirement is that candidates must demonstrate that they are able to exercise sound judgement, take responsibility and act ethically throughout the engineering work/activities/tasks/project performed. This requires careful management by the supervisor. The following section outlines the legal constraints on candidates exercising sound judgement, taking responsibility and acting ethically while performing engineering work/activities/tasks/project.

Legal constraints

Under the EPA, a mentee/candidate is not allowed to take responsibility for the work. Various sections of the Act require registration for particular aspects of work. Section 18(2) provides that a person may not practise in any of the categories unless registered in that category. Section 18(3) provides for a person to practise in a consulting capacity in the category they are registered in. Section 18(4) provides for a person registered in the category of candidate to perform work in the engineering profession only under the supervision and control of a professional of a category as prescribed.

Furthermore, EPA Section 26 provides for the identification of the type of engineering work that may be performed by persons registered in any of the categories, including work that may fall within the scope of any other profession regulated by the Professions' Acts referred to in the Council for the Built Environment Act, 2000. While the regulations identifying engineering work/activities/tasks/projects have not yet been promulgated, they should be used as prudent guidelines for whether particular work falls into the 'identified' category.

Managing conflict

The following aspects need to be considered:

- Taking due care to ensure that the objectives of engineering work/activities/tasks/projects are achieved in an ethical manner.
- Addressing impacts of engineering work/activities/tasks/projects and risks.
- Being *accountable* for the work, in particular that due care is taken to deal with risks.

Supervisors and mentors must implement strategies to ensure that mentees can demonstrate the ability to exercise *due care* without having to make decisions that require accountability; the supervisor must be accountable. Taking due care requires mentees to exercise the following defined competencies: problem-solving, management, impact identification and mitigation, ethical behaviour together with acting responsibly and applying sound judgement. Working within the limits of these competencies is a clear requirement. In such a mode of working, mentees would be required by the supervisors to express judgements and propose decisions and recommendations; these may be at the level that a Registered Person would normally perform. Although mentees do not carry any legal accountability, they are accountable to the employer or organisation. Supervisors must check the judgements, decisions and recommendations as they bear ultimate responsibility for the work.

Diversity of engineering

It is important to recognise that the scope of engineering that must be adhered to by candidates is too wide for definitive training guides.

Engineering education, training and work is generally partitioned according to disciplines/sub-disciplines and industry sectors such as consulting, contracting, construction, manufacture, mining, process industries, services, utilities and infrastructure. Within a sector or discipline, an engineering practitioner may be concerned with systems, processes, components or materials.

The competency standards identify the generic outcomes for competent practitioners irrespective of the discipline or industry sector, for example, identify and analyse problems and synthesise solutions. These represent the fundamental transferable competencies.

Rather than formulating complex requirements for all functions, the system relies on engineering peers for training and assessment. Peers are persons who are engineering practitioners in the same discipline and are registered in the category to which the mentee aspires.

Stage 2f: Ready to register as a professional

As depicted in Figure 7, once a mentee has reached and passed the stage for Demonstrating the Professional Competency for Registration, there are different entry routes for registration the mentee can follow to register in the specific professional categories: candidate, applicant without candidacy registration, or alternate route applicant as detailed in Section **4.1.2** in Stage 2a and b of the **Training and Mentoring Programme Process**.

Mentee as applicants are considered ready for registration when they can provide evidence to demonstrate competency in all 11 outcomes at the required DoR.

Registration categories

A person or applicant may register in the engineering profession in three categories:

- Professional (covered in this document)
- Candidate (covered in this document)
- Specified category prescribed by the Council (not covered in this document, refer to **R-04-T&M-GUIDE-SC**).

Registration as a professional practitioner

ECSA is empowered to register persons in four *professional categories*:

- Professional Engineer
- Professional Engineering Technologist
- Professional Certificated Engineer
- Professional Engineering Technician.

Common requirements for applicants in all professional categories

In terms of Section 19(2)(b) of the EPA and policies laid out by ECSA document **R-01-POL-PC**, to attain registration with the ECSA in a professional category, applicants must demonstrate that they:

- meet the educational requirements for the category
- demonstrate competent performance against the standards laid down for registration in the category.

Applicants in academic, research and management positions

In certain cases, applicants are employed in engineering academia as lecturers, research and development industry or in highly specialised fields during their development towards registration. While these applicants do not conform to the normal industry employment situation, they nevertheless gain the opportunity for development towards meeting the Competency Standards. These applicants should utilise the opportunities that exist while working with industries, and students that apply for research or further studies to investigate real industry problems and participate in complex/broadly defined/well-defined engineering activities to solve engineering problems. Interaction with industry will bridge the gap of certain outcomes that cannot be met/demonstrated in a purely academic environment. For example, samples or experiments can be undertaken from a real live plant or equipment to verify engineering theories. Most industries have a list of problems to be investigated or benchmark practices awaiting to be resolved.

Applicants working in industries in management positions should ensure that they keep themselves abreast of the engineering activities and problems for IPD and maintain their CPD activities. This can be achieved through but not limited to the following:

- Participate in engineering projects committees as a member or chairperson; this assists with sound engineering judgements and ensures the meeting packages are reviewed and challenged as to their integrity.
- Review the engineering documents that subordinates compile and be part of the approval team.

- Volunteer to lead the engineering problems that arise in the industry and participate as a team member.

4.1.3 Stage 3: Practice – maintain competency through CPD and observe code of conduct

Refer to **ECPD-01-STA** Standard Document for CPD. In today's rapidly changing world, it is no longer feasible to rely on basic engineering studies coupled with a few years of practical training as it cannot provide lifelong professional advice and services. Professionals need to regularly update their knowledge and develop and refine their skills to remain competitive and relevant. This means undertaking on-going or CPD in terms of Section 13(K) of the EPA. In addition, Section 22(1) requires that every 5 years, a registered person must renew registration and apply in the prescribed manner to the Council for the renewal of registration.

CPD may be acquired through but is not limited to the following:

- Attending CPD-accredited workshops and seminars offered by non-VAs
- Participation in statutory, professional, institutional, technical or non-technical committees or task-groups (1 credit per 10 hours of active participation)
- Evaluation of educational qualifications for ECSA's Committee: (1 credit for every 10 notional hours of active involvement
- Evaluation of educational qualifications for ECSA (1 credit for every 10 hours of active involvement)
- Evaluation of competence and applications for ECSA registration (1 credit for every 10 hours of active involvement)
- Self-study which includes but is not restricted to studying of journals or computerised material (1 credit per 10 hours).

5. PLANNING GUIDELINES FOR MENTOR AND MENTEE

5.1 Planning guidelines for mentors

Mentors must follow three principles when planning an applicant's/mentee's training and mentoring programme:

1. The planning, execution and monitoring must focus on the competencies to be developed.
2. A variety of work activities is necessary for the proper development/progression of an applicant/mentee. The object of having a variety of work is to broaden the experience of the applicant and to ensure that all aspects of competency are developed and ultimately reviewed. Variety may be obtained in different ways, both singly and in combination:
    - An individual's engineering activities are located at various stages in the lifecycle of an engineering activity/work/project, that is, conception, planning, design, construction/implementation, operation, plant handover and decommissioning, as stipulated as an example in **Figure 9**.
    - Associated with this lifecycle are specific functions that include commissioning, testing, improving and troubleshooting. The applicant should experience several stages in the lifecycle of a project or projects.
    - Variety may also involve different aspects of a discipline (or cross-disciplinary fields). The Discipline-specific Training Guidelines/requirements indicate the acceptable variety of experience in different disciplines and may elaborate on training aspects appropriate to the discipline.
3. Increasing responsibility and accountability within the organisation must be imposed and accepted by applicants/mentees until they are capable of accepting professional responsibility in making and executing engineering decisions at the full professional level (i.e., DoR Level E: Performing). The DoR, defined in **Table 5**, should be used to quantify the level of responsibility and accountability and recorded via the *Mentoring Programme Process Tool/Technique* in accordance with guidance in section **6.1**.

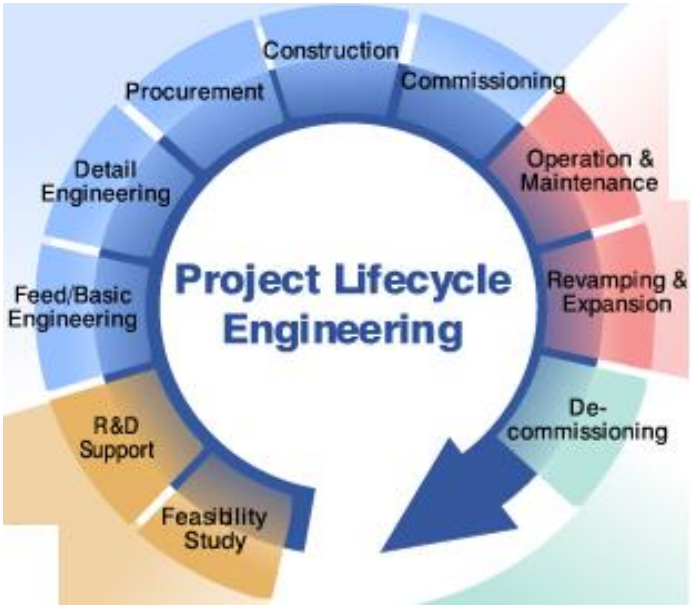

Figure 9: Generic lifecycle of engineering work/project

It is imperative for the mentor to ensure that the planning guidelines are matched with section **6.2** for *Technique for successful mentor-mentee relationship.*

5.2 Planning Guidelines for Mentee

This section aims to assist the applicant/mentee and the mentor/supervisor to plan the training and mentoring programme for the applicant's/mentee's progression.

During development from graduate level to meeting the competency requirements for registration, the applicant/mentee progresses through levels of work capability until the required level for registration is attained. A useful scale for indicating progression throughout the training and mentoring and programme, i.e., DoR Levels, is presented in Error! Reference source not found.. The table shows the nature of the applicant's/mentee's work at each DOR, ranging from being orientated in the engineering environment at degree *A: Being Exposed* to working at the DOR required for registration, namely *E: Performing*. The responsibility that should be placed on the applicant/mentee at each stage is in terms of the applicant's/mentee's own responsibility and the extent of supervision and mentoring support.

More detailed information on progression, i.e., how this general definition can be linked to particular disciplinary contexts, is included in the relevant Discipline-specific Training Guidelines e.g. **R-05-XXX-PE/PT/PN** and **R-05-XXX-PCE**.

The main learning process is through working with competent engineering personnel. The applicant/mentee is under the direct or indirect supervision of an engineering professional. A mentor guides the applicant's/mentee's professional development. The applicant/mentee is involved in engineering work of adequate variety and increasing demand and responsibility. Initially, the applicant/mentee *assists* with engineering work, carrying out defined tasks under close supervision. The applicant/mentee progresses by contributing individually and as a team member to the engineering work/activities/project. By the end of the training period, the applicant/mentee must perform individually and as a team member at the level of problem-solving and engineering work/activity/project required for registration and must exhibit a DoR Level E. This level of work provides evidence of competency against the standards. Over time, the emphasis on ***training***, that is, learning through the inputs of others, gives way to ***experience***, learning by performing engineering work and reflecting on observations and achievements.

Table 5: The nature of work and summary of degrees of responsibility

Degree of responsibility (DOR)	Nature of work: the mentee	Responsibility of mentee	Extent of mentor support	Extent of supervisor support
Level A: **Being Exposed**	Undergoes induction, observes engineering activities, processes, and work of competent professionals.	No responsibility, except to pay attention.	Mentor showing genuine interest on Mentee work. Mentor explains challenges and forms of solution.	Accept mentee's plan for training and mentoring programme by recording or documenting via the *Training and Mentoring Programme Process* tool.

Degree of responsibility (DOR)	Nature of work: the mentee	Responsibility of mentee	Extent of mentor support	Extent of supervisor support
Level B: Assisting	Performs specific engineering activities and processes under close supervision.	Limited responsibility for work output.	Mentor coaches, offers feedback.	Closely supervise the mentee's engineering activities/work/ project.
Level C: Participating	Performs specific engineering activities and processes as directed with limited supervision.	Mentee articulates own reasoning and compares it with that of supervisor.	Exposes mentee to increasing demands in the range of engineering competencies through shared knowledge.	Supervisor progressively reduces support but monitors outputs.
Level D: Contributing	Performs specific work with detailed approval of work outputs.	Full responsibility for supervised work.	Mentor support Mentee in building strong problem-solving skills via experience sharing.	Full responsibility to supervise the immediate quality of work done by mentee. (e.g., monitor and approve).
Level E: Performing	Works in team without supervision, recommends work outputs, responsible but not accountable.	Level of responsibility to supervisor is appropriate to a registered person; supervisor is accountable for mentee's decisions.	Provide construction review feedback on industry projects against competency outcome objectives.	Mentee takes on problem-solving without support, or at most, with limited guidance.

6. TRAINING AND MENTORING PROGRAMME TOOLS AND / TECHNIQUES

The objective of attaining training and experience through a training and mentoring programme is to develop the competency that must be demonstrated by a mentee at the time of application for registration as professional engineering registered person/practitioner. Training and work experience must, therefore, be planned, executed and evaluated to ensure that this goal is attained. As a result, mentees, supervisors and mentors must at all times focus on the goals of training and mentoring programme, which must be viewed in an integrated way. The mentee's execution of engineering activities must be monitored and reviewed on a regular basis in line with the programme goals.

6.1 Mentoring stage documents/templates/tools/techniques required

It is imperative that during the Stage 2 of *Training and Mentoring Process* that mentees equip themselves with certain tool or techniques to plan, track and monitor the progression of engineering tasks, work, projects or activities undertaken during training and experience stage towards professional registration. The following is a list of proposed documents/tools/ techniques although the list is not exhaustive:

6.1.1 Mentor-mentee agreement form

To formalise the agreement between a mentor and mentee, it is recommended that a contract be entered into by both parties as a voluntary agreement to establish the terms of the mentoring relationship. An example can be found on the ECSA website or any generic template can be used with the following requirements:

- Duration of the mentorship
- Frequency of meetings to review the progress
- Agreement to maintain strict confidential unless the information disclosed by either party
- Roles of a mentor must be stipulated
- Roles of a mentee must be stipulated
- Role acceptance sign off by both parties with dates
- Termination.

6.1.2 Training and Mentoring Programme Process Tool or Technique

It is important for the programme to be in a format that is user friendly and effective for both mentor and mentee – an example can be found on the ECSA website or any generic template preferably in Ms Excel can be used with the following requirements:

- List of ECSA Competency Outcomes 1 to 11 per group A to E
- Match ECSA outcomes with engineering projects/work/tasks/activities planned to be met for each competency outcome
- Set goals per DoR level descriptor on how to meet each Competency Outcome and consider **Integrated Performance** technique
- Use a recording technique that is an evidence-based system as stipulated in section **6.6** of this document.

It is imperative for the mentee to refer to the roles and responsible section when planning, reviewing and monitoring the *Training and Mentoring Programme Tool* as depicted in **Figure** 3 as well as **Figure 4**.

This section provides more guidelines on how the DoR level descriptors align with mentee progression, duration of training and mentoring programme and detailed planning guidelines for both mentee and mentor. In addition, the following sections provide guidelines on techniques to be used for a successful mentor-mentee relationship.

In accordance with section **4.1.2**, there are 6 mentoring steps on how to meet professional competency standards (refer to **Figure 8**). The mentor must have a distinctive role to play in the training and mentoring programme compared to the influential role of the mentee's supervisor as stipulated in **Figure 3.**

An example of a programme may be found on the ECSA website.

6.2 Technique for successful mentor-mentee relationship

Based on the mentor characteristics that are now explicit, it is vital for a mentor-mentee to have surety on their long-term relationship. Both mentor and mentee must ensure their

relationship is guided by simple principles of clear expectations, mutual respect, reciprocity (e.g., benefit for the mentor as well), high level of support via shared values, etc.

The DoR Levels A to E must be matched throughout the phases of mentor-mentee relationship as illustrated in **Figure 10** with the numbers of years as an example for a particular project.

In summary, the successful mentor-mentee relationship should yield the following results:

- Mentor participates in the planning and advises on the suitability of the work and experience for training and mentoring programme via mentor showing genuine interest in the applicant's/mentee's work.
- The applicant/mentee is exposed to increasing demands in the range of engineering competencies through shared knowledge.
- Following a training and mentoring programme ensures that the applicant/mentee completes the training via integrity and confidentiality.
- The applicant/mentee liaises with supervisor to ensure work is consistent with the training objectives.
- The applicant/mentee receives regular reports and review outcomes against the objectives via constructive feedback.
- Success acknowledgements assist the mentor to review and evaluate the level of competency achieved and plan for future work experience as well as assisting the applicant/mentee to decide when ready to apply for registration.

6.3 Phases of technique for successful mento-mentee relationship

During the mentoring and coaching process, phases of the mento-mentee relationship are aligned with DoR progression Levels A to E during the training and experience of the mentee as illustrated in **Figure 10** and **Figure 11**.

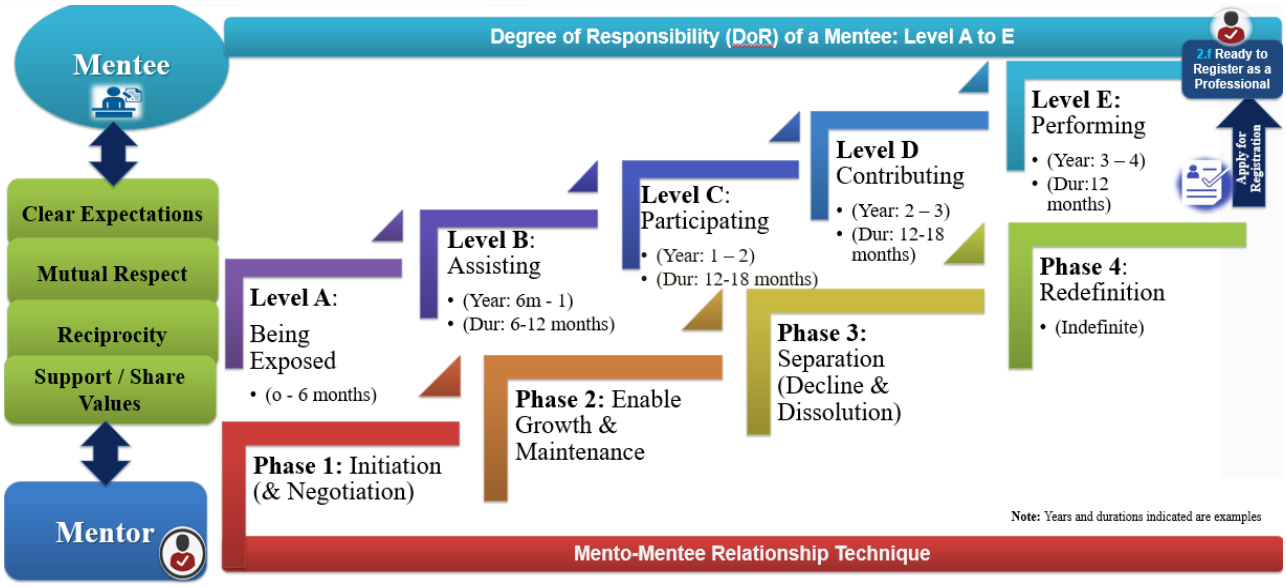

Figure 10: Phases of successful mento-mentee relationship

Phases of the technique for a successful mento-mentee relationship include but are not limited to the following:

Phase 1 – Initiation & Negotiation:

- Mentee takes lead to initiate relationship (relationship gets started and begins to have importance).
- Mode of communication is developed, negotiations, agreement sign-off.
- Mentee takes mentor through mentoring programme per professional descriptor he/she will be applying for registration n.
- Mentor prepares to take lead for next Growth & Maintenance Stage.

Phase 2 – Enabling Growth & Maintenance:

- Bond of trust, mentee take lead in activities.
- Transparency and comfort level is set.
- Mentor supports mentee to build strong problem-solving skills via experience sharing.
- Mentor reviews the Mentoring Programme Tracker and rates the mentee's DoR for each competency.

Phase 3 – Separation (Decline & Dissolution):

- Mentee starts preparing or compiling ECSA application forms.
- Final mentor comments addressed.
- Changes in relationship.
- Mentee requests signatures for application forms.

Phase 4 – Redefinition (Indefinite):

- Relationship ends or takes more peer-like relationship.
- Some mentorship relationships may continue for more career growth for future opportunities.

Table 5 aligned with the phases of the mento-mentee relationship includes but is not limited to the levels in **Table 6**:

Table 6: Nature of work and summary of degrees of responsibility aligned with phases of mento-mentee relationship

Level	Time period	Phase
Level A – Being exposed	Within 0–6 months	• Undergoes induction, follow Step 1 to 4 of the Mento-Mentee Framework. • Observes engineering activities, processes and work of competent professionals. • Mentee ensures alignment with "**Phase 1 – Initiation & Negotiation**".
Level B - Assisting	Within 6 months–1 year	• Performs specific engineering activities and processes under close supervision. • Mentee ensures alignment with "**Phase 2 – Enabling Growth & Maintenance**".
Level C – Participating	Within 1–2 years	• Performs specific engineering activities and processes as directed with limited supervision. • Mentee ensures alignment with "**Phase 2 – Enabling Growth & Maintenance**".
Level D – Contributing	Within 2–3 years	• Performs specific work with detailed approval of work outputs. • Mentee ensures alignment with "**Phase 2 – Enabling Growth & Maintenance**".

Level	Time period	Phase
Level E – Performing	Within 3–5 years	• Works in team without supervision, recommends work outputs, responsible but not accountable. • Mentee ensures alignment with "**Phase 2 – Enabling Growth & Maintenance, Phase 3 – Separation (Decline & Dissolution) and Phase 4 – Redefinition (Indefinite)**".

6.4 Progression levels of a mentee aligned to DoR

It is recognised that an individual applicant may experience a combination of training in and outside a mentoring programme and that training may be carried out with different employers. The result, however, must always be the same – being able to perform at the required level of competency and to be responsible for the work that is performed and required for registration in the chosen category. Mixed-mode training requires extra planning and management effort on the part of supervisors, mentors and the applicant/mentee. Three measures are recommended:

- The applicant's/mentee's record-keeping must be consistent across the various periods and modes of training.
- If possible, the applicant/mentee should retain the same mentor if the employer or mode of training changes.
- In the final analysis, the applicant/mentee must take ownership of the training and negotiate with employers to ensure that the necessary competencies are attained.

Figure 12 shows the general elements of a mentoring programme as part of training and experience. The process is governed by standards, policies and procedures.

6.5 Mentee progression principles

The applicant/mentee engages in a sequence of engineering activities that may be the completion of a particular aspect of training or a unit of work by following the illustrated progression principles as part of quality management in **Figure 11** below.

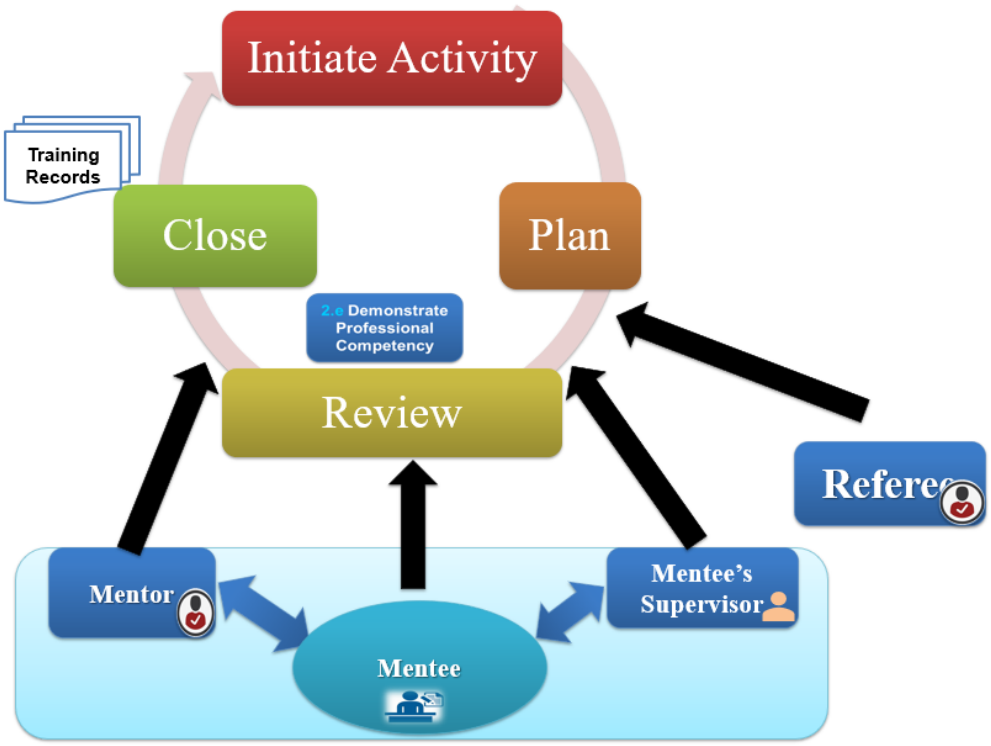

Figure 11: Mentee progression principles for engineering work or activities

The progression principle is that for a specific engineering work/activities/tasks/project within the training period there is:

- **Initiation of an activity** – beginning of the training period where the applicant/mentee initiate/start the engineering work/activity/task/project and ensure it is documented in the training and mentoring and programme tool for tracking as well as the training period TER forms.
- **Planning** – for each of the progression DoR levels, the applicant/mentee, working with the supervisor and mentor, sets and documents the competency development objectives of the DoR levels/training periods. The plan must be reviewed annually or as the DoR level/period changes.
- **Review (i.e., which is part of the Stage 2 for "Demonstrate Professional Competency")** – at the end of each DoR Level, the applicant/mentee, supervisor and mentor must review the achievements of the immediately completed DoR Level against

the objectives that were set for the Planning stage. Thereafter, objectives are set for the next DoR Level.

- **Close (i.e., where the training records are kept)** – after one or more DoR Levels of working at the exit level (i.e., *Responsibility E: Performing*) defined in **Table 5**, the mentor and applicant/mentee may determine that sufficient evidence of competence has been accumulated to apply for registration, provided that the 3-year minimum period has elapsed. The applicant/mentee then prepares an application for registration, setting out evidence of competency (as part of Training Records).

Figure 12 indicates how the mentee progression levels over the DOR should be aligned.

Detailed information on Planning Guidelines for an applicant/mentee's training and mentoring programme is available later in this guide/document.

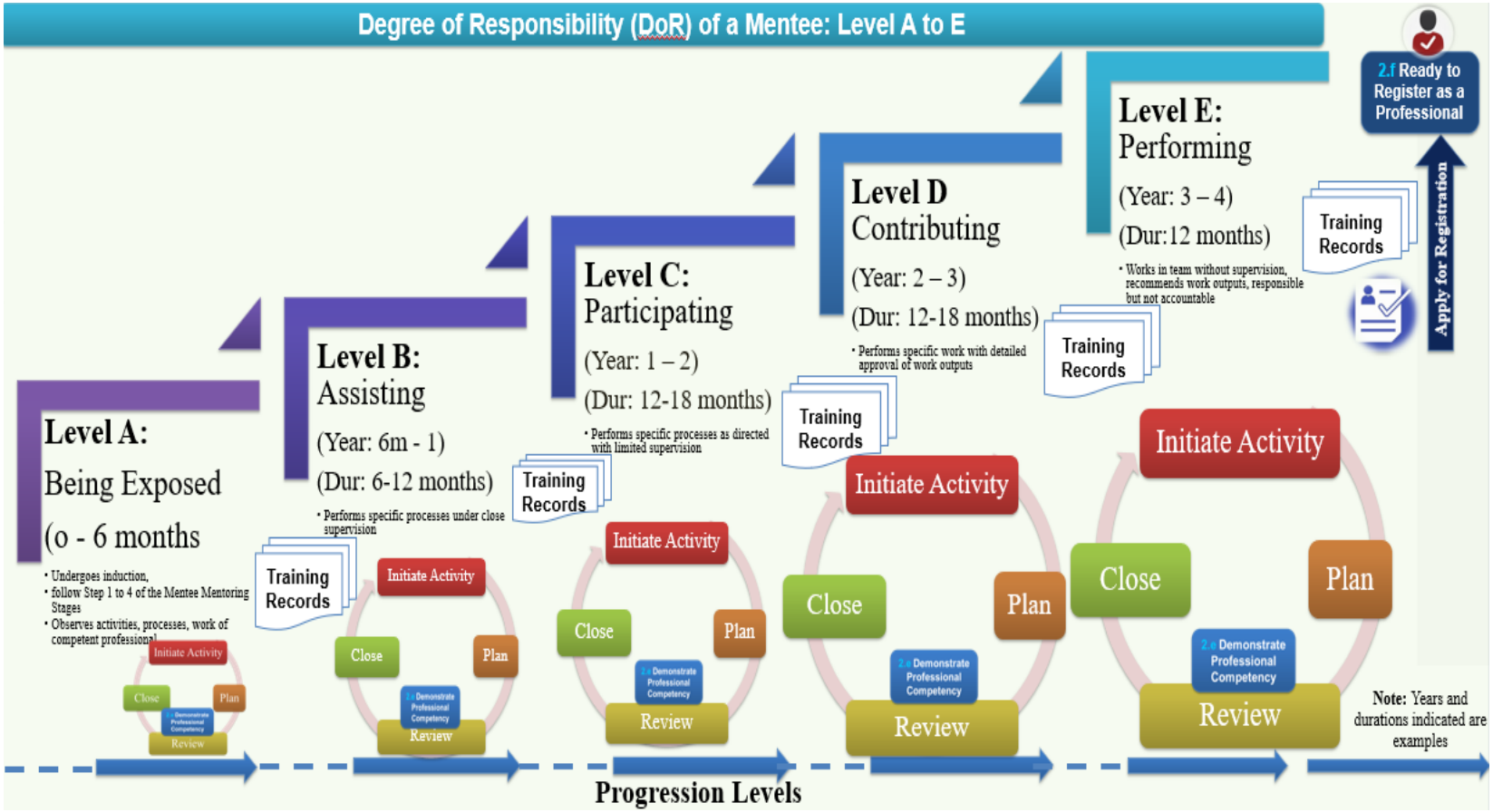

Figure 12: Degrees of responsibility for a mentee aligned with progression levels

6.6 Documenting and review of training and experience

Phase-by-phase planning and the review of the mentee's training must be supported by documentation for the immediate purpose of managing training and mentoring and the programme, as well as for compiling evidence for when the mentee applies for registration.

Training and experience are generally arranged as separate activities, tasks or DoR levels as shown in **Figure 12**. Each DoR level of an activity is designed to develop specific aspects of competency (outcomes) at an agreed level of problem-solving and engineering activity/work/ project with the appropriate DoR as detailed in documents **R-02-STA-PE/PT/PN** and **R-02-STA-PCE**. Such a unit typically ranges from several weeks to several months in duration. For each task or DoR Level, the mentee, together with the supervisor and mentor should use a suitable format for recording the planned outcomes the level to be achieved and the results of the previous DoR Level. The format of recording can be via the ECSA *Training and Mentoring Programme Process* tool (refer to section 6.1.2. of this document). Document **R-03-PRO-PC** defines key aspects of the application and assessment process and the forms of evidence that must be submitted by the applicant. A suitable template is the Training and Experience Report (TER) form for professional engineering applicants. This form allows particular aspects of competency to be identified as being amenable to development in the task or DoR Level. In addition, the level at which competency is to be demonstrated and the nature of the applicant's/mentee's responsibility are identified.

When the task or DoR Level is complete, the applicant/mentee, supervisor and mentor must review and rate the level of competence that was learnt and displayed. Level descriptors for problem-solving and the demands of engineering work should be consulted to determine progress to the exit level. Such achievement (or shortfall) may influence planning for subsequent tasks or DoR Levels. This evaluation/review is also recorded on the TER form. The evaluation/review at the end of one DoR Level should form an input to the planning of the subsequent and future DoR Levels. Each engineering project/task/work/period must be rated by the mentor from inadequate to adequate (refer to **Figure 13**) and the rating must comprise four elements: 1. Appreciation, 2. Knowledge, 3. Experience, 4. Capability.

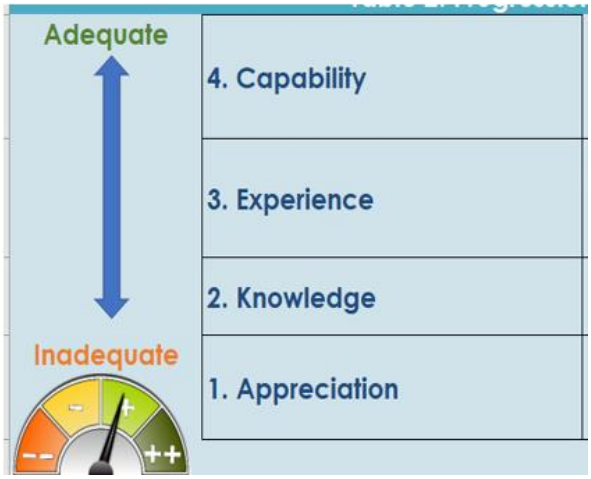

Figure 13: Progression elements through competency levels rating

- **Appreciation:** Applicant/Mentee must demonstrate a general appreciation of the subject matter as well as the reasons for its inclusion in the training and mentoring programme.
- **Knowledge:** Applicant/Mentee must demonstrate sufficient knowledge of how to carry out the processes that are necessary to meet the objectives.
- **Experience**: Applicant/Mentee must demonstrate that they have, independently or under supervision, performed the processes relating to each objective. Experience of the relevant techniques and functions must be gained.
- **Capability:** Applicant/Mentee must demonstrate the capability, independently or (at most) with limited guidance, of performing the process and making the decisions required to reach the objectives of each element and also that they have the capability of leading or supervising others in the process.

The process continues until the applicant/mentee is working at the level required for registration (DoR *Level E: Performing*) against individual outcomes and as a whole.

When the applicant/mentee applies for registration, each task or DoR Level must be summarised in the Training and Experience Summary (TES) document and reported in a TER. Each activity is described in the industry/organisation's generic terms. Industry terms include the names of specific plants, processes and sites while generic descriptions include terms such as design, troubleshooting, construction and commissioning. The TES and TER are required in the application

for registration. It is, therefore, advisable for the applicant/mentee to complete the TER and update the TES at the same time.

As the *training and mentoring programme* progresses, the applicant's/mentee's competency must develop towards the DoR Level required for registration. Supervisors and mentors should be alert to the applicant/mentee arriving at this level of competence.

6.7 Relating the Competency Standards to specific engineering work

The generic competencies of problem-solving, management, impact analysis and taking responsibility manifest themselves in several forms of activity such as design, investigation, troubleshooting, improvement, research and development. Each of these activities can be expanded, for example, design includes the preparation of a brief. At an industry-specific level, these activities are performed in relation to specific plant, operations and business functions. Applicants/Mentees should consider both the specific requirements of the task or DoR Level/period of work and the generic competencies required for the work.

The applicant/mentee should identify and analyse problems, synthesise solutions and use their knowledge in the process. The applicant/mentee must examine and deal with the legal and regulatory factors and the environmental, social and cultural impacts of the engineering activities.

6.8 Evidence-based system & monitoring mentoring programme

Evidence of competent performance has two essential components: first, the capability to *perform a number of defined actions* must be demonstrated and second, the performance must be at or exceed a *specified level of demand*. The defined actions are the outcomes and typifying actions that reflect acceptable performance according to the assessment criteria. The level is defined by a specification of the demands of the engineering activities and the nature of problem-solving. In a professional field, evidence of competent performance is obtained from the competent performance of substantial engineering tasks by the person being assessed. Typical tasks provide evidence of several outcomes and the assessment must be holistic.

The 11 outcomes defined for each category of engineering professional represent different aspects of holistic performance and professional attributes. The outcomes fall conveniently into five groups; the first relates to problem-solving, the following three to engineering practice and professional

attributes and the last to the ability to maintain and develop competence. Four of these groups are recognised as competencies in the ECSA documents **R-02-STA-PE/PT/PN** and **R-02-STA-PCE** while the fifth group recognises CPD as a competency.

While competence is specified by 11 outcomes to be demonstrated at a particular level, the applicant for registration must demonstrate integrated performance against outcomes. This reflects the reality that an engineering task or function is unlikely to require only one outcome, for example, problem analysis seldom stands alone; it will require the use of knowledge, the analysis of impacts and must lead seamlessly into the solution phase. A possible visualisation for engineering competence is shown in **Figure 5**.

Engineering problem-solving comprising analysis and synthesis is central to all engineering activities, including design, investigation and management. Problem-solving is supported by a number of capabilities corresponding to Outcomes 3 to 10. Outcome 11, which is CPD, is better expressed as the maintenance and extension of competency and it provides a platform for the performance of Outcomes 1 to 10.

Different engineering functions and assignments have different mixes of demand. As part of the application for registration, the applicant is expected to provide evidence of working at the required level of problem-solving in engineering activities/work/project at the specified level of demand.

7. DURATION OF TRAINING AND MENTORING PROGRAMME

Document **R-01-POL-PC** sets a minimum of 3 years of training and experience. It is unlikely that this competence required for registration can be developed and demonstrated at the required level in less than 3 years. During this time, the applicant's competency will develop and must be demonstrated at the required level over a certain period. Mentors, applicants/mentees and employers must plan for a period of not less than 3 years. The duration of the tasks on which the applicant is working at the DoR level *Responsibility E: Performing* (see **Table 1**) must not be shorter than 52 weeks.

8. ADDITIONAL INFORMATION FOR EXPERIENCED APPLICANTS

8.1 Mature applicants for professional registration

The documentation requirements within each category of professional registration differ between applicants with considerable experience after graduation who are at the level required for registration and applicants who do not have considerable experience. Specific documentation requirements for each category are defined in the relevant document **R-03-PRO-PC**.

Mature applicants, i.e., those with at least 10 years of post-graduate experience, need not hand in lengthy experience reports in respect of the earlier years of their career. Applicants must report at least 3 years at degree of engineering responsibility E (*Performing*) in detail in the TER format that are signed by the supervisor. Applicants may submit Training and Experience Outlines (TEO) for the remaining periods or groups of related periods.

The Council's requirements for registration as set out in Competency Standards **R-02-STA-PE/PT/PN** and **R-02-STA-PCE** remain the basic requirements for registration.

8.2 Process for registered persons wishing to register in an additional category

Applicants who are already registered in a professional category and wish to register in an additional category must meet both the educational and competency requirements for the second category. In such cases, the additional category would have more demanding educational and professional competence requirements. A person wishing to pursue this route is advised to become familiar with both the educational requirements and the professional competency standards for the additional category.

The enhanced educational requirements can be met by formal study in an accredited programme or other means. Document **E-17-PRO** defines criteria for meeting the educational requirements other than accredited or recognised degrees. A supporting document outlines various practical means for meeting the individual criteria. The educational requirements may be satisfied at any time before applying for registration.

Professional competencies must be developed through work performed to the degree of responsibility required for the additional category. The level of problem-solving within these

engineering activities must be raised/progressed to a DoR level that satisfies the higher-level descriptor.

8.3 Process for professional registration under an international agreement

ECSA is a signatory to several international agreements aimed at reducing the complexity of the registration process for persons who are registered with a foreign signatory and who wish to register with ECSA in a particular professional category. The agreements in force are summarised in document **R-01-POL-PC**.

REVISION HISTORY

Revision number	Revision date	Revision details	Revision number
Rev. 0: Concept	8 Sept 2007	Initial working skeleton.	JIC Working Document
Rev. 0: Concept B	21 Oct 2007	Description of training process added.	JIC Working Document
Rev. 0: Concept C	17 Nov 2007	Changes as discussed by JIC. Addition of categories of applicant.; Best practice section filled out.	JIC Working Document
Rev. 0: Concept H	5 Nov 2010	Navigation added. Understanding Engineering Competencies separated out	JIC Working Document
Rev. 0: Concept I	17 Jan 2011	Further development guide removed to separate category-specific document.	JIC Working Document
Rev. 0: Concept J	1 March 2011	Document further developed. Rationalised some sections	JIC Working
Rev 0: Concept K	28 March 2011	Document sections rationalised and relocated.	JIC Working
Rev. 0: Concept L	24 June 2011	Document diagram removed from Section 5.4. First page reformatted in standard form.	JIC Working
Rev. 0: Draft 1	31 Oct 2011	Final: Submitted for no changes relative to Concept L approval.	JIC Council
Rev. 1.0	12 Jan 2011	Approved by Council.	Council
Rev. 2: Concept A	10 April 2017	Special provision for Professional Certificated Engineers. Providing for registration requirements in the DSTGs.	For Consideration by PDSGC
Rev. 2	11 May 2017	Alignment with R-02-PCE.	For consideration by the Pr Cert Working Group
Rev. 2	3 July 2017	Approved.	PDSGC: For consideration by Council
Rev. 2	17 August 2017	Ratified.	For ratification by Council

Revision number	Revision date	Revision details	Revision number
Rev. 3: Draft A	07 May 2021	Routine review and addition of the stages of development for an Engineering Professional (Figure 2).	ERPS
Rev. 3	20 May 2021	Approval.	RPSC
Rev 4 Draft A	15 Aug 2023	• The document has been reviewed to ensure consistency and seamless training; section 2 roles and stakeholders have been added to overview of the roles in training and mentoring roles of mentee and mentors to indicate what is expected of external mentors and ECSA professional registered mentors and to indicate the benefits of the Mentor Database. • The document further indicates the distinctive responsibilities of a mentor, mentee, and supervisor, this is further. The following figures have been added: • Figure 2: Benefits of Mentoring, Figure 3: Influential Responsibilities of a Mentee's Supervisor and Mentor Distinctive Role, while figure 6: Engineering Professional Development Stages have been revised to align with current practice and Figure 7 explains Training and Mentoring Process, Figure 8 shows the Mentoring Steps on how to meet Professional Competency • Figure 9: Generic Lifecycle of Engineering Work / Project, Figure 10: Phases of Successful Mento-Mentee Relationship, Figure 11: Mentee Progression Principles for Engineering Work or Activities, Figure 12: Degrees of Responsibilities for a Mentee Aligned with Progression Levels, Figure 13: Progression Elements Through Competency Levels Rating.	Reviewed by Working group

Revision number	Revision date	Revision details	Revision number
		• The objective of attaining training and experience through a training and mentoring programme is explained and made clear; the section further added the following subsection: • Mentoring Stage Documents / Templates / Tools / Techniques Required during, Phases of Technique for Successful Mento-Mentee Relationship, Phases of Technique for Successful Mento-Mentee Relationship, Progression Levels of a Mentee aligned to DoR, Mentee Progression Principles, Documenting and Review of Training and Experience.	
Rev 4 Draft B	13 Dec 2023	Document revised with WG	RI BU and WG
Rev 4 Draft C	18 Jan 2023	Document revised with WG and Registration BU	RI BU, Registration BU and WG
Rev 4 Draft D	30 Jan 2024	Reviewed and checked	Executive: RPSC
Rev 4	08 Feb 2024	Approval	RPSC
Rev 4	08 Feb 2024	Updated number of referees	Executive: Statutory Services

The Guide for

Training and Mentoring Guide for Professional Categories

Revision 4 dated 08 February 2024 and consisting of 74 pages was reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards **(RPS)**.

..... 09 April 2024.....

Business Unit Manager Date

....2024/04/09.....

Executive: RPS Date

This definitive version of the policy is available on our website.