ENSURING THE
EXPERTISE TO GROW
SOUTH AFRICA

Code of Practice for the Performance of Computer Engineering Work

R-02-COP-COMP

REVISION No. 0:02 June 2023

ENGINEERING COUNCIL OF SOUTH AFRICA
Tel: 011 6079500 | Fax: 011 6229295
Email: engineer@ecsa.co.za | Website: www.ecsa.co.za

ECSA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

DEFINITIONS

In this Code of Practice, any word or expression defined in the Act has that meaning unless the context otherwise dictates.

Act means the Engineering Profession Act.

Candidate means a person who is registered in terms of Section 19(2)(b) of the Act.

Category of Registration means the categories of registration provided for in Section 18(1)(a) of the Act, i.e., Professional Engineers, Professional Engineering Technologists, Professional Certificated Engineers and Professional Engineering Technicians.

Code of Conduct means the Code of Conduct for Registered Persons in terms of the Act.

Council means the Engineering Council of South Africa established in terms of Section 2 of the Act.

Designer means the person undertaking work in relation to any structure, including drawings, calculations, design details and specifications.

Computer Engineer means a Professional Engineer registered in terms of 18(1)(a)(i) of the Act who has experience specifically in the of sub-discipline of Computer Engineering.

Computer Engineering Technician means a Professional Engineering Technician registered in terms of section 18(1)(a)(i) of the Act who has experience specifically in the sub-discipline of Computer Engineering.

Computer Engineering Technologist means a Professional Engineering Technologist registered in terms of section 18(1)(a)(i) of the Act who has experience specifically in the sub-discipline of Computer Engineering.

Computer Engineering Work means Engineering Work identified specifically in the discipline of Computer Engineering.

Engineering Work means the work identified in terms of Section 26 of the Act.

Project Engineers means Registered Persons responsible for the management of the Engineering Work within a project and its technical aspects.

Registered Person means a person registered with the Engineering Council of South Africa in terms of the Act under one of the categories referred to in sections 18 and 19.

Risk means the effect of uncertainty on the objectives of a design, expressed in terms of a combination of the consequences of an event and the likelihood of occurrence.

Specialist Work means Computer Engineering Work that requires training, knowledge and experience outside the normal education curriculum and beyond that which is obtained in the general practice of the profession.

The Code means this code of practice document.

ABBREVIATIONS

API	American Petroleum Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
CAD	Computer Aided Design
CoP	Code of Practice
CPD	Continuing Professional Development
DCS	Digital Control System
ECSA	Engineering Council of South Africa
FAT	Factory Acceptance Test
HMI	Human Machine Interface
IFE	The Institution of Fire Engineers
ISA	International Society for Automation
ISO	International Organization for Standardization
PC	Personal Computer
PLC	Programmable Logic Controller
POPIA	Protection of Personal Information Act, 4 of 2013
Pr Cert Eng	Professional Certificated Engineer
Pr Eng	Professional Engineer
Pr Tech Eng	Professional Engineering Technologist
Pr Techni Eng	Professional Engineering Technician
QCP	Quality Control Plan
Reg Eng Tech	Registered Engineering Technician
SAE	Society of Automotive Engineers
SANS	South African National Standards
SAT	Site Acceptance Test
SCADA	Supervisory control and data acquisition

1. INTRODUCTION

This Code of Practice has been developed by the Engineering Council of South Africa (ECSA) to supplement the Code of Conduct for Registered Persons: Engineering Profession Act 2000(Act No.46 of 2000).

Section 27 of the Engineering Profession Act 2000 (Act No.46 of 2000) empowers the Council to draw up codes of practice in addition to codes of conduct and it requires all registered persons to comply with such codes. While codes of conduct regulate behaviour, codes of practice regulate engineering practice.

Section 18(1) of the Act provides for registration of professionals and candidates in four categories of registration, namely Professional Engineers, Professional Engineering Technologists, Professional Certificated Engineers and Professional Engineering Technicians. Section 18(2) prohibits persons so registered from practising in a category other than that in which they are registered.

In line with these requirements, this code of practice classifies “engineering work” in the discipline of computer engineering in terms of its complexity and stipulates the category of registration as well as the level of competence required for the execution of such work.

The code does not repeat the expected ethical values and professional standards that are found in the Code of Conduct and Overarching Code of Practice.

1.1 Scope

The Code identifies specific engineering work within the computer engineering field and applies to computer engineering and its sub-disciplines: computer equipment, networks, solution design and development, process optimisation, data collection and consolidation, secure internet and network design, process automation, factory and general automation.

The Code classifies computer engineering work according to the complexity of the work and its sensitivity concerning public safety, asset and equipment safety as well as environmental

stewardship. Most computer engineering work involves risk due to the nature of the product and the impact of its incorrect application.

1.2 Purpose

The purpose of the Code is to:

- identify engineering work in the discipline of computer engineering and to classify such work in terms of its complexity
- establish the appropriate level of competence required for the execution of various classes of computer engineering work
- make provision for and regulate the execution of computer engineering work by registered professionals in other fields
- set and reinforce technical and ethical standards for the execution of computer engineering work.

1.3 Applicable Legislative Framework

This Code should be read in conjunction with the following:

- Engineering Profession Act 2000 (Act No.46 of 2000)
- Code of Conduct
- Occupational Health and Safety Act, 85 of 1993
- Overarching Code of Practice for the Performance of Engineering Work
- Identification of Engineering Work Rugulations
- All other relevant legislation

2. IDENTIFICATION AND CLASSIFICATION

2.1 Practice Areas:

Computer and software engineering work includes the following:

- Conducting research and developing new or improving theories and methods related to computer and software engineering;

- Advising on and designing computer-based systems or components, systems equipment, software and distribution centres;
- Specifying production or installation methods, materials, quality and safety standards and directing production or installation work of computer-based products, software and systems;
- Supervising, controlling, developing and monitoring the operation and maintenance of computer-based systems, software, networks and equipment;
- Organising and directing maintenance and repair of existing computer-based systems, programmes and equipment;
- Researching and advising on computer-based equipment and software;
- Planning and designing computer-based communications networks based on wired, fibre optical and wireless communication media and ultra-high speed data networks;
- System analysis, designing and developing complex computer-based systems and implementing these through appropriate choice of hardware and managing the development the necessary software;
- Determining manufacturing methods for computer-based systems as well as the maintenance and repair of existing computer-based systems, networks and equipment;
- Designing usable and fit for purpose products;
- Identifying and involving all stakeholders in the design process.

2.2 Technologies

Computer and software technologies include:

- Enterprise resource planning
- Materials requirements planning
- Product lifecycle management
- Telemetry and IIOT devices
- Supply chain management
- Advanced planning and scheduling

- Advanced visioning & diagnostic systems
- Industrial software engineering
- Digital twins
- Augmented reality
- Artificial intelligence
- Machine learning
- Data management
- Data analytics
- Robotics – kinematics, electronic sensors, software integration
- Biometrics
- Solutions architect – full design approach
- Industrial internet of things and cloud systems
- Smart factory
- Autonomous processes, systems and operations
- Cyber security
- Wide area and local area network topologies
- Industrial network topologies
- Telecommunication devices and installations
- Process optimisation
- Process modelling tools
- Control philosophies
- Embedded controllers (including microcontrollers)
- Data acquisition, logging and recording
- Sensors, transducers and measurement systems
- Safety systems and design
- Additive and subtractive manufacturing
- Energy efficiency and renewable systems
- Vision systems
- Automation safety and best practices from an automation perspective

- Software programming languages and applications, Network Technology programming languages and applications and Database programming languages and applications
- Numerical analysis methods
- Single board computers
- Windows and Linux-based operating systems
- Circuit analysis and design
- Power electronics and drives – motors, drives, power supplies
- Workflow systems

2.3 Aspects

Below is an outline of the different aspects of computer engineering work:

Group A: Engineering problem solving

- Define, investigate and analyse engineering problems. These engineering problems are not limited to the computer engineering field.
- Design or develop solutions to engineering problems.
- Comprehend and apply advanced knowledge: principles, specialist knowledge, jurisdictional and local knowledge.

Group B: Managing engineering activities

- Oversee one or more engineering activities, and effectively manage time during the process.
- Maintain clear communication with all involved parties throughout the engineering activities.
- Evaluate project proposals and determine their feasibility.
- Assess potential risks associated with each project and develop risk mitigation strategies.
- Make decisions regarding the allocation of resources among various projects.
- Consider dependencies between projects and ensure they are accounted for.

- Eliminate redundant efforts across projects.
- Determine and assess any gaps in the engineering activities and address them promptly.

Group C: Impacts of engineering activities

- Recognise and address the reasonably foreseeable social, cultural and environmental effects of engineering activities.
- Meet all legal and regulatory requirements and protect the health and safety of persons during engineering activities.

Group D: Act ethically, exercise sound judgement and take responsibility

- Conduct engineering activities ethically.
- Exercise sound judgment while conducting engineering activities.
- Be responsible and accountable for making decisions on part of or all engineering activities.

Group E: Initial professional development

- Undertake professional development activities sufficient to maintain and extend competence.

2.4 Functions

The computer engineering field consists of any or a combination of the following types of work within computer devices, factory automation, process automation and general automation:

- Audits
- Build
- Business analysis
- Calibration
- Change management
- Consulting

- Functional and technical solution design documents
- Hardware and software architecture design
- Solution and application development
- Database design development and administration
- Education
- Graphic design
- Software lifecycle management
- Optimisation
- Production and plant operation
- Project management
- Prototyping
- Research
- Software and hardware upgrade
- Retirement / end-of-life replacement
- Testing and commissioning and fault-finding
- Troubleshooting and debugging.

2.5 Industries

The computer engineering field includes any industry or industry sector where the engineering work, as defined, includes among others, the following:

- The development of any system processing and/or storing confidential or restricted data.
- The development of any system essential for the continuous safe operation of people, processes or devices.
- The development of any system essential for the continuous safe manufacture or processing of physical products, including but not limited to, electricity, oil, gas, minerals, metals, food, beverages, medical equipment and devices, fast-moving consumer goods, clothing, furniture, automobiles amongst others.
- The development of any system providing a critical or campus-wide service.

- The development of any system to monitor, detect and react to adverse events before they escalate.
- The development of any system to guide processes which may alter production or financial outcomes.
- The development of any system to monitor, detect and record incidents that will have consequences to the health and safety of product, people or the environment.

3. IMPLEMENTATION

The computer engineering field is identified and categorised by the following:

3.1 Consult

Consult on the specification, design, installation, configuration, maintenance, operation, performance assessment and optimisation of the Computer systems classified in section 2.1 above.

3.2 Research

The Computer Engineering work conducts various research in the field of computer sciences and engineering. Research studies focus on the branches such as:

- Artificial Intelligence
- Machine Learning
- Embedded Systems
- Information Systems
- Process Management Systems, including but not limited to Process Control Systems.

3.3 Specifications

Issue and interpret specifications on the installation, configuration, optimisation, operation, maintenance, testing, safety and eventual retirement or replacement of the computer systems classified in section 2.1 above.

3.4 Design and development

Use technologies, engineering knowledge or systematic approaches to develop new and improved techniques and methods to design or optimise the computer systems classified in section 2.1:

- Develop commissioning scope of work and input into the planning process.
- Develop and improve commissioning procedures.
- Develop and improve quality and maintenance plans, including maintainability.

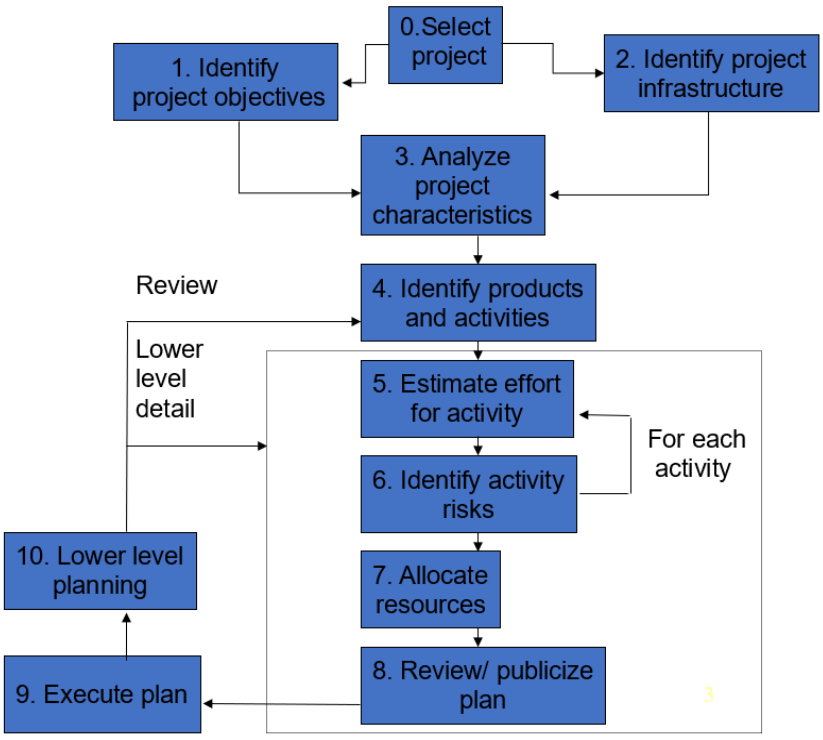

Figure 1: Process: Designing and optimizing systems

3.5 Installation

Use technical knowledge, engineering principles and technologies to install and test computer systems, hardware devices and automation systems followed by testing, monitoring, and evaluation of design, construction and installation.

3.6 Commissioning services

Commissioning services include the following:

- Provide commission engineering services.
- Provide consulting services.
- Optimise devices, control loops, processes and systems and plant.

3.6.1 Co-ordination

Co-ordinate commissioning efforts of the technical teams, considering technical, budgetary, logistical, legislative and safety requirements.

3.6.2 Management

- Ensure that commissioning quality plans and checks/check sheets are in accordance with the Original Equipment Manufacturer (OEM) procedures and specifications.
- Perform a technical investigation and root cause analysis into any issues during commissioning.
- Identify and manage or redesign repeat incidents.
- Implement corrective actions and change management.

3.7 Testing

Testing includes the following:

- Debugging of programmed systems.
- Evaluation of materials, environmental interaction, safety and manufacturing integrity, and quality.

- Perform user acceptance and factory acceptance tests to ensure safe and effective operations

3.8 Maintenance

Maintenance includes maintaining, operating and optimising:

- systems and devices within hazardous areas
- emergency shutdown systems
- industrial telecommunication systems
- robotic systems.
- Software solutions
- Systems integration
- Operator support

4. COMPETENCY REQUIREMENTS

4.1 Competence required

Any person who performs computer engineering work must comply with the requirements contemplated in the Engineering Profession Act 2000(Act No.46 of 2000) to:

- be registered with ECSA in the appropriate professional registration category applicable to the level of service performed; and
- possess the necessary core competency in the categories as specified under Section 18(1)(a)(c) of the Act, to perform such core service as a Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer, Professional Engineering Technician, or a Specified Category Practitioner in terms of Section 18(1)(c) of the Act or a Candidate registered in terms of Section 18(1)(b) of the Act.

In case of performing computer engineering work in any other category, the computer engineering registered person must comply with the relevant competency requirements imposed by ECSA.

4.2 Competence evaluation

Computer engineering registered persons may only undertake work that their education, training and experience have rendered them competent to perform and is within their registration category.

ECSA document **R-02-STA-PE/PT/PN**: Competency Standard for Registration in Professional Categories PE/PT/PN defines the criteria for assessing competency.

4.3 Risk categories (risk of occurrence versus severity of occurrence)

There are numerous factors can contribute to the failure of a project. It is crucial to identify and address these potential risks early to avoid costly and time-consuming setbacks. These risks can range from personnel shortfalls and unrealistic time and cost estimates to developing the wrong software functions and user interfaces. Additionally, gold plating, late changes to requirements, shortfalls in externally supplied components, real-time performance problems, and development that is technically too difficult can all impact the success of a software project. In this context, it's essential to understand these risks to develop effective risk management strategies and ensure project success.

Table 1: Risk Probability level

Probability level	Range
High	Greater than 50% chance of happening
Significant	30-50% chance of happening
Moderate	10-29% chance of happening
Low	Less than 10% chance of happening

Table 2: Risk reduction Techniques

	Risk reduction techniques
Personnel shortfalls	Staffing with top talent, job matching, team building, training and career development, early scheduling of key personnel. Establish external partnerships for specialised skills

Unrealistic time and cost estimates	Multiple estimation techniques, Design to cost, incremental development, recording and analysis of past projects, standardization of methods
Developing the wrong software functions	Improved software evaluation, formal specification methods, user surveys, prototyping, early user manuals. Apply Agile methodology where necessary
Developing the wrong user interface	Prototyping, task analysis, user involvement and frequent feedback
Gold plating	Requirements scrubbing, prototyping, design to cost
Late changes to requirements	Change control, incremental development, frequent feedback and feedback sessions
Shortfalls in externally supplied components	Benchmarking, inspections, formal specifications, contractual agreements, quality controls
Real-time performance problems	Simulation, prototyping, tuning, implementation of appropriate performance monitoring tools
Development technically too difficult	Technical analysis, cost-benefit analysis, prototyping, training

4.4 Overlaps

a) Persons registered in a particular discipline may perform Engineering Work in a different discipline if their knowledge, training, experience and applicable qualifications specifically render them competent to perform such work and subject to the expressed permission of ECSA.

b) Persons registered as professionals under a Professions' Act other than the Engineering Profession Act may not perform Engineering Work even if their knowledge, training, experience and applicable qualifications specifically render them competent to perform such work without the expressed permission of ECSA.

c) Chemical engineering has a bearing on many activities of industry and even commerce and hence there may be no clearly defined boundaries. In such cases the experienced and appropriately registered engineer would recognize the competencies required and hence act appropriately.

The Overarching Code of Practice for Engineering Work must be consulted when any overlap occurs.

5. GOOD PRACTICE REQUIREMENTS

5.1 General good practice

All work carried out or services rendered must be:

- in accordance with accepted norms and standards of the computer engineering field
- in an ethical and responsible manner in accordance with the Code of Conduct
- within the area of competency with honesty, fidelity and integrity
- in accordance with the Labour Relations Act, 66 of 1995, as amended
- in accordance with the Protection of Personal Information Act, 4 of 2013 (POPIA), as amended.
- any other applicable legislation.

Prior to taking a role in the computer engineering field, computer engineering registered persons must ensure that they possess the competencies required to undertake the work. In addition, prior to undertaking any task, computer engineering registered persons must ascertain and document:

- the purpose of the activities
- the approach that will be used to execute the activities
- the performance requirements for the activities
- any statutory, regulatory or other requirements that may pertain to the activities.

Computer engineering registered persons must take account of the likely variation in input parameters and the accuracy of the models or methods used and must consider the following:

- All calculations and/or specifications must be independently checked, either by another suitably qualified computer engineering registered person or by alternative calculation methods.

- Prior to approving any work, or signing any completion certificate, computer engineering registered persons must ensure sufficient detailed checks or inspections to warrant such approval. Where the checks or inspections were limited in any way or carried out by a third party, approval must be qualified accordingly.

5.2 Health, safety and environment

All computer engineering work must be done in accordance with the following:

- Occupational Health and Safety Act, 85 of 1993, as amended
- National Environmental Management Act, 107 of 1998, as amended
- Protection of Personal Information Act , 04 of 2013 as amended
- Any other applicable legislation.

Cognisance should be taken of health and safety requirements from planning to completion of any computer engineering work.

The environmental impact of all computer engineering work should be assessed and appropriate measures taken to minimise such impacts or to remediate areas so impacted.

Computer engineering registered persons must involve relevant expertise when identified impacts of the computer engineering field are outside their area of expertise.

The client must immediately be notified of any condition that is observed which may compromise the health and safety of persons or the environment.

5.3 Ethical considerations

Utilitarianism

Seek to promote the greatest amount of happiness or pleasure for society as a whole by evaluating the morality of an action based on its ability to maximize overall benefit while minimising harm.

Duty ethics

In this view, a right choice is one that follows ethical rules.

Rights ethics

In this view, a right choice is one that respects the rights of the individual person.

Virtue ethics

In this view, a right choice is one that supports good character traits (responsibility, honesty, competence, loyalty, trustworthiness, fairness, respect)

5.4 Codes and standards

All computer engineering work must be carried out in accordance with the norms of the profession, and these norms are generally represented by the Computer and Automation Engineering relevant national and international standards, industry standards, codes of practice and best practice guidelines.

Standards and codes must be applied as and when required by government regulation, customer or end-user requirements and as an accepted industry norm.

It is the duty of computer engineering registered persons to ensure that all standards and codes used abide by the applicable acts and regulations (considering that more than one country's legal frameworks may be relevant).

Standards and codes may be used in place of regulations where it can be proved that the requirements of the standard or code meet and/or exceed those prescribed by regulations and/or law.

Any deviations from the standards or codes requested by the customer or end-user should be communicated to the appropriate stakeholder, supported by evidence that the deviation will compromise the performance and safety of the system or device.

Various international bodies are recognised and accepted within industry to develop and publish standards related to the computer engineering field, notably:

- SANS – South African National Standards
- ASME – American Society of Mechanical Engineers

- ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers
- ISO – International Standard Organization
- SAE – Society of Automotive Engineers
- API – American Petroleum Institute
- IFE – The Institution of Fire Engineers
- ASTM International.

5.5 Computer Engineering Data

Sufficient quantitative or qualitative data is required for all computer engineering tasks.

Computer engineering registered persons should ensure that the data used is adequate for the intended purpose. Where this is not the case, additional data should be obtained, or the work should be based on parameter values selected such that the occurrence of less favourable values is unlikely.

Data analysis should be presented in sufficient detail to allow independent assessment of the data.

5.6 Reporting

During the planning of an activity, computer engineering registered persons should ascertain the purpose for which the activity is required and the nature of the proposed activity. Computer engineering registered persons must ensure that the proposed activity can yield the information required for that purpose.

Computer engineering registered persons should advise the client of the effect of any restrictions placed on the activity that are likely to adversely affect the accuracy or adequacy of the data obtained. This information may be presented as a single report or in two separate reports: a factual report and an interpretive report. All assumptions must be clearly documented as well as the reason for the specific assumption.

5.7 Quality and risk management

ISO Standards:

ISO standards provide guidelines for various aspects of software development, including the development life cycle. For instance, ISO 12207 outlines the sequence of processes that should be followed to produce the software deliverable and the intermediate products that should pass between the processes. By following the recommended development life cycle, software developers can ensure that the end product meets the necessary quality standards and is delivered on time and within budget. Additionally, adherence to ISO standards can facilitate communication and collaboration between different teams and stakeholders involved in the software development process, leading to a more efficient and effective project outcome.

Software product Quality

ISO 9126 provides a framework for assessing the quality of software products. The attributes that determine software quality can be categorized into two types: external qualities, which are apparent to end-users of the software, and internal qualities, which are apparent to developers. By considering these attributes, software developers can ensure that the end product meets necessary quality standards and satisfies the needs of stakeholders.

Assessment of Product Quality

ISO 14598 outlines the procedures for conducting and assessing of the software product qualities defined in ISO 9126. These procedures provide a systematic and structured approach to evaluating the quality of software products based on the established criteria. By following the guidelines set forth in ISO 14598, software developers can effectively assess the quality of their products and identify areas for improvement. This can lead to the development of more reliable, maintainable, and user-friendly software products that meet the needs of all stakeholders involved in the development process.

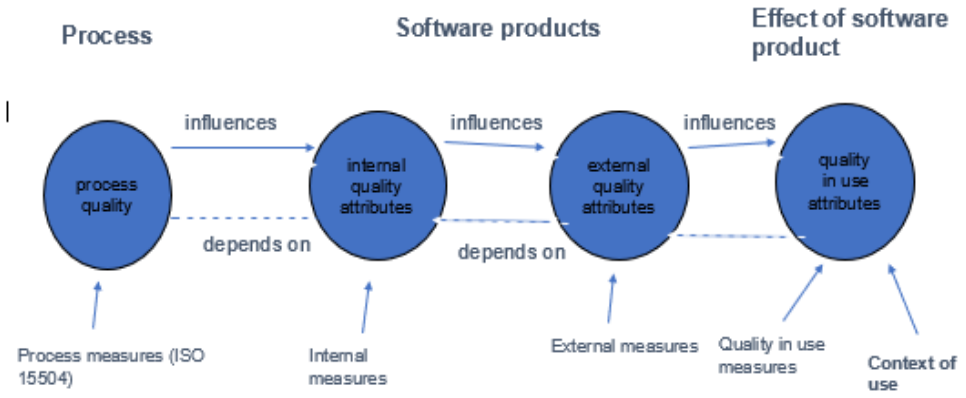

Figure 2: Quality process: influence and dependencies

5.8 The design process

Computer engineering registered persons need to follow an acceptable procedure of either a sequential or a concurrent design process that could include design procedures as follows:

Sequential design procedure

- Problem identification: First, a clear statement of the need for and objectives for the design must be written.
- Ideation: Technical documents are often used to convey concepts to multidisciplinary teams.
- Refinement/analysis: Designs may be rethought, based on engineering analysis. Process Flows, Workflows, Information Flows drawings, process or equipment state models and business process modelling notation (BPMN) tools are useful during the analysis and refinement stage. Accurate use-case models, process/workflows and information flow diagrams are created to refine the design.
- Implementation/documentation: Operating and/or user manuals providing the details of system operation are finalised and approved.

Concurrent design procedure

A systematic approach that integrates the design and development of products with the goal of optimising all elements involved in the life cycle of the product.

5.9 Design requirements

Computer engineering registered persons should incorporate engineering design processes and procedures that address society's needs, desires and problems by applying scientific principles, experience and creativity. The following subsections highlight standard procedure and practice required within project documentation.

5.9.1 Calculations and simulations

Computer designs may include calculations and simulations to demonstrate and test process operation and anomaly handling. Computer engineering registered persons are expected to use design tools to simulate, analyse and test designs efficiently, accurately and quickly. Typical design tools include the following:

- Common CAE packages used include Finite Element Analysis (FEA)
- Business Process Modelling Notation (BPMN) tools
- Unified Modelling Language (UML)
- Hazard and Operations (HAZOP) Studies
- Value Reference Model
- Software Simulation tools
- SIPOC modelling: Suppliers-Input (Requirements) - Process-Output (Requirements) - Customers
- Capability and Maturity Model Integration (CMMI)
- SOA Maturity Model
- Levels of Information Systems Interoperability (LISI) Reference Model
- Zachman Framework for Enterprise Architecture
- Supply Chain Operations Reference (SCOR)
- Value Stream Mapping (VSM)

- Manufacturing optimisation software etc.

5.9.2 Documents

Technical documents can take many forms: idea or concept drawings such as the drawings on the previous page User Requirement Specifications, Functional Design Specifications, Detail Design Specifications, Entity Relationship Diagrams, Database Design documents, Factory Acceptance Test documents, Site Integration Acceptance Test documents, Site Acceptance Test documents and Final Handover Certificates are all examples of technical documents. Technical documents serve one of three purposes:

- Visualisation
- Communication
- Validation.

5.9.3 Testing

Testing should be conducted in accordance with an established doctrine, if possible, that adheres to the project field's governing, regulatory body. If no such body exists, then testing should be done in accordance with the scientific method, with the methodology fully documented to ensure replication and validation by third parties.

5.9.4 Document Storage

All the information to manage, design, analyse, simulate, package, market and develop a product should be stored in a single complex digital database. This database should be able to be shared with a diverse (and perhaps geographically distant) group of users.

5.9.5 Quality

Computer Engineering Registered Persons should apply a systematic methodology to design "quality" into their products as well as to measure performance and make decisions based on data. Methodologies could include the following:

- Design for Six Sigma (DFSS) is an approach that uses engineering and statistical tools to design products in a way that predicts and minimises customer and manufacturing problems.
- Six Sigma is a process that originated at Motorola to improve quality by reducing or eliminating defects.
- DMAIC – Define, Measure, Analyse, Improve and Control are steps in a continuous improvement process that attempts to define and ensure critical to function (CTF) characteristics.
- QFD – Quality Function Deployment is a tool for decision-making that helps companies focus on a customer-driven approach and set of product characteristics.

5.9.6 Records

Product data management (PDM) systems or enterprise data management (EDM) systems electronically store the various types of data associated with designing and manufacturing a product. A Computer Engineering Project should include an effective PDM system that allows all the product data to be quickly stored, retrieved, displayed, printed, managed and transferred anywhere in the organisation. This allows for designs to be optimised or directly modified at any time.

5.10 Due diligence

Computer Engineering Registered Persons should endeavour to optimise an engineering solution that minimises harmful impacts on both the environment and society as far as reasonably possible. All projects, products, operations and systems created by Computer Engineering Registered Persons must adhere to “industry best practices” and legal restrictions and requirements. It is the responsibility of Computer Engineering Registered Persons to seek out and familiarise themselves with the requirements relevant to their project.

5.11 Acts and regulations

Computer Engineering Registered Persons must always ensure compliance with the appropriate acts and associated regulations. Notable national acts that may apply to Computer Engineering Work include the following:

- Engineering Profession Act 2000 (Act No.46 of 2000), as amended
- Occupational Health and Safety Act, 85 of 1993, as amended
- Mine Health and Safety Act, 29 of 1996, as amended
- National Building Regulations and Building Standards Act, 103 of 1977, as amended
- National Environment Management Act, 107 of 1998, as amended.

REVISION HISTORY

Revision Number	Revision Date	Revision Details	Approved By
Rev. 0 Draft A	19 September 2022	New document	RPS & Working Group
Rev. 0 Draft B	13 April 2023	Broader Consultation Draft	Working Group
Rev. 0 Draft C	21 April 2023	Steering Committee	Steering Committee
Rev. 0 Draft D	21 April 2023	Steering Committee recommendation to submit to RPSC for approval	Steering Committee
Rev. 0	18 May 2023	Approval by RPSC	RPSC
Rev.0	02 June 2023	Ratification	Council

The Code of Practice:

Computer Engineering

Revision 0 Dated 02 June 2023 consisting of 30 pages have been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards (RPS).

..... 25 March 2024.....

Business Unit Manager Date

..... 2024/04/05.....

Executive: RPS Date

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