



KEY AREAS OF KNOWLEDGE

Pre-Application Skills Assessment (PASA) - RPL

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Introduction

Key Areas of Knowledge (KA) has been developed from the ACS Core Body of Knowledge (CBOK) as a guide for applicants who did not acquire a formal ICT qualification equivalent to an Australian Degree or Diploma but spent a considerable length of time in professional-level ICT employment and wish to apply for PASA via Recognition of Prior Learning (RPL) pathway.

The purpose of RPL is to give applicants the opportunity to demonstrate that they have acquired a level of knowledge equivalent to that of a formal tertiary ICT qualification by addressing as many of the areas referred to in the *Key Areas of Knowledge* they consider are covered by their acquired knowledge.

A summary of the key areas of knowledge appears below. The details of each area follow as separate sections.

KEY AREAS OF KNOWLEDGE

TR. TECHNOLOGY RESOURCES

- TR1. Hardware and software fundamentals
- TR2. Data and information management
- TR3. Networking

TB. TECHNOLOGY BUILDING

- TB1. Programming
- TB2. Human-computer interaction
- TB3 & TB4. System development and acquisition

SM. SERVICES MANAGEMENT

- SM1. Service management
- SM2. Security management

OM. OUTCOMES MANAGEMENT

- OM1. Organisational and Management Concepts
- OM2. Change management

None of the areas are mandatory: applicants will be allowed an opportunity to address areas of knowledge they acquired through their experience.

Required Level of KA Acquisition

Applicants are expected to demonstrate a clear **comprehension** of a number of the individual thematic modules within their chosen knowledge area/-s. Applicants should also be able to demonstrate **application** in at least one of the units or modules which should be clearly supported by professional references included and the Project Reports submitted in section 4.

Structure of the KA Descriptions

The *Key Areas of Knowledge (KA)* is organized hierarchically into three levels.

The highest level of the hierarchy is the **knowledge area**, e.g. TECHNOLOGY RESOURCES (TR).

Each knowledge area is identified by a two-letter abbreviation, such as TR for *Technology Resources*.

The knowledge areas are broken down into smaller divisions called **units**, which represent individual thematic modules within a knowledge area, e.g.: Hardware and software fundamentals, Data and information management and Networking for TR knowledge area. Each unit is identified by adding a numeric suffix to the area name.

Each unit is further subdivided into a set of **topics**, which are the lowest formal level of the hierarchy. Topics are given as example only and do not constitute a complete and exhaustive list of possible topics within a unit.

Amount of topics depends on the unit and should be sufficient for the applicants to demonstrate their knowledge of the unit.

There are topics which are further broken down into **subtopics**.

There is a **preamble** to each unit.



The Areas of Knowledge

TECHNOLOGY RESOURCES (TR)

TR1. Hardware and software fundamentals

Preamble

ICT systems require both hardware and software. The hardware is the multiple physical components within the system and the software is the computer programs and associated procedures and documentation

Table of Topics

Topic 1: Hardware fundamentals

- Central Processing Unit (CPU)
 - ALU
 - Instruction set
 - Addressing
- Memory
 - Primary memory
 - Cache memory
 - Virtual memory
- Peripheral devices
 - Mass storage
 - Removable storage
 - Human-computer interaction devices
- Mobile ICT devices
- ICT integration

Topic 2: Software fundamentals

- System software
 - Operating system
 - Human interaction
 - Device drivers
 - Compilers/interpreters
 - Visual development environments
 - Text editors
- Application software
 - Word processing
 - Spreadsheets
 - Business applications
 - Financial management
 - Customer relationship management
 - Supply chain management
 - Education
 - Medicine
 - Decision support systems
 - Industrial automation
 - Image processing and manipulation
 - Music



TR2. Data and information management

Preamble

Data and information management address the policies, practices and architectures that control, protect, deliver and enhance the data and information of the enterprise. The topic is broad ranging and includes

- the organisation of sets of shared data for efficient query and update
- an appreciation of the data resource
- an understanding of the technical background of computer system management of data
- definition of data needs and the functions of data
- user-oriented data languages, and
- the management of data and information within the organisation.

Table of Topics

Topic 1: Data

- Character based data
 - Fields, records and files
 - Data files
 - Text files
- Image data
 - Static images
 - Moving images
 - Sound

Topic 2: Data Governance

- Data owner

Topic 3: Data Architecture, Design

- Data architecture
- Data Analysis
- Data Modelling
 - Hierarchical model
 - Entity relationship model
 - Object model

Topic 4: Database Management

- Database management systems
 - Data definition
 - Data manipulation
 - Database administration
 - RDBMS
 - OODBMS
- Database Query Languages
 - SQL
- Database security
- Database integrity

Topic 5: Data Security Management

- Data access
- Data privacy
- Data erasure

Topic 6: Data Quality Management

- Data cleansing
- Data integrity
- Data quality assurance

Topic 7: Data Warehousing and Data Intelligence

- Data warehouse
- Data mart



TR3. Networking

Preamble

Networking is concerned with communication among ICT systems and devices and includes the design, implementation and management of digital communications networks. It covers basic concepts and terminology; the International Standards Organisation reference model for open systems interconnection; communications equipment, software and services; network architectures; an overview of local area networks; Telstra facilities.

Table of Topics

Topic 1: Network Classification

- Connection method (wired, optical, wireless)
- Type
 - LAN
 - WAN
 - VPN
- Relationship (client-server, peer-to-peer)
- Topology (bus, star, ring)
- Private Networks / Public Networks

Topic 2: Data communication

- Link control
 - OSI Reference model
- Asynchronous and synchronous transmission
- Communication protocol
 - TCP/IP
 - FTP
 - HTTP
 - DHCP

Topic 3: Internet

- History
- Governance
- World Wide Web (WWW)
 - Browsers
 - Copyright
 - URLs
- Electronic mail (e-mail)
- Telephony (VOIP)
- Data transfer
- Social Impact
 - Social networking (e.g. Facebook, Twitter, ...)
 - SMS
 - Forums
 - Gaming
- Malware (viruses, worms, identity theft, phishing, etc)

Topic 4: Networking hardware

- Modem
- Router
- Firewall
- Repeater
- Personal Digital Assistant (PDA)



TECHNOLOGY BUILDING (TB)

TB1. Programming

Preamble

This area deals with the ability to specify a solution to a problem in a form which is able to be converted to a machine-executable product which will produce the correct result for a specified problem. It encompasses the ability to design a solution to a problem, preferably in a form which is independent of the target programming language for its implementation, to translate that design into the syntax of a programming language and to produce an executable program which is correct, efficient and maintainable. The unit also encompasses the aspects of software documentation which are essential to the effective use of the software during its lifetime.

Table of topics

Topic 1: Program specification

Design of documentation to specify the requirements of a program

Topic 2: Program design

Algorithm design and associated documentation
Program structure and logic data design
Suitability of languages for problem domains

Topic 3: Program implementation

Structure and syntax of a programming language
The procedures of editing, compiling, etc, needed to produce an executable program

Topic 4: Program testing

Formal proof of correctness vs testing procedures
Design of test data
Program testing methods

Topic 5: Program documentation

Internal and external program documentation
Differing documentation requirements for technical staff and users

Topic 6: Programming paradigms

An appreciation of the existence of and fundamental differences between procedural, functional, logic and object-oriented paradigms



TB2. Human-Computer Interaction

Preamble

This area deals with the interaction between the users of computer systems and the software managing the applications being used. It involves aspects of interface design which impinge on the user's ease of operation and a study of human phenomena which relate to the ability of the user to make efficient and effective use of the facilities available.

Table of topics

Topic 1: User interaction design

Information design and visualisation, interaction design, hardware elements such as mouse, microphone, pointer, etc.
Usability testing
Rapid prototyping

Topic 2: Display design

Graphic design, legibility and colour, top-down processing, pictorial representation, access minimisation, consistency of response, user tailorability
Multi-lingual facilities
Multi-cultural issues

Topic 3: Special considerations

Design for the disabled and impaired users
Design for group use applications

TB3 & 4. System Development and Acquisition

Preamble

This area develops basic systems analysis and design skills by examining commonly used techniques and system development methodologies. A range of life-cycle models are considered including the classical waterfall approach and more recent approaches such as prototyping and evolutionary development. The aim is to present a balanced overview of the process of analysing user requirements, designing computerised information systems to meet these requirements and at the same time developing the necessary skills to apply the techniques to simple problems. It also deals with the translation of the design into the implementation of the working system.

Table of Topics

Topic 1: Role of Information Systems in an Organisation

Topic 2: System Development Methodologies

Different systems development life cycle models such as waterfall, spiral, evolutionary, prototyping
Phases, stages, activities and stakeholders, deliverables, models and modelling techniques
Common system development methodologies - structured analysis and design, information engineering and object oriented approaches

Topic 3: Fact Finding Techniques

Interviews, workshops, discussions, forms and documents, observation

Topic 4: The role of Models and Modelling Techniques

A framework for relating and understanding models - planning, analysis, design and implementation stages versus data, process, behaviour, location, organisation and motivation perspectives



Topic 5: Business Area Analysis

Problems, participants, physical versus essential models

Typical modelling techniques based on any one development methodology or paradigm which may include data flow diagrams, functional decomposition diagrams, functional dependency diagrams, decision tables / trees, state transition diagrams, process descriptions, entity relationship diagrams, class diagrams, object diagrams, interaction diagrams, module diagrams, etc.

Topic 6: Business Systems Design

Constraints, problems and participants. Deciding on the automation boundary. Design options. Typical modelling techniques based on any one development methodology or paradigm which may include structure charts, dialog flow diagrams, module diagrams, call graphs, etc. User interface design - ergonomics, data entry and validation, input forms, windows, window objects, screens and reports. Transforming analysis models into design models.

Topic 7: Supporting Analysis and Design

The use of proformas and standards, system dictionaries and CASE tools.

Topic 8: Project Management

Team structures, project scenarios, risk assessment, monitoring and measurement, tools PERT/ CPM

Topic 9: Quality Assurance

Topic 10: Walkthroughs, inspections, reviews, consistency checks

Topic 11: System acquisition

Options available for acquisition – in-house development, outsourced development, proprietary software products

Enterprise Resource Planning (ERP) systems

System evaluation criteria

Acquisition strategy and management

Contract and legal considerations

SERVICES MANAGEMENT (SM)

SM1. Service Management

Preamble

ICT Service Management deals with the ongoing operation of ICT in an organisational context and includes frameworks for structuring the interactions of ICT personnel with business customers and users. It is concerned with the back-office or operational concerns of the organisation and may be referred to as operations architecture or operations management.

Table of Topics

Topic 1: ICT Service Management

- Service and Quality
- Organisations and Policies
- Process Management

Topic 2: Service Support

- Service Desk
 - Recording Problems
 - Resolving and Monitoring Problems
- Incident Management
 - Incident Identification
 - Incident Recording
 - Incident Resolution
- Problem Management
 - Underlying Cause Determination
 - Problem Resolution
 - Future Incident Prevention
- Configuration Management
 - ICT Infrastructure Change Control
 - Record Keeping of ICT Infrastructure Components
- Release Management

Topic 3: Service Delivery

- Service Level Management
 - Defining Service Level Agreement
 - Monitoring Services
 - Underpinning Contracts with Suppliers
- Financial Management for ICT Services
 - Budgeting and Accounting
 - Price Performance Analysis
- Capacity Management
 - Capacity Planning
 - Resource Management
 - Performance Management
 - Demand and Load Management
- Availability Management
 - Resource Deployment Methods and Techniques
 - Maintenance Management
- Continuity Management
 - Disaster Recovery Planning
 - Business Continuity Planning
 - Contingency Planning



SM2. Security Management

Preamble

Information technology professionals are increasingly responsible for the incorporation of security services and mechanisms into overall information systems under development and in operation. This responsibility is expected to increase as national and international guidelines and legislation are developed and enforced. The ICT professionals will need to be familiar with social, governmental and legal requirements in this area and to incorporate appropriate technologies into systems during the development phase with appropriate levels of security management created for ongoing usage of the systems.

Table of topics

Topic 1: Historical Background

Role of Information Technology Professionals

Topic 2: Societal, Governmental and Legal Imperatives for Information Systems Security and Privacy

International Guidelines (OECD Privacy and Information Systems Security Guidelines)

Regional Security Requirements (European Community)

Legal Requirements - Australia's Privacy Act, State Privacy and Computer Security / Crime Related Acts and Regulations

Australian Standards for Information Security

Topic 3: Professional Responsibility and Information Systems Security

Relationships between Concepts of Quality, Safety, Reliability and Security

Topic 4: Computer Security

Hardware Requirements and Features

Operating Systems Security

Topic 5: Access Control, Authentication, Integrity, Confidentiality eg RACF, ACF-2, Etc.

UNIX Security

Database Security

Personal Computer/Small Systems Security

Topic 6: Security Technologies

Access Control Mechanisms

Algorithms - Hash, One-Way and Related Functions / SHA, ISO

Cryptography

Symmetric and Asymmetric Techniques

Commonly-Used Ciphers: DES, RSA, RC2-4, IDEA, SAFER, Etc.

Topic 7: Key Management

Topic 8: Modes of Usage

Authentication Architectures

Third Party Schemes/Certificates

Topic 9: Network Security

Early Proprietary and Mainframe Technologies

Open Systems Interconnection Security Architecture (ISO 7498-2)

Topic 10: Security Services and Mechanisms

MIT "Kerberos"

ECMA Model - "SESAME"

Security and Telecommunications Services

Topic 11: Computer-Telephone Integration



Topic 12: Trusted Systems and Networks

"Rainbow" Series (USA) / National Criteria, eg Canada, Australia, and Others
ITSEC / ITSEM (Europe)

Topic 13: Concepts of Security Functionality and Enforcement/Verification

Common Criteria
Significance of Trusted Systems Technologies

Topic 14: Verification Techniques and Software Engineering

Topic 15: Security in the Distributed Systems (Client/Server) and Object Oriented Environments

Topic 16: Security and Specific Industry Requirements

Health Care Industry
Banking and Finance Industry
Commercial and Military Government Systems

Topic 17: Security Management

Organisation Responsibilities
Management Requirements



OUTCOMES MANAGEMENT (OM)

OM1. Organisational and Management Concepts

Preamble

Organisational governance comprises a set of processes and policies affecting the way an organisation is run. It encompasses the goals and strategies of the organisation and its various stakeholders, namely, employees, customers, suppliers, regulatory agencies, shareholders, management, board of directors, and the community at large.

This area also deals with the methods and problems of managing and assuring the quality of computing system projects, particularly from the viewpoint of the practitioner as a member of the project team. The area takes a balanced approach to software quality in that there is a focus on both product and process issues. Factors that impact quality outcomes associated with all phases of development are addressed. Throughout there should be a constructive focus on quality; that is, quality requirements are planned and specified, processes are then put in place to satisfy these requirements, and these processes are supported by integral processes which ensure that the quality requirements have been satisfied.

Table of Topics

Topic 1: Organisational Governance

- Organisational Functions
- Organisational Structure
- Business Processes
- Organisational Culture
- Organisational Performance and Shareholder Value
- Conflict Resolution
- Board of Directors

Topic 2: ICT Governance

- Management of ICT
- Strategic ICT Processes
 - Business Systems Planning
 - ICT Architecture Definition
 - Strategic Planning and Control
- Tactical and Operational ICT Processes
 - Management Systems Planning
 - Systems, Application and Data Management
 - Project Management
 - End User Service Management
 - Security and Recovery Management
 - Skills Planning and Management
 - Problem and Change Control
 - Resource, Production and Distribution Control
 - Financial Administration
 - Education and Training

Topic 3: ICT Project Management Concepts and Models

- Project Definition
- Project Success
 - Measuring Success
- Post-Implementation Reviews
- Project Size
 - Lines of Code
 - Effort/Duration
 - Function Points
- Project Life Cycle



Topic 4: Project Management Techniques

- Steering Committees
- Project Justification
- Project Planning
- Project Development Strategies
 - Methodologies
- Risk Assessment
- Estimation
- Quality Assurance
- Scheduling
- Project Tracking and Reporting

Topic 5: Introduction to Software Quality

- Understanding and Measuring Quality
- Costs and Benefits of Quality
- Role of People in Producing Quality Software
- Factors That Impact the Quality of Software

Topic 6: Software Quality Planning

- Role of Planning
- Software Quality Requirements
- Preparing a Software Quality Plan
- Implementing a Software Quality Plan
- Preparing a Quality Manual

Topic 7: Processes for Assuring the Quality of Software

- Risk Management
- Conformance to Standards
- Reviews, Audits, Walkthroughs and Inspections
- Verification, Validation and Testing
- Configuration Management

Topic 8: Product Quality

- Software Product Standards
- Quality Attributes of Software
- Product Characteristics of Quality Software
- Measuring and Evaluating Product Quality and Associated Metrics

Topic 9: Process Quality

- Software Process Standards
- Process Definition
- Process Measurement

Topic 10: Process Assessment

- Process Improvement
- Capability Evaluation
- Procurement of Software

Topic 11: Post Development Software Quality Assurance

- Maintenance and Evolution of Software
- Re-Engineering of Software
- Software Product Quality Improvement



OM2. Change Management

Preamble

Change management is the process of ensuring that all changes are assessed, approved, implemented and reviewed in a controlled manner. In the context of ICT the objective of Change Management is to ensure that standardised methods and procedures are used for efficient and prompt handling of all changes to ICT infrastructure so that there is minimal impact on the provision of service. Changes may arise in response to problems, or externally imposed requirements, such as, regulatory changes, new business initiatives, or need for improved efficiency and effectiveness.

Table of Topics

Topic 1: Approaches to Change

Topic 2: Individual, Team, and Organisational Change

Topic 3: Change Management

- Phases of Change
- Change Process
- Change Agent and Problem Owner
- Problem Management
- Key Factors for Effective Change Management
- Cultural Attributes of Change
- Resistance to Change
- Impact of change

Topic 4: Models and Approaches to Change

- Systems Approach to Change
- Change Strategies
- Moving towards Change
- Internal Vs External Change Agent
- Cultural Change
- IT Based Process Change
- Changing the Information Culture

Topic 5: Leading Change

- Phases of Change
- Leadership Style and Skills

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