

Key Areas of Knowledge – RPL Application

Australian Computer Society
Skills Assessment

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Jeff Ferguson, FACS CP
Peter Juliff, AM FACS HLM
Vijay Khandelwal, FACS

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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 have not acquired 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 an ICT Skills Assessment via the 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

PS. ICT PROBLEM SOLVING

PK. PROFESSIONAL KNOWLEDGE

- PK1. Ethics
- PK2. Professionalism
- PK3. Teamwork concepts and issues
- PK4. Interpersonal communication
- PK5. Societal issues, Legal issues and Privacy
- PK6. History and status of the discipline

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

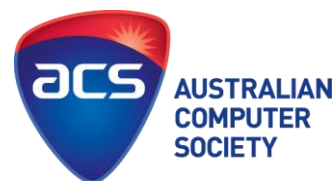
- SM1. Service management
- SM2. Security management

OM. OUTCOMES MANAGEMENT

- OM1. ICT governance
- OM2. ICT Project management
- OM3. Change management
- OM4. Security policy

None of the areas are mandatory: applicants should address relevant areas of knowledge that they have acquired through their experience.

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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 or 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 may be 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.

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THE AREAS OF KNOWLEDGE

ICT PROBLEM SOLVING (PS)

PS1. Problem Solving

Preamble

Problem solving requires knowledge of how to use modelling methods and processes to understand the problem, manage abstraction and design the solutions.

Table of Topics

Topic 1: Abstraction and Problem Solving

- Modelling Tools
- Modelling method
- Model evaluation and verification

PROFESSIONAL KNOWLEDGE (PK)

PK1. Ethics

Preamble

Ethics is the study of values and customs. Understanding and knowledge of ethics, particularly in the work place, often develops with maturity and experience.

Table of Topics

Topic 1: Ethical notions

- Virtue, duty, responsibility, harm, respect, rights, and consequences

Topic 2: Integrity systems

- ACS Code of Ethics
- ACS Code of Conduct

Topic 3: Specific ICT ethical issues

- Professional – e.g. compromising quality, conflict of interest
- Societal – e.g. privacy, phishing, unsolicited advertising

PK2. Professionalism

Preamble

Professionalism is the competence and skill expected in a role. An ICT professional exhibits competence and skill in ICT in a business/employment (non-hobby) context.

Table of Topics

Topic 1: Concepts of professionalism

- Competency, expertise, certification, autonomy, reflection, responsibility and accountability

PK3. Teamwork

Preamble

Many activities in ICT are collaborative efforts and understanding of teamwork is an important professional building block.

Table of Topics

Topic 1: Concepts of teamwork

- Group dynamics
- Leadership
- Conflict resolution
- Groupware

PK4. Interpersonal Communication

Preamble

ICT Professionals rarely work alone. Successful communication among co-workers and with clients and the broader community is paramount.

Table of Topics

Topic 1: Communication Theory and Practice

- Effective interpersonal communication
- Oral and written presentations
- Technical report writing
- User documentation

PK5. Societal Issues

Preamble

ICT systems can have significant influence on society. ICT Professionals should be aware of potential benefits and problems of ICT in society.

Table of Topics

Topic 1: Societal Issues

- Privacy and civil liberties
- Computer crime
- Intellectual property rights

PK6. History and status of the discipline

Preamble

Electronic computing, in less than one hundred years, has become ubiquitous in all areas of society including our personal lives. An ICT professional should have some knowledge of the evolution of the discipline and its role in society.

Table of Topics

Topic 1: History and status

- Evolution of computing
- Current trends in ICT

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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)
- Memory
- Peripheral devices
- Mobile ICT devices
- ICT integration

Topic 2: Software fundamentals

- System software
 - Operating system
 - Device drivers
 - Compilers/interpreters
 - Visual development environments
 - Text editors
- Application software
 - Word processing
 - Spreadsheets
 - Business applications
 - 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
- Image data

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Topic 2: Data Governance

Data owner

Topic 3: Data Architecture, Design

Data architecture
Data Analysis
Data Modelling

Topic 4: Database Management

Database management systems
Database Query Languages
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
Data mining
Business intelligence

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 (e.g. LAN, WAN, VPN)
Relationship (e.g. client-server, peer-to-peer)
Topology (e.g. bus, star, ring)
Private Networks / Public Networks

Topic 2: Data communication

Link control
Asynchronous and synchronous transmission
Communication protocol

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Topic 3: Internet

- History
- Governance
- World Wide Web (WWW)
- Electronic mail (e-mail)
- Telephony (VOIP)
- Data transfer
- Social Impact
- Malware (viruses, worms, identity theft, phishing, etc)

Topic 4: Networking hardware

- Modem
- Router
- Firewall

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

Topic1: 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

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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 (e.g. mouse, microphone, pointer)
Usability testing
Rapid prototyping

Topic 2: Display design

Graphic design, legibility and colour, top-down processing, pictorial representation, access minimisation, consistency of response, user tailor ability
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

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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
- Incident Management
- Problem Management
- Configuration Management
- Release Management

Topic 3: Service Delivery

- Service Level Management
- Financial Management for ICT Services
- Capacity Management
- Availability Management
- Continuity Management

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

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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

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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

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Topic 3: ICT Project Management Concepts and Models

- Project Definition
- Project Success
- Post-Implementation Reviews
- Project Size
- Project Life Cycle

Topic 4: Project Management Techniques

- Steering Committees
- Project Justification
- Project Planning
- Project Development Strategies
- 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

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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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