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Key Areas of Knowledge – RPL Application

Australian Computer Society
Skills Assessment

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Recognition of Prior Learning (RPL) Application

Jeff Ferguson, FACS PCP
Peter Juliff, FACS HLM
Vijay Khandelwal, FACS PCP

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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

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 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 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
        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
                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

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

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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