

The Technical Competency Handbook

Knowledge, skills and competency development for water industry operations staff



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The Authors

Dr Kathy Northcott (CEng, FICHEM) has authored the Technical Competency Handbook, on behalf of the Water Industry Operators Association of Australia (WIOA). Kathy is a process specialist in water treatment, wastewater treatment and water recycling. Kathy also has experience in the development and implementation of technical training and professional credentialing programs for water industry operations staff.

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Introduction

The Technical Competency Handbook (the Handbook) has been developed to assist water utilities to develop processes and practices designed to deliver a technically competent water industry operational workforce. Approaches for planning and delivery of learning and development (L&D) programs to achieve technical competency, as well as to manage ongoing professional development along with examples and case studies are presented.

This Handbook is primarily aimed at the *quality & risk management*, as well as *technical knowledge and skill* requirements of water industry operations staff. Together, these two areas form the basis of key technical competency requirements for operations. This is beyond the fundamental business systems knowledge and workplace health and safety training and skills, which are an essential for all staff working in the water industry.

The practical aspects relating to the creation of organisational technical capability frameworks include:

- Fostering organisational change towards a learning culture, through appropriate learning and development (L&D) program design.
- Identifying and articulating technical roles and responsibilities and creating fit-for-purpose skills sets.
- Creating a professional development framework to support the ongoing L&D needs of technical staff.
- A continuous cycle of L&D planning.
- Performance management systems – to evaluate competency and identify the L&D needs of technical staff.
- L&D records management – to manage, capture, record and report on learning activities.
- Workforce Planning – particularly succession planning and systems and processes for knowledge sharing.
- Identifying subject matter experts within an organisation, who will in-turn provide peer-based learning to others.

Further to this, the guide also provides supporting information, examples, case studies and resources, on the following topics:

- Learning and development models to recognise and support informal learning.
- Identifying learning styles and designing L&D activities to suit individual styles.
- Using professional credentialing and certification schemes to foster ongoing professional development and open up career pathways to technical staff.

The Handbook is intended to be used by Human Resources (HR), L&D practitioners, and direct line managers who are tasked with the creation and implementation of L&D programs for staff in water industry operations.

In addition to the Handbook, a shorter “Notebook” version is planned. This will contain practical guidance on skills evaluation, training gap analysis, training planning and ongoing professional development, suitable for use by operational staff and their direct line managers. It is hoped that the Handbook and any future supporting tools, templates and resources created will be of benefit to water industry operations staff to better manage their technical competency needs.

Glossary of Terms

70:20:10 – Learning and development model that advocates 70% on-the-job, 20% social and networking and 10% formal learning programs

ADWG – Australian Drinking Water Guidelines

AGWR – Australian Guidelines for Water Recycling

Bulkwater – Water that is transferred between source water storages or supplied in bulk to large users (e.g. agriculture, power stations).

Capability – Relates to the organisation. That is, the organisation has all of the L&D systems and processes in place to support a workforce with the ability to safely and competently deliver the products and services to the customer.

Catchment – Generally refers to the rainfall collection area around surface water dams, reservoirs and water courses that supply source water for treatment and supply to communities.

Competency – Relates to the individual. That is, operational staff with the required minimum level of skills, knowledge and experience to safely and competently carry out their job role.

CPD – Continuing Professional Development

Drinking Water – Water that is treated and supplied to customers for drinking (potable) purposes

HR – Human resources

L&D – Learning and Development

NHMRC – National Health and Medical Research Council

WHS – Workplace Health and Safety

PD – Position Description

Proficiency – The level of competency that a person may have in a particular skill area. For example, a person may either have an acceptable, advanced or expert level of proficiency.

Recycled Water – typically effluent from wastewater treatment systems that is further treated to a point where it is suitable for non-potable reuse purposes (e.g. irrigation)

RTO – Registered Training Organisation

Skills Matrix – A list or table outlining the minimum set of skills an individual would need to safely and competently perform their job.

SME – Subject Matter Expert

Skills Set – A fit-for-purpose set of skills mapped to an individual's role and responsibilities, as outlined in their position description

TMS – Training Management System

VET – Vocational Education and Training

Wastewater – used water from any combination of domestic, industrial, commercial or agricultural activities, surface runoff or stormwater, and any sewer inflow or sewer infiltration. Wastewater is treated to a standard that is fit-for-purpose for its end use (reuse or discharge to the environment)

WIOCT – Water Industry Operator Certification Taskforce – Committee with responsibility for the development and implementation of the national operator certification framework.

Water Utility – A business (in Australia, often government owned) that provides water and/or wastewater services.

Workforce Planning – Process used to align the needs and priorities of the organisation with those of its workforce to ensure it can meet its legislative, regulatory, service and production requirements and organisational objectives.

Chapter 1 - Technical Competency in Water Industry Operations

In the water industry, operations staff have a direct influence on water and wastewater quality and, consequently, may have an impact on environmental and public health outcomes. It is vitally important that a water utility can demonstrate its people have the skills and knowledge to safely and competently carry out their roles in water industry operations. By demonstrating competence, assurance is provided to regulators, communities and users of drinking water and recycled water that staff are capable of identification and appropriate response to drinking water, wastewater and/or recycled water quality risks and incidents.

Well-designed L&D systems to foster competency are important. They deliver benefits to the individual, their organisation, their profession and the public, ensuring:

- Skills keep pace with the current standards of the industry.
- Knowledge and skills are appropriate to deliver a professional service to customers, clients and the community.
- Staff knowledge stays relevant and up to date.
- Staff become more effective in the workplace. This facilitates opportunities to lead, manage, influence, coach and mentor others.
- Opportunities for staff to self-reflect and drive their own development with the support of their manager.
- The job stays interesting. A focused L&D program opens up new possibilities, new knowledge and new skill areas.
- Increased public confidence in individuals and the profession as a whole.
- Knowledge and skills transfer between water Utilities.
- Provides the background knowledge and skills to make sound decisions that support effective water quality risk management objectives.

In the context of the water industry, technical competency contributes to improved protection and quality of life, the environment, sustainability, water infrastructure and assets and the economy. The importance of maintaining competency should not be underestimated – it is a career-long obligation for practicing professionals.

Principles of an Organisational Capability Framework to Promote Technical Competency

Successful learning and development programs to develop technical competency would typically have the following characteristics:

- The organisation has a culture of L&D, with a **strong focus on partnership between managers and staff** working together to enhance staff growth and performance.
- The framework for L&D within the organisation is explicit and **accessible to all** (e.g. not just degree-qualified staff).
- There is **recognition of importance of L&D by business managers** that L&D for all staff can result in increased staff satisfaction and engagement.
- There is an allocation of **sufficient staff and resources, including budget and time**, to the management of staff development.
- **Those responsible for managing the professional growth of staff have the skills and knowledge** required to undertake their role.
- **Staff are actively engaged in L&D**. Staff ask *'how can I contribute?'*, and there is a willingness to learn in collaboration with others.
- There is a **range of options for L&D** of individual staff as well as a flexible framework for managers to operate within, one which enables rather than restricts development.

Table A1 in Appendix 1 provides an example of the questions an organisation should consider when designing an L&D program for technical staff. In summary, the key principles that need to be addressed are:

1. Alignment with the business group KPI's and organisational strategy – with consideration of the products and services delivered by the organisation.
2. Integration with HR systems and processes.
3. Creation of a culture of learning.
4. Provision of L&D options to suit learning needs and styles – including training needs analysis.
5. Ongoing management - identification of L&D needs, planning, recording, reporting.
6. System for supporting skills application in the workplace.
7. Evaluation and continuous improvement.

The following practical aspects should also be adopted:

- Opportunities for **self-assessment and reflection on personal performance**. Staff should have a means to review and reflect on their own skills and knowledge and express their opinions on how best to facilitate their own career development.
- A cycle of **staff performance planning and scheduling of L&D**. An annual program of meetings between managers and staff to review performance and development needs and schedule in training and development activities for the following year.
- Tools for **monitoring/tracking of L&D activities and costs**. There should be a means of keeping track of activities that have been identified in performance reviews and systems for ensuring that training is undertaken and/or staff actively engage in L&D activities.
- Business systems for **collecting, storing and reporting on L&D activities**. An organisation should have document management systems in place to ensure all records of staff training and development activities are maintained for tracking and reporting purposes. Additionally, staff should have access to L&D management systems and tools in order to take ownership of their professional development.
- A focus on the **70:20:10** learning model to encourage opportunities for on the job, experience based, projects and practice (70); and coaching, mentoring and developing through others (20); to steer away from the traditional idea that development more often than not reflects formal learning interventions and structured courses (10).



Chapter 2 – Developing and Maintaining Technical Competency

The community has certain expectations of water industry professionals, their skill level, how they apply their knowledge and how they conduct their activities. Regardless of the specifics of roles and responsibilities, technical staff in the water industry need skills and knowledge in the following areas:

- Workplace Health & Safety.
- Quality & Risk Management.
- Team Skills - such as Self-management, Communication & Leadership.
- Technical proficiency.

This Handbook will focus primarily on the *quality & risk management* and *technical proficiency* requirements of water industry operations staff. Together, these two areas form the basis of a minimum technical competencies required for staff to safely and competently perform their roles. An organisation should have provision for staff to manage and develop their knowledge and skills, in-line with specific competency requirements, customised to the needs of the organisation.

Identifying Technical Roles

The first step in developing technical competency is identifying the roles that are relevant. For each role identified there should be a position description which outlines:

- Key Responsibilities.
- Key Performance Indicators.
- Skills set (required and desirable).
- Qualifications/accreditations (required and desirable).
- Previous experience.
- Employability and team skills.
- Other relevant skills (e.g. drivers licence, first aid etc.).

Based on each position description, it should be possible to create a list of technical roles and competency sets for an organisation. In broad terms water Utilities will have technical roles that fit into the following categories:

- Operational – such as catchment management, bulk water transfer, water/wastewater or recycled water treatment, networks (distribution & collection).
- Maintenance (may or may not be part of operations – depending on organisational structure).
- Process engineering.
- Water quality / Process science.

Although not an exhaustive list, Table 2.1 gives some examples of technical roles and skills requirements. Note this table does not cover the specific WH&S training or business systems training requirements of each role. Additionally, the role descriptions outlined in this table are very broad and cover varied requirements within water industry operations, such as water, wastewater, network operations and treatment plants. For further delineation of specific roles, refer to Chapter 6 of this Handbook, as well as selected case studies.



Figure 2.1: Process of identification, development and maintenance of technical competency.

Table 2.1- Examples of technical roles and requirements of the role

Operator		
Qualification	Personal Attributes	Technical Skills
Certificate II, III or IV in appropriate water industry operations stream from the National Water Package (NWP). Possible trade qualification.	<ul style="list-style-type: none"> • Able to work unsupervised. • Completes tasks on time. • Logical approach to problem solving and trouble shooting. • Able to work in a team. • Well-developed communication skills. • Ability to multitask. 	<ul style="list-style-type: none"> • Operation of water (drinking water, wastewater and recycled water) treatment systems, processes and/or networks. • Proficient water quality sample collection and field and laboratory-based analysis. • Capability to perform basic mechanical, in some cases electrical and / or instrumentation maintenance. • Application of quality management systems and procedures. • Using computers and process control systems. • Understand water quality / environmental risk management principles i.e. ADWG and/or AGWR, apply (or follow) HACCP or similar principles and environmental licencing conditions.
Operations Supervisor/Team Leader		
Qualification	Personal Attributes	Technical Skills
Certification III or IV from NWP. Other requirements may be Certificate IV Frontline Management and/or Diploma of Water Industry Operations.	<ul style="list-style-type: none"> • Good communications skills. • Coaching/mentoring skills. • Well-developed problem solving ability. • Leadership and management skills. • Good planning and organisational skills (delegation skills). 	<ul style="list-style-type: none"> • Management of water treatment systems, processes and/or networks. • Co-ordinating mechanical, electrical and / or instrumentation maintenance. • Contractor management. • Management of quality systems and procedures. • Using computers and process control systems. • Application of water quality risk management principles i.e. ADWG and/or AGWR, implement actions / ensure compliance with at an operational level site specific HACCP or similar principles, environmental licencing requirements. • General understanding of legislative and/or regulatory rules.

Maintenance Planner		
Qualification	Personal Attributes	Technical Skills
Trade qualification or appropriate engineering certificate/diploma.	<ul style="list-style-type: none"> • Good communication and interpersonal skills. • Good written and verbal skills. • The ability to work in a team environment. • The ability to respond to rapidly changing work requirements. • Good planning and organisational skills. 	<ul style="list-style-type: none"> • Maintenance planning and management. • Using computerised maintenance management systems (CMMS). • Knowledge of mechanical and electrical equipment and their maintenance requirements. • Understanding of an operating plant environment. • Knowledge of water treatment operations.
Project Engineer		
Qualification	Personal Attributes	Technical Skills
Appropriate Engineering degree.	<ul style="list-style-type: none"> • Must be able to communicate effectively, both written and verbally, to staff clients, and contractors. • The ability to work in a team environment. • Problem solving, planning and organisational ability. • Excellent organisational skills. 	<ul style="list-style-type: none"> • Project management experience in design and construct environment. • Understanding of contract/commercial issues and financial management and reporting. • Contractor management • Knowledge and experience of the construction industry. • Knowledge of planning controls and legislative approval processes. • Experienced in contract management and the preparation of specifications. • Experience in quality, environmental and WH&S Management systems. • Clear understanding of water quality / environmental risk management practices.
Scientist/Technician		
Qualification	Personal Attributes	Technical Skills
Appropriate science degree, or lab technician certificate/diploma plus equivalent experience.	<ul style="list-style-type: none"> • Excellent communication skills. • Investigative and problem solving skills. • Ability to work autonomously with minimal supervision / direction. • Be able to work in a highly developed team environment. • Good organisational skills. • Good interpersonal skills. 	<ul style="list-style-type: none"> • Managing water quality data, both of a drinking water and wastewater effluent nature (for both water discharge and/or land reuses application purposes). • Laboratory operation and analysis techniques including application of QA/QC procedures. • Technical report writing and presentation skills. • Liaising with stakeholders and other external organisations. • Knowledge of water and wastewater treatment processes and recycled water applications. • Clear understanding of legislative and regulatory obligations and the ability to translate requirements into effective functional operational practices to achieve compliance. • Well-developed knowledge of water quality / environmental risk management procedures and practices applicable to the water industry.

Process Engineer		
Qualification	Personal Attributes	Technical Skills
Appropriate Engineering degree.	<ul style="list-style-type: none"> • Excellent communication skills. • Coaching and/or training skills • Investigative and problem solving skills. • Ability to work autonomously with minimal supervision / direction. • Be able to work in a highly developed team environment. • Good organisational skills 	<ul style="list-style-type: none"> • Management of process and water quality data, both of a drinking water and wastewater effluent nature. • Technical report writing and presentation skills. • Liaising with external organisations. • Process investigations/troubleshooting of water and wastewater treatment processes • Engineering design and calculations. • Clear understanding of legislative and regulatory obligations and the ability to translate requirements into effective functional operational practices to achieve compliance. • Well developed knowledge water quality / environmental risk management procedures and practices.

Developing a Technical Skills Matrix

Technical competencies reflect the skills, know-how and processes needed to deliver an organisation's core business operations and services. Based on the position description, and knowledge of the products/services that an organisation or department delivers, it should be possible to create a technical skills matrix specific to each operational role. The skills matrix contains all of the required training and competencies an individual requires to carry out their duties.

Example 2.1: A drinking water operator works at a plant with the following treatment processes:

- **Potassium Permanganate dosing**
- **Powdered activated carbon dosing**
- **pH and alkalinity adjustment**
- **Coagulation/flocculation**
- **Dissolved air flotation**
- **Granular media filtration**
- **Chlorine disinfection (gas)**
- **Fluoride dosing**

See Table 2.2 for the technical skills matrix with specific training requirements for an operator at this plant.

Using this example, based on the position description and knowledge of the processes and activities managed within the water treatment operation, a drinking water operator would be required to have technical knowledge and skills in:

- Drinking water quality and risk management.
- Environmental risk management.
- Sampling and testing for water quality.
- Operational knowledge and skills for treatment processes, specific to the treatment plant/s at which they work.
- Skills in basic maintenance and calibration of equipment and instrumentation relevant to their treatment process, to maintain treated water quality.

Whilst the example cited here is for a drinking water operator, the model can be easily applied to other technical roles including operators, scientists, process or project engineering.

Table 2.2 - Example of a technical skills matrix for a drinking water operator for the drinking water process described in Example 2.1.

Technical Competency	NWP Unit of Competency	Other Training/Qualifications	Quality/ Risk		Treatment Processes						Maintenance			
			Health & environmental risk	Water quality testing	Potassium Permanganate	Powdered activated carbon	pH and alkalinity adjustment	Coagulation/flocculation	Dissolved air flotation	Granular media filtration	Chlorine disinfection (gas)	Fluoride dosing	Electrical	Mechanical
Quality and Risk Management														
Risk management principles of the water industry	GEN001													
Environmental & licensing procedures	GEN003													
Management of change		On-the-job												
Sampling and testing														
Sample/test water	GEN007													
Laboratory testing	GEN009													
Drinking water treatment														
Iron and manganese removal	TRT014													
Activated carbon	TRT034													
Chemical dosing		On-the-job												
Coagulation/flocculation	TRT015													
Dissolved air flotation	TRT033													
Granular media filtration	TRT041													
Chlorine (gas) disinfection	TRT013													
Fluoride dosing	TRT012													
Basic maintenance			Trade qualification or specified minimum on-the-job experience											

Ongoing Knowledge and Skills Development

It is one thing for technical staff to achieve the minimum technical competencies, qualifications and experience to perform their role. Maintaining currency of skills and knowledge and keeping up with industry trends and technologies is another matter entirely. The need to maintain currency of skills highlights the importance of an ongoing professional development framework for technical staff. Supporting staff to maintain professional skills and knowledge throughout their career is one of the biggest challenges Utilities face. Managing a large workforce with disparate skills sets, as well as meeting regulatory requirements for ongoing training in areas such as WH&S, can be expensive and time-consuming.

However, it should not be necessary to re-invent the wheel when it comes to professional development. In-fact, it is a good idea to look to other well-established frameworks for guidance. One of the best-known industry examples of a continuing professional development framework would be that for chartered engineers. The Institute of Engineers Australia (IEAust) and the Institute of Chemical Engineers (ICChemE) both maintain globally recognised professional development programs for engineers.

The benefits of seeking chartered status and participating in mandated professional development are:

- Chartered status is understood across all sectors of the profession.
- It provides a benchmark of professional competence and commitment.
- It allows for external validation and independently conducted, peer review.

Examples of recognised activities under the IEAust Chartered Engineering Scheme are shown in Table A2.1 in Appendix 2.

However, ongoing professional development is vitally important for more than degree-qualified staff. Recently it has become possible for water industry operators to also gain the benefit of their own certification (credentialing) scheme and professional development framework. Chapter 6 of this guide provides details on the Certification Framework for Operators within Drinking Water, Wastewater and/or Recycled Water Treatment Systems (the Certification Framework) and the WIOA Water Industry Operator Certification Scheme. There are case studies presented (Chapter 8), of how operator certification and ongoing professional development can be implemented and managed within an organisation.

Example 2.2: A water business has opted to use a CPD model based upon the IEAust Chartered Engineers Scheme. The position description for a process engineer role within the business outlines the following key responsibilities:

- **Monitor process performance and provide advice on process optimisation.**
- **Prepare reports for water/wastewater treatment plants.**
- **Ensure that adequate planning is undertaken of the treatment assets.**
- **Provide a high level of technical advice on water quality and wastewater treatment and reuse issues.**

The process engineer might record required CPD hours (subject to providing appropriate documentation as evidence), as outlined in Table 2.3.

Table 2.3 - Example of claimed professional development hours for a process engineering role.

Type	CPD activity / topic / provider	Risk Management	Business & Management	Related Area of Practice	Hours
I to VI		Minimum: 10 hours	Minimum: 15 hours	Minimum: 50 hours	
I	Undertake TAEASS502 - Design and develop assessment tools to update TAE qualification. This is to further develop training and assessment skills to support operational staff.		2 day course = 16 hours		16
II	WIOA distribution seminar short course – managing water quality risks in distribution systems.	6 hours			6
III	Special research project – trialling a new membrane cleaning technique to improve membrane performance at a drinking water plant			75 hours	75
IV	Reading monthly Engineers Australia magazine and quarterly WIOA publications			18 hours	18
V	Act as Committee member on a WSAA Network – attend network meetings and collaborate on projects.	16 hours time contribution to algal bloom risk management project.		16 hours attendance WSAA network meetings and workshops.	32
V	Acting as industry supervisor/mentor for undergraduate student engineer during industry project placement.		22 hours		22
Total		22	38	109	169

Chapter 3 – Planning and Implementation of L&D

When planning for staff learning and development, it is always helpful to have appropriate planning tools and an annual L&D planning cycle. These can be used to help employees and their direct line managers to identify key technical knowledge, skills and behaviours needed, and find options for on and off the job activities to strengthen and improve performance.

Learning and Development Cycle and Budgeting

Typically, L&D planning occurs on an annual cycle (Figure 3.1). The recommended planning process is as follows:

1. **Link L&D to organisational core values.** Employees undertake development that is in close alignment with the business strategic goals and values, which enables them to use new knowledge and skills to maximum benefit.
2. **Regular review of L&D options and offerings.** This involves a panel of subject matter experts reviewing existing options and conducting job role analyses. The priority areas for development are determined, related to successful performance of people on the job.
3. **L&D needs analysis.** This is prepared annually to identify the gaps between an employee's capability to perform their role and the required level of competency. This is typically undertaken as part of the annual performance appraisal process.
4. **Roll-out of L&D activities.** The activities on offer are based on the job roles and needs analyses. Design of the program, L&D resources and training providers are identified on an as-needs basis each year, based on the collated training plan results.
5. **Evaluation and improvement.** The end of one L&D cycle marks the beginning of a new cycle. Feedback is sought from employees on the effectiveness of L&D on offer and improvements are made for the following year.

L&D options and offerings will always be dependent on the available budget. Often L&D budgets are the first to be cut when cost savings need to be made across a business. Therefore, it is a good idea to explore lower-cost options and opportunities that can achieve the same (or better) outcomes compared to traditional training delivery modes. For example:

- Online learning and webinars are often a lower cost alternative to classroom-based training.
- Industry events, trade shows and exhibitions are often low or no-cost, as well as great networking opportunities for staff.
- Offering programs involving staff exchanges, secondments or encouraging people to take on stretch projects, as an alternative to formal training.
- When sending staff to conferences and symposia, give preference to those willing to present posters or papers. This results in a greater professional development outcome to the individual staff member.
- Establish mentoring and/or coaching programs to allow experienced staff to share their knowledge and skills.

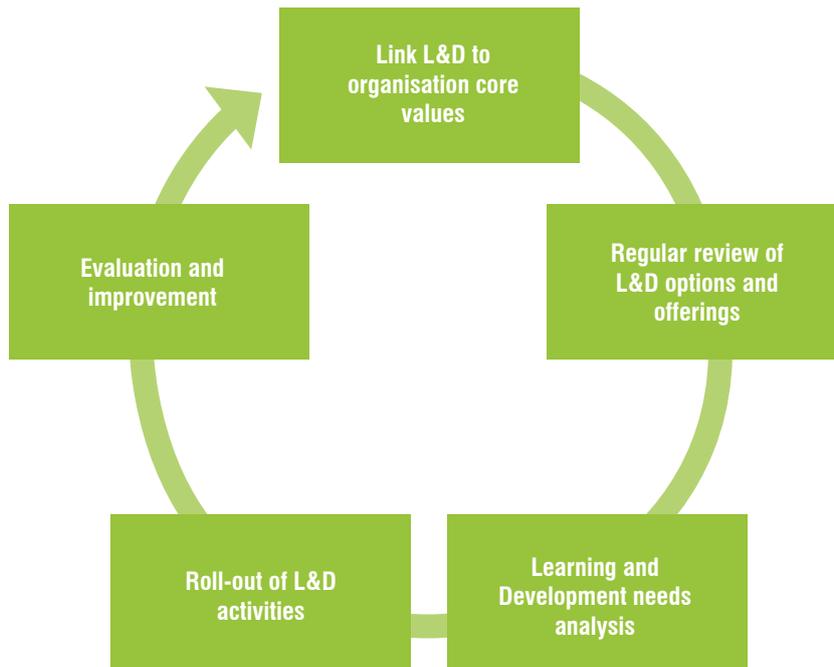


Figure 3.1 - Learning and development planning cycle.

Learning and Development Planning for Staff

As part of the annual L&D process, it is good practice for individual employees to carry out a self-assessment of their own knowledge and skills relative to the requirements of their job role. The first step is to identify the key competencies required to effectively carry out their role. A good starting point is the staff member’s position description. For more established L&D programs, an organisation may already have a fit-for-purpose skills set for job roles, which will have the key competencies identified. For examples refer to the case studies in Chapter 8.

To identify areas for development, the steps in preparing a self-assessment of competency against the requirement for a role are shown in Figure 3.2.

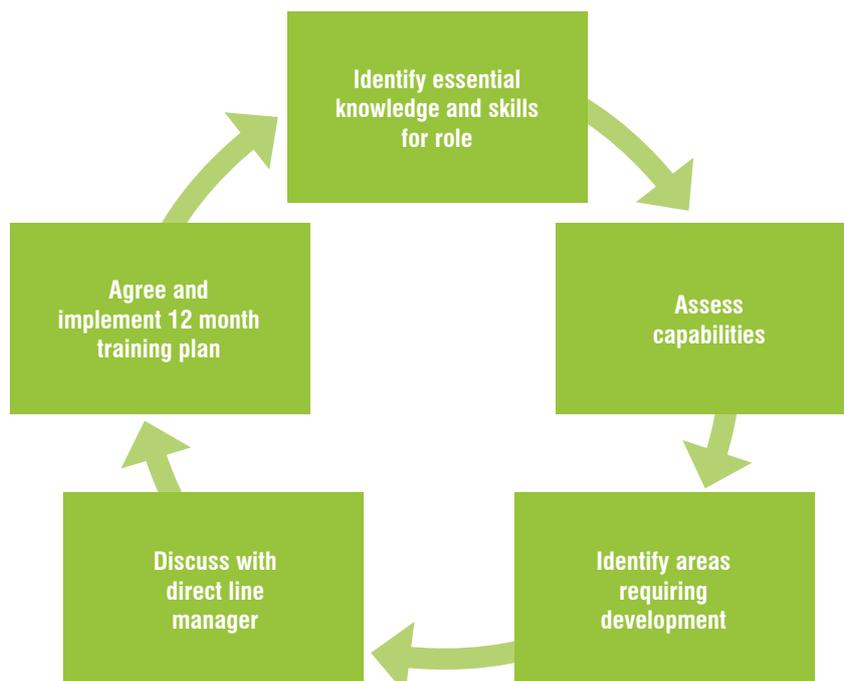


Figure 3.2 - Self-assessment for annual performance planning.

By identifying essential competencies, an employee can focus on priority areas for further development. Key items to consider:

1. Only list the competencies relevant to the role.
2. Prioritise the list by those most important to be successful in the role.
3. Create a short-list of competency requirements based on priority areas. This would be no more than 10 items.
4. Check against the training plan for the previous year. Was there any development identified previously that has not yet been addressed? If so, include this in the shortlist.

Once the priority areas have been shortlisted, an employee should give themselves a rating for each. An example would be:

- 5** - Significantly exceeds expectations
- 4** - Exceeds expectations
- 3** - Meets expectations
- 2** - Meets most expectations, may need some development
- 1** - Does not meet expectations

If none of the original competencies identified fall into the category of requiring development, then a new list of competencies is created and reviewed again.

Once the employee has completed their self-assessment, they then have a discussion with their direct line manager for agreement on the development needed. Agreed areas for development should then be documented in the annual training plan for each employee, which is then used to develop annual budgets and schedule activities for the coming year.

If an employee is not sure how to rate themselves, then there are tools that can be used to self-assess their capability. An example self-assessment checklist that can be used to assess capability against the requirement to perform the role is provided in Appendix 3.

Using Tables A3.1 and A3.2 in Appendix 3 can help define which competencies the operator should focus on for further development, and also whether the employee has the potential to be a coach or trainer for a given competency.

Learning and Development Records Management

Records management forms a critical part of the overall L&D process. A Training Management System (TMS) is a system used by the training administrator or learning and development co-ordinator to organise delivery of training and development activities, manage training and development plans, keep track of records of training, and facilitate reporting.

There are a large number of TMS options available. These can range from a very simple Microsoft Excel-based training register (for example the Excel Training Tracker template), through to significantly more powerful software packages with complete data and record storage capabilities.

As a minimum, L&D records management should capture the following information:

- **The skills set requirements of a specific job role**, broken down into particular qualifications and competencies needed for the role.
- **Identification of knowledge/skills gaps** and presentation of plans to address said gaps.
- **Record of all competencies achieved**, including the “who, what, where, when and how” of all learning undertaken.
- **Ongoing refresher training requirements**, including frequency of refresher training and professional development.
- **Maintain training records and documentary evidence**, including statements of attainment, attendance registers, assessments, training request and approval forms etc.
- **Ability to capture evidence of alternative modes of L&D**, such as mentoring, stretch projects, on-the-job experience etc.

It is advisable that the chosen TMS can be customised to meet the ongoing L&D needs of the business. For example, in the case of certified water industry operators, the TMS would ideally facilitate the generation of the following reports and documents:

- Operator skills matrix mapped to the specific plants, systems and processes that they operate.
- Training gap analysis, competencies completed and those yet to be achieved.
- Any site-based competency evaluations and the outcomes of assessment.
- Certification, credentialing status (if any).
- Annual training plans to meet certification/ongoing professional development requirements.
- Facility to track CPD activities and points allocations.
- Flag alerts of any accreditations needing to be renewed (generally required for organisational and OH&S training, e.g. First Aid certificate refresher).
- Facility to keep records of CPD undertaken, including certificates, registration forms, etc.

In the case of smaller regional councils with limited budgets to be able to invest in a commercial TMS, there are alternative options that may be considered. For example, there was a Microsoft Excel template called the Training Tracker, which although is no longer hosted on the Microsoft website, can be accessed and downloaded from other websites, such as *knowledgewave.com*.



Chapter 4 - Learning and Development Models

Studies of organisational learning programs make reference to the fact that a significant proportion of professional learning is informal. This has led to the creation of the 70:20:10 L&D model, which states that:

- 70% of our learning comes from challenging assignments and on-the-job experiences.
- 20 % of our learning is developed from our relationships with other people, our networks and the feedback we receive.
- 10% of our learning comes from formal training, such as courses, workshops and programs.

The 70:20:10 Model

There are many interpretations of 70:20:10, but in general terms, the model is described as:

- 70%—On the job, experience based, stretch projects and practice.
- 20%—Social, coaching, mentoring, networks.
- 10%—Formal learning and structured courses.

There is no single approach for implementation of the 70:20:10 model into an organisation. However, one possible means is to incorporate 70:20:10 thinking into the staff performance appraisal process and annual L&D plans. During the annual learning plan development cycle, the various possible formal and informal learning options can be reviewed. This is a challenge to the “training course” mentality, to create awareness amongst staff that there are other learning options beyond formal training.

The challenges to implementing 70:20:10 are gaining buy-in from managers and staff, capturing and reporting on learning activities and measuring the impact of the activities undertaken. Some key considerations in making the 70:20:10 model effective are:

- **Be flexible:** Use the model as a guide, not a rigid approach. Some organisations have changed the ratio of activities to better suit the style of their organisation (e.g. 50:30:20 instead of 70:20:10 etc.). Some organisations use it for their whole performance management process, whilst others focus specifically on the mix of L&D activities. What is important is that the approach is reviewed and revised as appropriate. The right ratio of on-the-job to formal training may depend on where an employee is in terms of their career path (i.e. a trainee verses an employee with experience).
- **Communicate and educate:** Develop understanding and commitment and encourage people to make a connection with the 70:20:10 approach. Managers and leaders need to be aware that coaching and mentoring should be part of their roles. Education and support is needed across the entire organisation for people to understand the importance and application of informal learning.
- **Provide examples:** The concept of informal learning needs to be demystified by promoting real examples of informal learning, as well as supply of worksheets, templates and resources to facilitate capture of the learning activities.
- **Keep it simple:** When rolling out new learning strategies and programs use clear, concise information and keep the L&D jargon to a minimum.
- **Be prepared for resistance:** Many people find the idea of informal learning challenging and difficult to understand. There will be a transition period and some people will be resistant to change.

To help make sense of what 70:20:10 looks like in practice, it is useful to look at each technical role and consider the appropriate activities that can support learning. Not only does this act as a checklist against which L&D practitioners can review their current approach, it can also ensure that opportunities for learning are considered across each competency. For an example of the 70:20:10 approach to learning, refer to case studies in Chapter 8.

Table 4.1 - L&D Activities that follow the 70:20:10 model.

70% – On-the-job	20% – Social, Networks	10% – Formal Learning
Job rotations/secondments	Networking	Courses
Stretch Assignments/Projects	Mentoring	E-learning
Working groups & taskforces	Coaching	Seminars
On-the-job Resources (procedures, manuals, Apps)	Communities of Practice	Workshops

Application of 70:20:10 – the AEE model

The Adding, Embedding, Extracting (AEE) model for Workplace Learning is a means of recognising existing L&D opportunities in the workplace and making informal learning more effective. The AEE model reflects the idea that both working and learning should be highly experiential and social. The model supports learning in the workplace, where it can add the greatest value.

Adding learning to work	Embedding learning within work activities	Extracting learning from work
Adding activities to work that have the explicit purpose of assisting learning	Helping teams and individuals solve problems at the point of need	Supporting individuals and teams to learn from existing day-to-day work activities

Figure 4.1 - The AEE model for workplace learning.

Ideas for Adding Learning to Work:

1. Identify ways to include challenging experiences into work, including:
 - a. Job rotations.
 - b. Stretch assignments.
2. Create job-focused content, to support a shift from courses to resources. This may include templates, checklists, apps and videos that can be quickly and easily accessed by workers as needed.
3. Offer a range of experience-based and social opportunities, such as site visits and demonstrations, and make them accessible to staff.
4. Adapt L&D systems to facilitate capture of the job-related learning activities and equip people managers/staff to commit to these options.
5. Talk about L&D opportunities in toolbox and operational meetings to encourage idea sharing and collaboration.

Ideas for Embedding Learning Within Work:

1. Develop practices and resources for people to use, to respond to workplace problems and challenges effectively.
2. Refocus formal development by:
 - a. Encouraging people to find learning opportunities in their day-to-day role.
 - b. Building a culture where people can learn and share with each other.
 - c. Foster coaching and mentoring to help staff development.
3. Establish professional networks, task forces and working groups as part of the support structure.
4. Use meetings and toolboxes to encourage idea sharing, problem solving and collaboration.

Ideas for Extracting Learning from Work:

1. Use performance planning systems as a means of providing feedback and encouraging learning.
2. Create “lessons learned” workshops or forums to review and improve team performance.
3. Identify opportunities to use Peer Reviews to share knowledge, promote collaboration and challenge the status quo.
4. Explore opportunities for people to share and present their work for individual and collective benefit.

The Pervasive Learning Model

An alternative approach to adult learning was put forward by Dan Pontefract (Pontefract, 2013). The Pervasive Learning Model suggests that:

- 33% of learning happens by **formal** means (e.g. in a physical or virtual classroom, at conferences and roadshows and via e-learning).
- 33% is **informal** (e.g. via mentoring, coaching, webinars, reading books and case studies, listening to podcasts and role shadowing).
- 33% is **social** (e.g. via user generated content, wikis, blogs, videos, discussions, comments, ratings and instant messaging tools etc.).

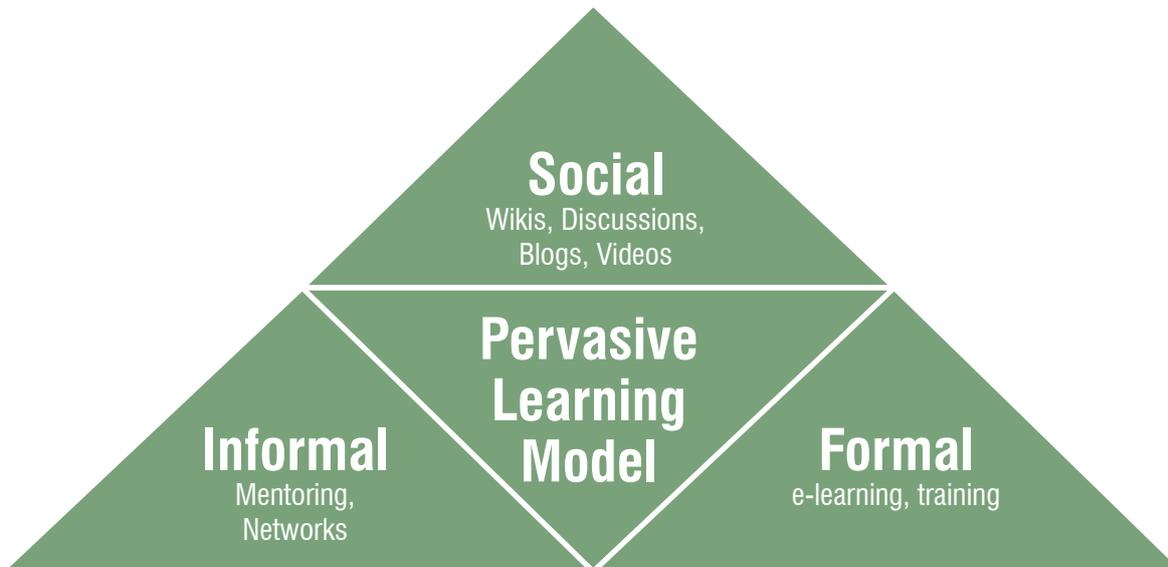


Figure 4.2 - The Pervasive Learning Model and example L&D activities.

According to this concept, learning goes far beyond traditional classroom settings. It extends to the world of e-Learning, informal learning, and “as-needs” learning. There are opportunities to learn in everyday life, and education is not something that can only be found in textbooks or formal learning resources, but everywhere. As such, everyone becomes lifelong learners with the ability to absorb and retain knowledge every day, even if not enrolled in school or participating in specific training activities on-the-job.

Thanks to new and emerging e-Learning tools and technologies, learners now have access to a wealth of information anytime, anywhere. Today, learners can get on their phones, tablets, and computers if they need information, which allows them to expand their understanding and develop their skills when it’s most convenient for them and when they truly need to gather new, critical knowledge.

A pervasive learning approach allows organisations to develop eLearning experiences that are informal, effective, and immersive for staff. It offers them the chance to expand their knowledge base and develop their skill sets whenever and wherever it is most convenient, making it an ideal tool for both corporate and adult learners.

Demonstrating the Benefits/Impacts of Informal Learning

When adopting informal learning into an organisation there are five key questions that L&D practitioners can ask of themselves and the wider organisation:

1. How are people learning in the organisation?

What sorts of activities are employees engaging in to help them do their jobs more effectively? Equally, what learning activities are they engaging in that aren't so valuable? Informal learning will already be taking place, so conducting an 'L&D audit' can help identify pockets of successful informal and social learning such as fledgling communities of practice which would benefit from some support and guidance.

2. Will an organisation's most senior people get behind an informal learning model?

Map out who the key stakeholders are at the start of the process and develop strategies for gaining commitment and resources. Use the insight gathered from the L&D audit to build a business case which highlights the most successful areas of L&D provision and those which would benefit from more attention and support. Talk to stakeholders about the benefits of implementing informal learning, linking it to key organisational challenges and not just using cost reduction as the only justification.

3. Does the L&D team have the skills to promote all aspects of informal learning?

It is likely that many L&D teams (where they exist within water Utilities) will need to review their existing skill sets, to determine how to embrace the non-formal learning elements. Most L&D functions are highly skilled in developing and delivering traditional training, but when it comes to supporting informal and social learning, there may be a lack of experience in the team. As well as mastering these new skills, L&D practitioners may also need to broaden their horizons regarding the available technologies and tools.

4. What is the right formal to informal learning mix for an organisation?

The 70:20:10 ratio is not a prescription for all L&D activity. It is a generalisation of the learning activity that is taking place in an organisation and, as such, should be used in a flexible way to inform and guide L&D practice. The key advantage of 70:20:10 is that it encourages L&D to explore all available options for learning and not simply to rely upon formal learning.

5. How can managers best support learning?

Line managers have a fundamentally important role to play in cultivating a new approach to learning in their teams. In some smaller organisations the direct line manager also plays the role of L&D practitioner, tasked with the responsibility of making judgements for appropriate training and L&D options for their team. It is important to make expectations for line managers clear - embedding a life-long learning mindset is fundamental. Focus on improving line manager capability in supporting the development of their teams. Can they hold effective one-to-one conversations, deliver constructive feedback and suggest appropriate development activities? Do they have the skills to deliver coaching and mentoring to their teams?

Setting Indicators for Organisational Change

To make an L&D program effective, it should be developed with specific goals in mind. This includes setting metrics to measure progress toward those goals. The following examples are common expectations of a successful L&D strategy, but each require a clear definition of what success looks like before collecting data and measuring outcomes:

- **Cost reduction.** Whilst reduced L&D budgets should never be the primary focus of re-aligning the L&D program, they will always be a driver. Collect good data on the actual cost of formal training (course fees, associated travel and living expenses and staff time commitment in \$ terms) and compare this against data on delivery of alternative L&D delivery options.
- **Increased employee productivity.** Effective L&D should enable staff to readily apply new knowledge and skills in the workplace.
- **Increased employee retention.** Employees who are happy with their jobs tend to stay. In fact, up to one-half of employees will say that career development and advancement opportunities within their organisation are very important to their job satisfaction.
- **Increased customer satisfaction.** When employees have effective tools at their disposal, this leads to better outcomes for customers.

Once the goals are established, the metrics need to be set. No two businesses have exactly the same set of goals and metrics, so it is important to know what you want to measure prior to actually collecting any data. Maximise the efficiency by setting up data collection and analysis for specific key performance criteria. Try establishing metrics such as:

- **Engagement.** Either face-to-face discussions with staff, or via an anonymous survey. Are they interested in what they are learning? Do they feel like it is worth their time?
- **Learning.** Develop skill checking tools, programs and initiatives to see if staff are retaining the information they have gained and applying it effectively in the workplace.
- **Application.** Are staff demonstrating a change in their behaviour as a result of their learning? Do they use what they have learned in the workplace? Try creating tools and checklists for managers and supervisors to observe and record changes in the way staff go about their work.
- **Business impact.** This metric often requires input across several departments, such as finance, information technology, and human resources. It also depends on the goals that have been chosen while developing content (e.g. staff productivity, or retention, cost savings).

Re-evaluate KPIs regularly to make sure that they still reflect the changing goals and needs of an organisation. The metrics that work now may not be necessary in a year or two, so keep the strategy dynamic.



Chapter 5- Learning Styles and Activities

Principles of Adult Learning

The five main principles for adult learning are:

1. Adults must self-direct their own learning.
2. Adults must have opportunities for critical reflection when learning something new.
3. Adults must be able to access their own experiences when learning something new. Additionally, adults will need new experiences in order for learning to “stick”.
4. Adults need a purpose for learning. There must be a goal or outcome, as most adults will not learn for the sake of learning.
5. Adults must “learn how to learn”.

In order for a learning and development program to be effective, it is imperative to cater to these learning needs of adults. Additionally, the benefits of the program should be communicated before, during and after learning activities, with an emphasis on relevant outcomes. It is also helpful for managers to understand the unique motivations of each of their team members.

Preferred Learning Styles

When conducting meetings, leading training, supervising others, presenting work products or simply hoping to share what the team knows, the effectiveness of the learning can be improved by understanding that adults have a preferred learning style. Adult learners have pre-existing habits about the way they prefer to take in and process information.

The Visual, Auditory, Kinaesthetic (VAK) learning styles model suggests that most people can be divided into three preferred styles of learning:

- Someone with a **visual** learning style has a preference for seen or observed things, including pictures, diagrams, demonstrations, displays, handouts, films, flipchart, etc. These people will use phrases such as “show me”, “let’s have a look at that” and will be best able to perform a new task after reading the instructions or watching someone else do it first. These are the people who will work from lists and written directions and instructions.
- Someone with an **auditory** learning style has a preference for the transfer of information through listening: to the spoken word of self or others, of sounds and noises. These people will use phrases such as “tell me”, “let’s talk it over” and will be best able to perform a new task after listening to instructions from an expert. These are the people who are happy being given spoken instructions over the phone, and can remember all the words to songs they hear!
- Someone with a **kinaesthetic** learning style has a preference for physical experience – touching, feeling, holding, doing, practical hands-on experiences. These people will use phrases such as “Let me try”, “how do you feel?” and will be best able to perform a new task by going ahead and trying it out, learning as they go. These are the people who like to experiment, hands-on, and never look at the instructions first!

People commonly have a main preferred learning style, but this includes a blend of all three. Some people have a very strong preference; other people have a more even mixture of two, or less commonly, three styles. There is no right or wrong learning style. The point is that there are activities that work more effectively for each preferred learning style. The questionnaire in Appendix 4 can be used as a reference to determine the preferred learning style/s of individuals.

Activities that Cater to Specific Learning Styles

As described, the VAK learning styles model categorises people as either being visual, auditory or kinaesthetic learners, or a combination of the three. Depending on the preferred learning style, an operator undertaking development training in Drinking Water Management Plans for example, may choose to do one or more of a range of L&D activities, as shown in Table 5.1.

Example 5.1: During the annual performance evaluation, an operator and their line manager agree that the operator needs development in “Application of Drinking Water Management Plans”. The choice of L&D activity is discussed, and the most appropriate plan is agreed based on selection from the options outlined in Table 5.1

Table 5.1 - L&D Activities that may be most suited to particular learning styles.

Activity	Learning style most suited to		
	Visual	Auditory	Kinaesthetic
Read and prepare a written review of the organisation’s Drinking Water Management Plans.	✓		✓
Attend a formal training course.	✓	✓	
Register and participate in a webinar.	✓	✓	
Participate in a practical workshop with break-out group activities.	✓	✓	✓
Actively participate in a Drinking Water Audit.			✓
Join an online forum or community that shares information on Drinking Water Management Plans.	✓		✓
Join a working group tasked with the review and update of the organisation’s Drinking Water Management Plans.	✓	✓	✓
Develop and deliver a presentation on the organisation’s Drinking Water Management Plans.			✓
Enter into a mentoring arrangement with a drinking water quality expert.		✓	✓



Chapter 6 – Recognition of Technical Competency for Operators

In this chapter, the national *Water Industry Operator Certification Framework 2018: Drinking Water, Wastewater and/or Recycled Water* (the Certification Framework) is presented. Whilst the Certification Framework refers specifically to the ongoing technical competency requirements of drinking water, wastewater and recycled water operators, it also provides a direction for water utilities to develop their own competency frameworks for other technical and operational roles. This may include:

- Source water management and bulk water transfer operators.
- Networks operators (drinking water supply and wastewater collection).
- Trade waste and hydrography professionals.
- Water operations supervisors, process engineers and managers.

The Water Industry Operator Certification Framework

The Certification Framework provides a set of nationally consistent criteria that define and recognise minimum levels of competency and capability. The Framework is designed for those Operators who manage the treatment of water, wastewater and/or recycled water. It is primarily a risk reduction strategy aimed at ensuring that the final product does not have an adverse impact on public health or the environment, and that the quality of the final product is fit for purpose and safe to use.

Each State and Territory, and in some cases the Commonwealth, regulate drinking water and wastewater to various degrees. The National Health and Medical Research Council (NHMRC) maintains the Australian Drinking Water Guidelines (ADWG). The ADWG provides an interrelated set of standards to assure safe drinking water through a preventive risk management approach. The NHMRC, in collaboration with the Commonwealth Department of the Environment, also maintains guidelines for the safe use of recycled water (Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) and (Phase 2)).

The Certification Framework is not intended to take precedence over the local regulatory requirements for a drinking water supplier, wastewater authority or recycled water supplier. Instead, Certification provides an assurance to regulators, communities and users that operators are competent to manage drinking water, wastewater and/or recycled water quality, as well as being capable of identifying and responding to water quality risks and incidents.

The Certification Framework introduces a minimum level of competency for Certified Operators across all states and territories by aligning skills, knowledge and competency requirements to national Vocational Education and Training (VET) standards. Further, the Certification Framework ensures that there is a requirement for the ongoing maintenance and/or development of skills and knowledge.

Implementing the Certification Framework ensures that operators have the right mix of knowledge and skills to competently manage the plants at which they work. Additionally, it provides the incentive for continued learning and development, growth, and engagement beyond their own water supply system(s).

The Water Industry Operator Certification Taskforce (WIOCT), with **qldwater** as the secretariat, is responsible for the development and implementation of the national *Water Industry Operator Certification Framework 2018: Drinking Water, Wastewater and/or Recycled Water*. The Certification Framework document and other relevant certification information is available from the **qldwater** website.

Further information on the application process to attain certification, along with all the Certification forms and documentation can be accessed via the WIOA website.

Recognised Professional Development for Recertification

Once Certified Operator status is achieved, recertification is attained by undertaking a range of Continuing Professional Development (CPD) activities to ensure that the technical competencies and capabilities remain current. This is achieved through ongoing engagement within the water industry, participation in refresher and professional development activities, and by demonstrating that operators can respond to changes in conditions, responsibilities, technology or treatment processes.

The Certification Framework specifies the CPD requirements for certified operators, see Table 6.1, and the WIOA Certification Scheme outlines the range of CPD activities deemed appropriate for recertification along with the designated points allocated to each activity.

Table 6.1 - CPD requirements for Maintaining Certification.

Classification and Complexity Rating	Required Points
DRINKING WATER - LOW	5 in 5 years
DRINKING WATER – HIGH	15 in 5 years
WASTEWATER - LOW	5 in 5 years
WASTEWATER - HIGH	15 in 5 years
RECYCLED WATER	15 in 5 years

Importantly, CPD does not just include training programs or conferences. WIOA has recognised a range of development opportunities allowing certified operators and employers to choose those options that best suit their needs. For the WIOA Certification Scheme, development activities are classified into the following categories:

- **Accredited Training** – formal Units of Competence from the National Water Package delivered by a Registered Training Organisation (RTO) and where a formal Statement of Attainment is issued.
- **Non-Accredited Training** – completion of training courses, seminars or workshops designed to directly update or refresh the technical skills of certified operators.
- **Other Activities** – attendance or participation in conferences or industry events, along with activities designed to challenge technical competence and in doing so, keep the skills of certified operators current.
- **Significant Workplace Project** – by definition, undertaking a significant workplace project where certified operators are able to perform an in-depth investigation into a facet of their certified field. This is an ideal opportunity to challenge the technical competence and thought processes and in doing so, keep the skills of certified operators current.
- **Exceptional Activities** – activities that do not easily fall into any of the previous categories but which when completed, also challenge the technical competence and thought processes and in doing so keep the skills of certified operators current.

A list of all the CPD activities and the points allocated to each is available on the re-certification page on the WIOA website. A table outlining examples of CPD activities and points allocated to each is included in Appendix 5.

Planning and Undertaking Professional Development

It is good practice to carefully plan and manage the ongoing professional development activities to ensure that the required points are accumulated throughout a given recertification cycle. This ensures that to retain certified status, the operator does not have a large burden of training or other activities to undertake towards the end of the cycle. Typically, the required training and development would be discussed and documented between the manager and staff member during the annual performance appraisal, and then scheduled by the training administrator.

Taking the preferred L&D style into consideration is important for planning professional development. Typical preferred learning delivery modes include:

- **Formal learning** – training courses, seminars and presentations, reading technical books & journals.
- **Coaching/Mentoring and knowledge sharing** – mentoring programs, team-based development activities.
- **Work-related** – informal learning through projects and special assignments, job rotations and networking activities.

Often a professional development program for an individual will contain a mix of each of the above modes, with activities weighted towards a preferred L&D style.

Example 6.1: A certified drinking water operator who works at a conventional filtration plant is required to undertake 15 points of professional development in a 5-year period.

The operator prefers to learn on-the-job and be more hands-on (kinaesthetic). As such, over the 5 years, in consultation with their manager, the operator could undertake the sample CPD Program outlined in Table 6.2

Table 6.2 - Example CPD program for a drinking water plant operator.

Year 1 - Activities	Activity type	Description	Points
Special Project.	On-the-job, Kinaesthetic.	Undertake an investigation into changing the coagulation dosing chemical used onsite. Make operational changes, write and issue report on project outcomes.	4 points awarded, based on project report.
Year 2 - Activities			
Attendance at a water industry conference, trade show, field day or meeting with published agenda.	Social/ Networking, Auditory, Kinaesthetic.	Attend WIOA Exhibition, talk to trade delegates about new equipment and products and how they might improve the operation.	1 point based on evidence of registration to exhibition.
Attend a water treatment focused in-house training course with Q&A discussion.	Formal Learning, All learning styles.	In-house training seminar on optimising granular media filters.	1 point based on training register and training session agenda.
Year 3 - Activities			
Participate in a rotation, exchange or secondment program.	On-the-job, Kinaesthetic.	3 week secondment to another water utility where the operator works as part of a team but under direct supervision.	3 points based on evidence of daily log or work diary for duration of the secondment.
Year 4 - Activities			
Attend a training session approved or conducted by a state/territory regulator.	Formal Learning, Visual, Auditory.	Attend a water quality seminar delivered by water industry experts, and approved by WIOA and the state regulator.	3 points based on evidence of registration to attend seminar.
Year 5 - Activities			
Provide a public presentation in relation to the relevant area certified.	Social/ Networking, Kinaesthetic.	Run a plant tour for staff from a visiting water utility.	2 points based on evidence of the site tour – E.g. CPD activity statement signed off by direct line manager.
Attendance at a relevant water industry specialty event.	On-the-job, All learning styles.	Attend a Water Interest Day organised by the WIOA state advisory committee.	1 point based on evidence of registration to the event.
			15 Points

Collecting Evidence and Keeping Records of Development

Monitoring and recording professional development activities and points allocations can be a relatively simple process. WIOA provides a downloadable “*Individual Professional Development Register*” on the certification website. This is an Excel spreadsheet where staff can record activities they have undertaken that meet the criteria for points.

In addition to the professional development register, documentary evidence of activities undertaken also need to be provided. The following table provides examples of suitable evidence of activities.

Table 6.3 - Examples of CPD activities and evidence.

CPD Category	Activity	Evidence
Accredited Training.	Undertake appropriate unit of competency from NWP.	Verified copies of statements of attainment for NWP units of competency from RTO.
Non-Accredited Training.	In-house training seminar on optimisation of relevant treatment processes.	Training attendance register and copy of training agenda/program.
Other Activities.	Attend relevant industry conference.	Conference registration (including no of days registered). Conference agenda/program.
Significant Workplace Project.	Undertake a process investigation or optimisation study.	Project report.
Exceptional Activities.	Mentor a junior operator.	Mentoring agreement and report.

In addition to the above, WIOA requires the submission of the following recertification applications forms and documentation:

- Recertification application form.
- Training/CPD activities form, including copy of professional development register and CPD evidence.
- Certification of workplace evidence signed by suitably qualified person.

Recertification application forms are available for download from the WIOA website.

Chapter 7 – Recognition of Technical Competency for Engineers and Technicians

This chapter refers to recognition of competency for water industry professionals working in technical roles. More specifically, the Chartered Credential with Engineers Australia. Whilst Chartered status with Engineers Australia *is not the only option* available to professionals in the water industry, this chapter presents engineering chartership as an example of the key principles of minimum skills sets, recognition of competency and promotion of ongoing professional development that should be incorporated into an organisation’s learning culture.

Industry Drivers for Becoming Chartered

Chartered status provides a competitive edge for any professional working in the water industry. It is a mark that an industry professional is globally recognised and accepted by the community, industry and Government as able to effectively perform their role. Not only is a professional credential an excellent recognition of technical skills and knowledge, it gives eligibility to be registered as a professional engineer in those jurisdictions where this may be a legislative requirement.

For example, Queensland currently mandates a comprehensive registration system for engineers. It is anticipated that other states including Victoria are likely to also adopt a mandated registration scheme in the not too distant future.

Registered Professional Engineer – Queensland (RPEQ) is formal recognition of the qualification and competency of an engineer. There are currently 26 areas of engineering recognised by the Board of Professional Engineers of Queensland (BPEQ). The Board works with professional organisations to define these areas of engineering, which range from aeronautical, civil and chemical engineers through to naval architects. The registration system ensures a high standard of practice exists within Queensland across all areas of engineering.

It is a legislative requirement that professional engineering services in Queensland and the design of buildings, plants, machinery or products for use in Queensland, are carried out by a RPEQ. Alternatively, a person can carry out the services under the direct supervision of a RPEQ who is ultimately responsible.

Registration applies extraterritorially, meaning registration is still required for any professional engineering services carried out interstate or overseas but destined for Queensland. This could include the design, construction and maintenance of a building, plant, machinery or product. For all the requirements of the Professional Engineers Act 2002, refer to the Board of Professional Engineers of Queensland website: <https://www.bpeq.qld.gov.au/>.

Achieving Chartered Status

Chartered status is way to achieve recognition of skills and competency, as well as eligibility to be registered as a professional engineer. Engineers Australia has a six-step process for achieving chartered status, as described in Figure 7.1.



Figure 7.1: The pathway to Chartered status with Engineers Australia.

(Image source: <https://www.engineersaustralia.org.au/Chartered/Applying-for-chartered>)

There are three main occupational categories that are eligible for Chartered status with Engineers Australia based on educational qualifications. Engineers Australia recognises three occupational categories within engineering teams:

- Professional Engineer.
- Engineering Technologist.
- Engineering Associate.

Professional Engineers hold an Engineers Australia accredited or recognised four-year professional engineering degree. Engineering Technologists have an Engineers Australia accredited or recognised three-year engineering technology degree. Finally, Engineering Associates hold an Engineers Australia recognised two-year advanced diploma or associate degree of engineering.

The standard process for achieving chartered status involves, holding a current Membership Grade of Full Member with IEAust (MIEAust- Professional Engineer, TMIEAust- Technologist, AMIEAust – Engineering Associate) or above. The process of application is then as follows:

1. Complete a Chartered Self-Assessment (available through the Engineers Australia website), providing a competency rating against a set of Competencies (**Skills Set Gap Analysis**).
2. Complete an Industry Review to the level of Functional or Above (details available from the Engineers Australia website). The Industry Review involves providing a short statement of the items of evidence to demonstrate Chartered competence. These statements then need to be confirmed by a suitable Industry Reviewer. The Industry Review is similar to that of the **Workplace Evidence** statement signed off by a **Suitably Qualified Person**, as set out in WIOA's Operator Certification Scheme.
3. Enrol and provide payment, curriculum vitae and a log of CPD (**Training records and evidence of PD**). Areas of practice for Chartered status (similar to certified **Operator Skills Streams**) and also link the completed Industry Review to the application at this point.
4. The Application is reviewed and there is an Evidence Discussion with Assessors. The Assessors evaluate the Industry Review results and may suggest alternate evidence be submitted than that suggested and will also discuss the Areas of practice chosen (similar to WIOA's **Operator Certification Application and Evidence** review).
5. A Professional Interview will be arranged once review and assessment of evidence documents is complete and satisfactory. The Interview will take approx. 1 hour and will involve a broad discussion of the evidence presented. A presentation may be required and will be confirmed when arrangements are made. The Interview will be with at least one Assessor and may include external Industry panellists.
6. CHARTERED. Following the Interview, the applicant will receive an email notification confirming the award of Chartered status and the Areas of Practice. An official Certificate will follow in the mail soon after.

Planning and Undertaking Professional Development to Maintain Chartered Status

Continuing Professional Development (CPD) is considered as anything that helps expand knowledge, maintain up-to-date technical skills and progress an individual's engineering career. Participation in CPD activities can also grow professional networks and contacts. CPD is required to attain and maintain Chartered Status.

Chartered Professional Engineers, Chartered Engineering Technologists and Chartered Engineering Associates should be aware of the obligation to meet the minimum 150 hours of structured CPD over a three-year period (refer to Appendix 2 for examples and hours that can be claimed). For all practitioners, of the 150 hours:

- at least 50 hours must relate to the area(s) of practice.
- at least 10 hours must cover risk management.
- at least 15 hours must address business and management skills.
- the remainder must cover a range of activities relevant to career and interests.

CPD activities are designed to extend or update knowledge, skill or judgement in area(s) of practice, and enable Chartered individuals to:

- maintain technical competence.
- retain and enhance effectiveness in the workplace.
- be able to help, influence and lead by example.
- successfully deal with changes in your career.
- better serve the community.

The most obvious sources of CPD recognised by Engineers Australia is attendance at conferences, seminars, training courses, presentations and site visits. Additionally, reading industry journals, and studying at university or online are all valid CPD activities.

The not so obvious options are to participate in industry and volunteer committees, as well as mentoring activities. Others include presenting papers at conferences and seminars, writing articles for journals, or even learning a language (if used for work purposes).

Most importantly and often forgotten is learning in the workplace! There are numerous activities that are completed at work that can be considered CPD. These include learning new software or codes, in-house presentations, implementing/creating new systems and ways of conducting business and research activities.

Non-engineering related activities can count as well. Participation in community committees can give valuable skills in communication, business management and risk management, all things that help to advance knowledge and skills.

Collecting Evidence and Keeping Records of Development of CPD

The Engineers Australia Chartered Engineering Schemes have the facility for records management and CPD tracking via an online database. The eCPDRecord is accessible through the Engineers Australia members portal and allows members to record their CPD in a structured way by allocating hours in relevant categories and types. The summary of CPD enables members to see their fulfilment in Risk Management, Business and Management and Related Area(s) of Practice.

It is also possible to keep a manual record of CPD activities to maintain Chartered Status, by accessing and using Engineers Australia's Manual CPD recording sheet. This is a simple tracking sheet in Microsoft Word format that can be downloaded from the Engineers Australia website.



Chapter 8 – Technical Competency Case Studies

The following are summaries of a series of L&D case studies. The case studies were developed in conjunction with the Technical Competency Handbook, to provide real examples of L&D program development and implementation in the water industry operations context. The full case studies will be available, along with the Technical Competency Handbook from the WIOA websites. A number of extra case studies will be available on these websites for reference and guidance in technical competency development.

Case study in program design and implementation

Case Study 1 – Sydney Water’s Technical Capability Program

The Sydney Water case study describes the Technical Capability Framework for staff working in Production (previously Treatment). This Sydney Water business unit is tasked with providing water, wastewater and recycled water treatment services, resource recovery and deep ocean outfalls.

Sydney Water’s Strategic Plan 2020 aims for the business to transition to a customer-centric operating model. This requires Sydney Water to undertake a process of translating its strategic goals into its day-to-day operations. As a result, the Production team must change the operating model to be more customer focused, more efficient, more technology focused, more adaptable and more scalable. The Production Hubs technical capability framework forms part of a broader overall Production improvement program, linking back to Sydney Water’s key business drivers.

Implementation of the framework required a new system and support tools to link and facilitate consistent L&D outcomes across the Production Hub, including:

- A capability framework.
- A capability proficiency guide.
- Capability development guides.
- A capability self-assessment tool.
- Success profiles.
- Role pathways.

The Capability Framework has been designed for specific roles within the Production Hub, including:

- Production Officers, level 1, level 2 and Senior Production Officers.
- Operations and Maintenance Coordinator.
- Process Controller.
- Reliability Engineer.
- Process Engineer, Senior Process Engineer.
- Process Manager.
- Interface Manager.
- Production Manager.
- Production Leadership Team.

Under the framework, Sydney Water has identified 10 technical capabilities where Production Hub staff need to demonstrate an appropriate level of proficiency. The capability framework provides support tools for staff to achieve proficiency, through integration with Sydney Water’s Contribution Development Planning (CDP) process. This is part of annual performance appraisals, review and planning, to ensure staff skills and knowledge stays current and keep up with technology and industry trends.

The Sydney Water capability framework for the Production Hubs is an example of how production **roles can be clearly articulated through role profiles**, and the required skills and knowledge can be determined based on key capabilities and specified proficiency levels.

Key aspects of Sydney Water’s program encompass the following L&D principles:

- A clear **link to organisational vision, strategy and core values**. Sydney Water and its Production Hubs strive to become a “frontier treatment organisation”, with a focus on aligning and prioritising team resources to meet customer needs.
- A **performance planning and review process** (CDP), with supporting tools for both staff and managers to actively engage in their career development.
- An **L&D needs analysis** that identifies the gaps between an employee’s capability to perform their role and the required levels of proficiency.
- **Evaluation and improvement**, with initiatives such as the capability snapshot, undertaken across the Production Hubs in 2018, to demonstrate the power of the capability framework for assessing current and future skills needs.

Case studies in technical competency development

Case Study 2 – The Queensland Water Skills Partnership, Water Industry Worker Program

The Water Industry Worker case study describes the process of development of a **standardised and fit-for-purpose skills set** specific to field maintenance and construction staff in the Queensland water industry. The Queensland Water Skills Partnership, Water Industry Worker (WIW) Program is a key initiative of *qldwater* and began in South East Queensland in 2009 with a pilot involving 22 staff members from the field maintenance and construction. Original participants were from Ipswich City Council, Logan City Council, Redland City Council, Brisbane City Council, Gold Coast City Council and Scenic Rim, Lockyer and Somerset Councils.

This pilot program was seen as the first step of a major multi-year industry initiative. The aims being; design of fit-for-purpose qualification/s accepted by industry, fostering industry demand in delivery of training for said qualification/s, and supporting the training supply market to develop an efficient model that could be replicated across other skills streams.

The program involved planning and implementation of accredited competency-based training for employees tasked with field-based maintenance and construction. The intention was this approach would have the potential for adoption into other technical steams, para-professional, professional and potentially management roles.

Under the WIW Program, participants undertake either a Certificate II or III in Water Operations, with a major in Civil. Further stages of the program involve moving through to Certificate IV Water Operations and/or Diploma of Water Operations qualifications for supervisory staff.

The WIW Program provides a practical approach to valuing existing skills, with a focus on developing a formalised process for recognition of skills and knowledge gained that was deemed equivalent to, or better than that gained through a recognised trade. In many cases the more experienced field staff had accrued their experience on-the-job and in the absence of a structured learning framework or other formal qualification.

The qualifications issued through the WIW program are nationally accredited and recognised. The training is up-to-date with industry practices and technologies. Additionally, the WIW Program offers broader career paths through progression from Certificate II up to Diploma Level, opportunities for promotion and professional development. The training process includes a recognition of prior learning (RPL) component (where relevant) followed by gap training in specified areas where the participant cannot demonstrate competency.

The WIW Program demonstrates a number of key aspects in the successful development and delivery of skills initiatives for water industry staff, namely:

- The importance of **industry collaboration** (Water Skills Partnership), bringing together a number of water businesses to create a critical mass to build a market need and drive improvement in training delivery.
- Having a structured approach to business case development for **accessing priority skills funding**.
- Including the RTOs in the WIW program development, to ensure the best outcomes in training delivery.
- A committed steering group, with a willingness to provide management/oversight to the program over the long term.
- A process of **program review and continuous improvement**, to address any issues and keep up to date with industry trends and technology.

Case Study 3 – Seqwater Site-based Operator Competency Assessment

The Queensland Bulk Water Supply Authority (Seqwater) case study describes the process of **operator competency development, site-specific competency evaluation and ongoing skills development**. This is illustrated through Seqwater's training program for Water Treatment Plant (WTP) operators, which involves; development, support and growth of operator competence.

A key feature of the training program is the use of a Site Based Competency Assessment (SBCA) for WTP operators, which have also been developed for other operational functions in dam and catchment operations at Seqwater. These SBCAs have been developed as an important step in the recognition of the skills, knowledge and experience of trained and competent operators. The support of operator competence through a formal process of site-specific competency evaluation is a progressive approach by Seqwater in supporting WTP operator competency development.

Seqwater has developed a robust training and competency assessment program, which aims to meet a number of key business objectives:

Objective 1 – Develop and foster a Skilled and Committed Workforce.

Objective 2 – Address workforce demographic challenges.

Objective 3 – Link training and competency requirements with career development and remuneration.

Objective 4 – Keep pace with changes to regulation and legislation.

In 2011, there was an internal driver for Seqwater to establish a structured training program for new entrants to the water industry, but also establish minimum standards for all its existing Operations employees. Alongside this, Seqwater recognised that there was a skills shortage in the water industry as a whole and realised it needed to equip its new and existing workforce with the skills required to deliver this critical essential service into the future. Seqwater's training program "Operations Development Program" is an initiative in designing a program to foster a sustainable workforce, now and into the future.

The Seqwater Operations Development Program is an example of how competency development, site-specific competency evaluation and ongoing skills development can be used effectively to ensure operators have relevant **site-specific knowledge and skills** to perform their role safely and competently.

Case studies in ongoing professional development

Case Study 4 – Wannon Water’s Refresher Training Program

The Wannon Water case study demonstrates a practical approach to the application of **the 70:20:10 Learning and Development (L&D) model**, in the context of water industry operations. This is illustrated through Wannon Water’s operator Refresher Training Program and how it has been implemented to support the continuing professional development (CPD) of drinking water operators.

A key feature of Wannon Water’s program is the focus on **mapping skills-based operational refresher training** to specific **units of competency from the National Water Package (NWP)**. Key challenges in maintaining the currency of skills and knowledge for water industry operators is; having a structured approach to training course development for those skills which need to be refreshed and updated, as well as ensuring that you have the most suitable and experienced trainers to deliver the refresher.

Wannon Water has identified a number of challenges when developing a suitable program for operator professional development, including:

- The lack of opportunities for remote and regional operations to access CPD through networking activities such as site visits and giving presentations to other water utilities or to visitor groups.
- Internal training, without partnership with an appropriate professional training provider, does not provide for adequate quality control in the development and delivery of refresher training courses for operators.
- Most of the Wannon Water operators are fully qualified and trained, hence ongoing accredited training is not always a desirable solution for ongoing CPD.

Wannon Water’s approach to CPD for operators has been to leverage the large amount of site-specific and technical knowledge and skills from within their own teams and use this to deliver high quality operational refresher training.

Wannon reached out to Victorian training providers to develop a partnership model for delivery of in-house refresher training mapped to NWP units of competency. This resulted in an agreement being developed with the Water Industry Training Consultants (WITC), based in Geelong, Victoria. The in-house refresher training modules have been developed in cooperation between Wannon Water and WITC.

Wannon Water build the refresher training into their annual training calendar, such that at least one training module can be delivered across the operational teams over a number of dates in a calendar year. Refresher training can be delivered in one day, and time is allocated in staff schedules and rosters to have as many staff as possible available to attend. Each training session generally involves around 6 operators, and the training lasts 7 to 8 hours involving reviewing tasks and completing an assessment. The assessments are sent to WITC for validation and issue of a Statement of Attendance.

The refresher training program has been a cultural shift from simply sending operators away to attend courses, to incorporating training and professional development into the local operational activities and schedules. Wannon Water has taken greater control over CPD management and delivery, and included a new and innovative range of in-house refresher training courses.

Case Study 5 – Veolia’s Informal and On-the-job Learning

This case study demonstrates a practical approach to the application of the **70:20:10 Learning and Development (L&D) model**, in the context of water industry operations. This is illustrated through Veolia’s Succeed-Lead-Learn L&D program and how it has been implemented to support the continuing professional development (CPD) of drinking water operators.

A key feature of Veolia’s program is the focus on recognition of the importance of **on-the-job learning**. According to the 70:20:10 model of L&D, this should comprise up to 70% of all work-related learning activities. Key challenges in incorporating on-the-job learning into an organisational L&D strategy and training plans, is how to capture the evidence of L&D undertaken and value of these learning activities. The implementation of this program at Veolia sites has offered an opportunity to demonstrate how this can be achieved in a practical and effective way.

Veolia considers operator skills and competency, as well as nationally recognised accreditation schemes such as operator certification and the National Certification Framework (NCF), to be an important measure of the value provided to clients, as well as improving the capability and professionalism of Veolia’s operational teams.

Veolia encourages all employees to pursue professional development activities relevant to their role and career aspirations. The “Learn-Lead-Succeed” (10-20-70) initiative represents Veolia’s approach to learning and reflects leading practice on how adults learn and develop new skills and knowledge.

To date activities that Veolia’s certified operators have participated in include:

- Attending site tours (Succeed). Veolia has run a program of site tours to other water utilities around Victoria. This gives operators exposure to the operational practices of the wider water industry, allows them to build networks and contacts with operators at other water Utilities, as well as expand their knowledge of water and wastewater treatment processes.
- Operational secondments (Succeed). Veolia has always had a practice of providing opportunities for staff mobility. With the advent of certification, this practice has been extended to operators, providing them with the opportunity to participate in short-to medium-term operational secondments. Notable examples have been; working on a demonstration plant for robust recycling applications in Hobart, and a month at Casey Station in Antarctica commissioning and operating a water treatment plant to treat diesel-contaminated meltwater.
- Conducting process investigations (Succeed): There have been a number of process investigations that have been led and reported on by certified operators in Victoria. Notable examples have been; a drinking water network nitrification study, a troubleshooting study on granular media filters, and a wash water system water quality enhancement investigation.
- Hosting industry workshops and tours (Succeed and Lead): Experienced operators have led a number of site tours and maintenance demonstrations at Veolia facilities for operators and engineers visiting from other water Utilities. This has allowed them to show technical leadership and enhanced the reputation of the business.
- In-house technical and “lessons-learned” workshops and seminars (Succeed, Lead and Learn): There has been enormous benefit through using Veolia’s own technical staff to host and deliver in-house knowledge-sharing awareness sessions on a range of water-treatment topics.

As a result, much of Veolia’s effort has allowed the recognition that there are a number of activities that can be considered to be CPD that don’t involve classroom based training. The critical aspects are to;

- identify the key learning outcomes and benefits of these activities, and
- formalise the scheduling, management, record-keeping and reporting on CPD.

The implementation of a **training management database** is important to the overall management of Veolia Australia & New Zealand's (Veolia) continuing professional development programs and for maintaining operator CPD. Veolia has a training management database to manage all operator training requirements. The database includes information pertaining to nationally accredited qualifications and units of competency, work experience and certification requirements for each operator, to enable the business to achieve compliance with regulation and with Certification under the NCF. The database can have provision for reporting on competency and refresher training requirements for individuals. These reports can be used to allocate training budgets as well as for performance appraisals of operators.

A second key component of maintaining operator CPD is the link to Veolia's **annual employee Performance Appraisal and Development process**. Veolia's approach to performance holds team members accountable for their own ongoing learning and career development. It also holds managers accountable for the overall performance of their areas, which includes supporting individual team members to develop and improve performance.

Case Study 6 – SUEZ' Knowledge Sharing and Networking Programs

The SUEZ Australia & New Zealand (SUEZ) case study demonstrates a practical approach to the application of the **70:20:10 Learning and Development (L&D) model**, in the context of water industry operations. This is illustrated through programs relating to **knowledge-capture, sharing and networking** and how it has been implemented to support the continuing professional development (CPD) of technical staff involved in water industry operations.

A key feature of the SUEZ program is how they leverage the knowledge embodied within a vast network of contracts and staff globally, and are able to share it via a number of modes of communication. Whilst not all water businesses have the luxury of their own in-house global network, the SUEZ case study demonstrates the power of creation of online knowledge-sharing tools and both virtual and face-to-face networking between business units and/or organisations. It also demonstrates how they encourage and support staff to get the most out of these resources.

A key knowledge-sharing tool for SUEZ is the online Eureka application. This is a technical knowledge sharing application pitched at treatment infrastructure and operations. Eureka is a means for employees to access up to date technical information from across their global operations, with the benefit of it being validated and updated on a regular basis. The application can be accessed by any SUEZ employee who has a web enabled device, a web connection and the appropriate authorisations to login.

The Return on Experience (REX) is an interesting feature of the Eureka application. The REX is a formalised process of local data and knowledge capture and sharing to the broader organisation. The aim is to capture key knowledge and learnings from specific operating contracts and projects. Information is captured at the local level through structured meetings/workshops attended by operational staff and/or project participants. There are standard format templates for input to ensure consistency of information-sharing and communication, as well as a structured process review, verification and approval. Finally, the REX documentation is posted on Eureka for access by all registered users.

Innovation is a critical part of how SUEZ delivers efficiencies and optimum service and value to its customers. Engaging staff across the business in development of innovative ideas and work practices, can provide exceptional value at both local and global levels. An interesting initiative that SUEZ has implemented, to encourage and support teams to innovate, is InnoTech. This is a process where operational teams can raise their innovative ideas and put in a case for development funding and support to bring their idea to fruition.

Knowledge-sharing and networking is a well-established and integral part of how SUEZ does business. This extends from major international networking events, such as the annual World Technical Congress, through to smaller local and regional events such as operational teleconferences.

The World Technical Congress is the premier technical knowledge-sharing and networking event held by SUEZ and is open to all business units around the world. Every business unit is eligible to nominate two delegates to attend the event, which is generally held in SUEZ's Paris headquarters each year. Typically, around one thousand employees and important client representatives attend each year. The congress involves a range of presentations, technology displays, and development opportunities over the course of one week, delivered both to attendees and also via webcast allowing employees around the world can participate and learn in some capacity.

The SUEZ O&M Days are a specific operations and maintenance focused event, also targeted at the international level. Similar to the World Technical Congress, business units nominate staff to attend as delegates. Presentations and topics are very focused at immediate impact and implementation at the operational level and bring together; process engineers, scientists, operators, operations supervisors and managers, and assets and maintenance staff, to share their experiences and stories.

At the ANZ regional level, there is a virtual networking initiative run by SUEZ called Sharing Time. This is an event held via the Skype videoconferencing application, at a frequency of approximately monthly. It brings together process and technical people, as well as operators, to hear presentations on practical operational challenges and solutions. Each presenter speaks for around twenty minutes on topics such as optimisation of pH meters, or polymer dosing issues and considerations. On occasion equipment suppliers may be invited to present to attendees.

Tools, resources and opportunities are critical aspects of knowledge-capture, sharing and networking to support the continuing professional development (CPD) of technical staff involved in water industry operations. The SUEZ case study demonstrates that it is important to have a range of offerings to provide opportunity for employees, operations, customers and the community to benefit from knowledge-sharing.



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Appendices

Appendix 1 – Developing L&D Programs

Table A1: Checklist for reviewing and benchmarking the organisational culture, to facilitate the implementation of technical capability and competency into L&D programs. Key areas an organisation should consider and action, when designing L&D programs for technical staff.

Principles	Elements	Questions	Not Yet	In Progress	Doing
1. Align L&D with business	Workforce capability	Have the capability requirements of the business been identified and communicated in performance plans?			
	Governance	Does the business have a structured and accountable approach to the management of L&D? For example: Is L&D aligned with any applicable regulatory obligations, such as environmental or safe drinking water compliance?			
	Culture	Are processes in place to map the business culture against the desired culture and does the L&D program reflect cultural goals?			
	Funding	Is the L&D program sufficiently and appropriately funded for short- and long-term needs of the business? For example: ADWG and AGWR - E7C2A2 “ <i>Training needs should be identified and adequate resources made available to support appropriate programs</i> ”			
2. Integrate L&D with HR	People management processes	Are managers and employees aware of their roles and responsibilities regarding individual development and career management?			
	Core business	Is L&D considered a legitimate part of day-to-day business?			
	HR Systems	Is there a system that provides for the collection and reporting of data relating to HR management?			
3. Create a learning culture	Leading by example	Are senior and line managers modelling L&D for themselves and supporting L&D for their staff?			
	Active commitment	Is there appropriate promotion, recognition and resourcing of L&D by senior management?			
4. Provide appropriate L&D options	L&D Vs. work	Do managers see L&D as a legitimate and valued workplace activity?			
	Needs-based content	Are L&D options based on organisational, business unit and individual priorities and needs?			
	Appropriate interventions	Are L&D options cost-effective, relevant and action-oriented to facilitate transfer of learning to the workplace? Are L&D options varied, timely, flexible, collaborative, and compatible with individual learning styles and adult learning principles?			

Principles	Elements	Questions	Not Yet	In Progress	Doing
5. Manage L&D effectively	Value for money	Is the L&D program delivering value for money? For example:” ADWG and AGWR - E7C2A3 “ <i>Mechanisms for evaluating the effectiveness of training should also be established and documented</i> ”.			
	Effective stakeholder relationships	Are stakeholder relationships with staff, managers, service providers effective?			
	Monitoring and reporting	Are there systems in place to monitor and report on L&D activities? For example: ADWG and AGWR - E7C2A3 “ <i>Mechanisms for evaluating the effectiveness of training should also be established and documented</i> ”.			
6. Support application of skills in the workplace	Supportive workplace environment	Are mentoring and coaching by managers and senior staff on the job a part of L&D in the business?			
	Opportunities to apply new skills	Are there incentives in place to ensure that line managers encourage and provide opportunities to test and develop new skills?			
	Opportunities to share new knowledge	Are there support and assistance systems available to advise and support managers and individuals in identified capability areas? Are staff encouraged to share learning in specific subject matter / specialist areas through knowledge networks?			
	On-the-job performance evaluation	Do staff and managers translate performance management activities into L&D plans?			
7. Evaluate learning and development	Relevance	Does the L&D program address business, capability and individual needs? For example: Does L&D align with the planning cycle of the pricing submissions to state and territory governments?			
	Appropriate-ness	Is the L&D program appropriate in terms of time, cost, quality and integration with other strategies and practices?			
	Reaction	Are staff satisfied with the accessibility and quality of L&D?			
	Capability acquired	Has L&D improved individual and business knowledge, skills, and competency?			
	Performance on the job	Has learning been transferred to the workplace?			

Appendix 2 – Recognised PD for Professional Engineers

Table A2.1- Recognised activities under the IEAust Chartered Engineers Scheme.

Type of CPD	Conditions	Notes
I. Any tertiary course taken either as an individual course or for a formal post-graduate award.	<i>There is no limit to the maximum number of hours claimed over a three-year period for these activities.</i>	Time claimed is the actual hours of lectures / tutorials / laboratory work. Involves some form of assessment.
II. Short courses, workshops, seminars and discussion groups, conferences, technical inspections and technical meetings.	<i>There is no limit to the maximum number of hours claimed over a three-year period for these activities.</i>	Technical meetings, presentations, seminars and workshops, will normally be delivered or facilitated by recognised practitioners in the field.
III. Learning activities in the workplace that extend competence in the area of practice.	A maximum of 75 hours of total CPD in any three-year period may be claimed for these activities.	Activities that are normal work activities applying current knowledge cannot be claimed. Must be able to demonstrate how it has extended knowledge.
IV. Private study which extends knowledge and skills.	<i>Reading of the monthly Engineers Australia magazine can contribute to a maximum of 18 hours of CPD in any three-year period.</i>	Study may be in the area of practice and/or in the core areas of risk management, business and management skills. Private study includes the reading of books, journals, transactions, manuals etc. Sufficient records must be kept of claimed personal reading (e.g. date, title, author and time invested) to address an auditor's inquiry.
V. Service to the engineering profession.	A maximum of 50 hours of CPD in any three-year period may be claimed for these activities.	Service to the engineering profession may include: <ul style="list-style-type: none"> - serving in a volunteer capacity on boards and committees; - reviewing technical documents prior to publication; - mentoring a colleague for work experience purposes.
VI. The preparation and presentation of material for courses, conferences, seminars and symposia.	Up to 45 hours per paper may be claimed for papers published in journals and conference proceedings and for the preparation of material for courses not part of normal employment function eg. as a visiting lecturer from industry. Up to 75 hours per paper may be claimed for papers subject to critical peer review prior to publication.	This represents work outside the normal employment and can be claimed for CPD purposes if the material is prepared and presented by the individual and the activities contribute to the advancement of the profession.

Appendix 3 – Technical Competency Self-Assessment

Example A3.1: An experienced recycled water plant operator works at a facility with the following treatment processes:

Coagulation
Membrane filtration
Chlorine disinfection

See Table A3.1 for an example of the key competencies identified and a self -assessment against the skills and knowledge criteria.

A Self-Evaluation of skills and knowledge can be undertaken using Tables A3.1 and A3.2 below.

Key items to consider:

1. Only list the competencies relevant to the role.
2. Prioritise the list by those most important to be successful in the role (Column D). Priorities are generally determined by regulatory and compliance requirements, business strategy and/or at the direction of a line manager.
3. Create a short-list of competency requirements based on priority areas. This would be no more than 10 items.
4. Check against the training plan for the previous year. Was there any development identified previously that has not yet been addressed? If so, include this in the shortlist.

Table A3.1 - Technical competency self-assessment checklist.

Competencies to be evaluated	Column A Current Capability (self-assessment)	Column B Requirement for role	Column C Self Assessment Rating (from Table A3.2).	Column D Priority
Application of recycled water quality management plans	Some knowledge	Knowledge and ability	2	2
Application of environmental management plans	Knowledge and ability	Knowledge and ability	3	2
Management of change	Some knowledge	Knowledge and ability	2	2
Sampling and testing	Knowledge and ability	Knowledge and ability	3	1
Operating coagulation processes	Expert	Knowledge and ability	4	1
Optimising coagulation processes – jar testing	Some knowledge	Knowledge and ability	2	1
Operating membrane processes	Expert	Knowledge and ability	4	1
Membrane maintenance	Expert	Knowledge and ability	4	1
Operating chlorine disinfection processes	Expert	Knowledge and ability	4	1

Once the priority competencies have been shortlisted, an employee should give themselves a rating for each in Column C of Table A3.1 using the following criteria:

- 5 - Significantly exceeds expectations.
- 4 - Exceeds expectations.
- 3 - Meets expectations.
- 2 - Meets most expectations, may need some development.
- 1 - Does not meet expectations.

Table A3.2- Technical competency self-assessment matrix.

	Achieved Knowledge Level (Column A)				
	No Knowledge	Some Knowledge	Knowledge and ability	Expert	
Required Level (Column B)	No Knowledge	Identify another competency to assess	4	5	5
	Some Knowledge	2	3	4	5
	Knowledge and ability	1	2	3	4
	Expert	1	1	2	3

Table A3.2 can be interpreted as follows:

Numbers 1,2,3,4,5, refer to the ratings, from “Does not meet expectations” through to “Significantly exceeds expectations”.

- Cells highlighted in pink indicate further development will be of limited use in the current role.
- Cells highlighted in green indicate further development would be of limited benefit. However, the employee may have the capacity to be a coach or trainer for their peers.
- Cells highlighted in orange indicate that the achieved level is lower than required and development would be beneficial.
- Any competencies that fall into the grey area indicate that the wrong competency was chosen for assessment.

Based on the self-assessment, the operator would identify the following competencies as requiring further development in Column D of Table A3.1:

- Optimising coagulation processes – jar testing (Operational & Safety, first priority)
- Application of recycled water quality management plans (Compliance, second priority)
- Management of change (second priority)

Further to this, the operator may consider a coaching/mentoring role in the following areas:

- Operating coagulation processes.
- Operating membrane processes.
- Membrane maintenance.
- Operating chlorine disinfection processes.

Appendix 4 – Learner Styles Questionnaire

VAK Learning Styles Self-Assessment Questionnaire

Circle or tick the answer that most represents how you generally behave.

1. **When I operate new equipment I generally:**
 - a. read the instructions first.
 - b. listen to an explanation from someone who has used it before.
 - c. go ahead and have a go, I can figure it out as I use it.
2. **When I need directions for traveling I usually:**
 - a. look at a map.
 - b. ask for spoken directions.
 - c. try to find my own way, play it by ear.
3. **When I cook a new dish, I like to:**
 - a. follow a written recipe.
 - b. call a friend for an explanation.
 - c. follow my instincts, testing as I cook.
4. **If I am teaching someone something new, I tend to:**
 - a. write instructions down for them.
 - b. give a verbal explanation.
 - c. demonstrate first and then let them have a go.
5. **I tend to say:**
 - a. watch how I do it.
 - b. listen to me explain.
 - c. you have a go.
6. **During my free time I most enjoy:**
 - a. going to the movies, a museum or gallery.
 - b. listening to music and talking to my friends.
 - c. playing sport or doing DIY.
7. **If I was buying a new car, I would:**
 - a. read reviews in newspapers and magazines.
 - b. discuss what I need with my friends.
 - c. test-drive lots of different types.
8. **When I am learning a new skill, I am most comfortable:**
 - a. watching what the trainer is doing.
 - b. talking through with the trainer exactly what I am supposed to do.
 - c. give it a try myself and work it out as I go.
9. **When I listen to a band, I can't help:**
 - a. watching the band members and other people in the audience.
 - b. listening to the lyrics and the beats.
 - c. moving in time with the music.
10. **When I concentrate, I most often:**
 - a. focus on the words or pictures in front of me.
 - b. discuss the problem and the possible solutions in my head.
 - c. move around a lot, fiddle with pens and pencils and touch things.

11. **When I am anxious, I:**
 - a. visualise the worst-case scenarios.
 - b. talk over in my head what worries me most.
 - c. can't sit still, fiddle and move around constantly.
12. **I feel especially connected to other people because of:**
 - a. how they look.
 - b. what they say to me.
 - c. how they make me feel.
13. **When I have to revise for test, I generally:**
 - a. write lots of revision notes and diagrams.
 - b. talk over my notes, alone or with other people.
 - c. imagine making the movement or creating the formula.
14. **If I am explaining to someone I tend to:**
 - a. show them what I mean.
 - b. explain to them in different ways until they understand.
 - c. encourage them to try, and talk them through my ideas as they do it.
15. **I really love:**
 - a. watching films, photography, looking at art or people watching.
 - b. listening to music, the radio or talking to friends.
 - c. taking part in sporting activities, fine foods and wines or dancing.
16. **Most of my free time is spent:**
 - a. watching television or reading.
 - b. talking to friends.
 - c. doing a physical activity or making things.
17. **When I first contact a new person, I usually:**
 - a. arrange a face to face meeting.
 - b. talk to them on the telephone.
 - c. try to arrange to meet while doing something else, such as an activity or a meal.
18. **I first notice how people:**
 - a. look and dress.
 - b. sound and speak.
 - c. stand and move.
19. **If I am angry, I tend to:**
 - a. keep replaying in my mind what it is that has upset me.
 - b. raise my voice and tell people how I feel.
 - c. stamp about, slam doors and physically demonstrate my anger.
20. **I remember things best by:**
 - a. writing notes or keeping printed details.
 - b. saying them aloud or repeating words and key points in my head.
 - c. doing or practising the activity or imagining it being done.

Now add up how many A's, B's and C's you selected.

A's = B's = C's =

If you chose mostly A's you have a VISUAL learning style. If you chose mostly B's you have an AUDITORY learning style. If you chose mostly C's you have a KINAESTHETIC learning style.

Often people find that their learning style may be a blend of two or three styles.

Appendix 5 – Examples of Recognised PD for Certified Water Industry Operators

Accredited Training

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
2.1	Completion of additional approved units of competence at Certificate II level	<ul style="list-style-type: none"> Units from NWP or NWP07 relating specifically to the relevant treatment stream for the certified operator are automatically approved. Units from other training packages directly relevant to the treatment stream of the certified operator on application. 	3 points per unit completed
2.2	Completion of additional approved units of competence at Certificate III level	<ul style="list-style-type: none"> Units from NWP or NWP07 relating specifically to the relevant treatment stream for the certified operator are automatically approved. Units from other training packages directly relevant to the treatment stream of the certified operator on application. 	4 points per unit completed
2.3	Completion of additional approved units of competence at Certificate IV level	<ul style="list-style-type: none"> Units from NWP or NWP07 relating specifically to the relevant treatment stream for the certified operator are automatically approved. Units from other training packages directly relevant to the treatment stream of the certified operator on application. 	5 points per unit completed

Non Accredited Training

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
3.1	Attend a training session approved or conducted by a state/territory regulator or mandated as refresher training	<p>Such as;</p> <ul style="list-style-type: none"> Water industry issues update (Victorian Department of Health & Human Services). Note: this is specific to water skills set. Not a requirement for wastewater or recycled water. 	3 points
3.2	Completion of additional vocationally relevant, process based, refresher training (generally conducted by an RTO)	<ul style="list-style-type: none"> Completion of a WIOA approved non-accredited training course covering key knowledge and/or skills in processes operated relevant to the Certified stream. These courses must include some form of assessment. No topic can be undertaken more than once in each recertification period. 	4 points

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
3.3	Participation in WIOA specialist workshops/seminars	Such as; <ul style="list-style-type: none"> • Filter assessment and operation • Distribution system management • Activated carbon use • Optimisation of coagulation and flocculation • Optimisation of membranes systems • Calibration & operation of on-line turbidity meters • Operation & Validation of UV Disinfection Systems 	3 points
3.4	Participation in a relevant water industry courses, seminars or workshops	Such as; <ul style="list-style-type: none"> • IWES short courses relating to water treatment • Water Treatment Alliance/Peter Mosse run Filter Optimisation two day workshop. • NCEDA seminars • ICE WaRM short courses • National Centre for Groundwater Research and Training courses 	Up to 2 points per day
3.5	Attend a water treatment focused in-house training course	In-house training courses must be accompanied by details of duration, topics covered and assessment undertaken (if any).	1 point per day, max 4 points for this category

Other Activities

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
CONFERENCES & EVENTS			
4.1	Attendance at a WIOA operator's conference	Where relevant technical or operations focussed papers are being presented.	1 point per day attended
4.2	Attendance at an AWA annual conference	Where relevant technical or operations focussed papers are being presented.	1 point per day attended
4.3	Attendance at a water industry conference, trade show, field day or meeting with published agenda	Professional associations or societies, universities, colleges or technical institutes, manufacturers or distributors or part of an in-house training program, may sponsor these events.	1 point per day, max 4 points for this category
4.4	Attendance at a relevant WIOA specialty event	Such as; <ul style="list-style-type: none"> • Operator tour to New Zealand • Advisory Committee endorsed Water Interest Days and facility tours 	1 point per day attended, max 4 points for this category

4.5	Attendance at a relevant water industry specialty event	Such as; <ul style="list-style-type: none"> Overseas or Australian Study tour Water Interest Days and facility tours Participate in a technical webinar, webcast, podcast, with a published agenda. For example: <ul style="list-style-type: none"> WIOA Talks webinars WaterRF webinars DOW Water Academy webcasts IChemE Water SIG webinars 	1 point per day attended, max 4 points for this category For online events (e.g. webinars) 1 point for every 2 hours of webinar content, to a maximum of 4 points.
4.6	Undertake or attend a fact finding tour or information exchange event focussed on water treatment	Such as; <ul style="list-style-type: none"> Study tour of water plants/processes at another water business Technical information exchange event with another water business 	1 point per day attended, max 3 points for this category
TECHNICAL PRESENTATIONS			
4.7	Present a technical paper at a water industry conference, seminar or webinar	Presentation must be minimum 20 minutes.	5 points
4.8	Write, submit and present a poster presentation at a WIOA or other conference	Poster presentation must contain a verbal presentation of minimum 5 minutes.	3 points
4.9	Write and submit a poster paper at an event other than WIOA	Presentation	2 points
4.10	Host, present, or undertake a practical demonstration at a relevant WIOA endorsed event.	Such as; <ul style="list-style-type: none"> Veolia’s Microfiltration workshop Presentation to a WIOA AC interest day 	Up to 2 points per occasion, max 4 points for this category
4.11	Provide a public presentation in relation to the relevant area certified	Such as; <ul style="list-style-type: none"> Provision of plant tour for external group (school groups excluded) Provision of technical information at a public meeting 	Up to 2 points per occasion, max 4 points for this category
4.12	Provision of technical information during a formal water treatment plant audit	Such as; <ul style="list-style-type: none"> Department of Health drinking water management plan audit ISO audit 	Up to 2 points per occasion, max 4 points for this category

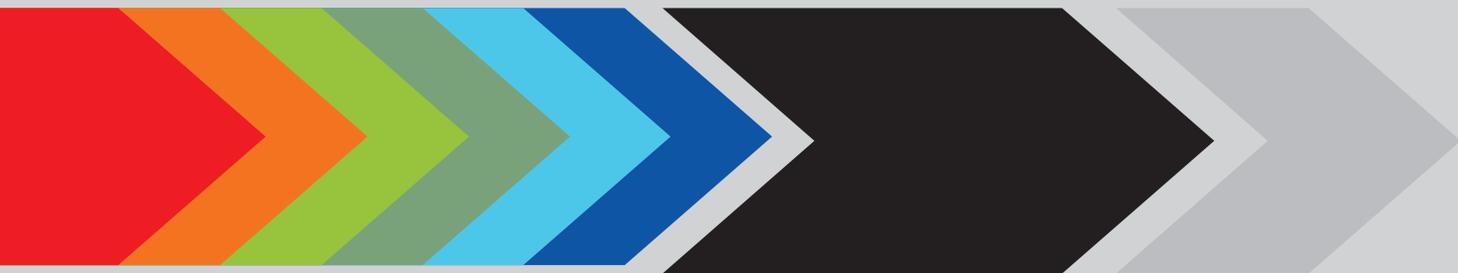
AWARDS & RECOGNITION			
4.13	Industry development awards and prizes	Such as; <ul style="list-style-type: none"> • WIOA Kwatye prize • IWA (Victoria) award • Churchill fellowship • PASS Award 	Up to 10 points
PUBLISHING			
4.14	Submission of an article that is published in a water industry or relevant Technical journal	Such as; <ul style="list-style-type: none"> • WIOA's WaterWorks journal • AWA's Water e-journal • Any other industry recognised journal 	Up to 5 points
4.15	Submission of an article that is published in WIOA's Operator newsletter	To attain maximum points, article must be technical in nature	Up to 2 points
ROTATIONS, EXCHANGES OR SECONDMENTS			
4.16	Participate in a rotation, exchange or secondment program at a water treatment plant	<p>To be eligible, the activity must be:</p> <ul style="list-style-type: none"> • For a minimum period of 5 days • At a treatment plant which the operator would not normally be required to operate (can be with own employer or external organisation) • Documented evidence outlining the activity, including specific details justifying the activity claimed must be provided <p>a) Activity where the operator works as part of a team but under direct supervision or with similar treatment processes to where they normally work</p> <p>b) Activity where the operator works individually or as part of a team but with minimum supervision and is required to optimise processes within the plant or to learn and operate process/es different to the treatment processes to where they normally work</p> <p>c) Activity where the operator works at another plant and acts as a trainer or mentor for the site operators.</p>	<p>1 point per week at the other plant, to a maximum of 3 points from this category per recertification period</p> <p>2 points per week at the other plant, to a maximum of 6 points from this category per recertification period</p> <p>3 points per week at the other plant, to a maximum of 9 points from this category</p>

Significant Workplace Project

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
5.1	Completion of a significant workplace project	Such as; <ul style="list-style-type: none"> • Analysis of performance of membranes in RO plant; • Investigation and implementation of plant process improvements. For example, undertaking a water treatment process based audit of multiple facets within a water treatment plant and develop, recommend and if possible, assist to implement an improvement plan 	Points reviewed and determined on a case by case basis up to a maximum of 10 points for this category.
5.2	Participate in a collaborative industry project, committee or specialist network – relevant to certification stream.	Active participation in a technical project team, water industry technical committee or network. Examples include: -Nominated employer representative on a WaterRA Community of Interest -Nominated employer representative on a WSAA technical network	1 point for every 6 months of active participation, to a maximum of 4 points.

Exceptional Activities

ACTIVITY		DESCRIPTION	POINTS and EVIDENCE
6.1	Exceptional activities	Activities that do not fall into any of the previous categories. WIOA will determine how many points will be awarded based on activities undertaken and the details provided in individual submissions. For example; <ul style="list-style-type: none"> • Completion of all/part of a relevant tertiary qualification • Undertaking formal training or workplace mentoring of new/junior staff 	Points reviewed and determined on a case by case basis up to a maximum of 10 points for this category.



Technical Competency Project Supporters

