Australian Government

Office for Learning & Teaching

The DYD Stakeholder Consultation Process

A USER GUIDE

Define Your Discipline >> **Stakeholder Consultation Process**

Defining Your Discipline to facilitate curriculum renewal in undergraduate programs

David Dowling – Roger Hadgraft

APRIL 2013

The University of Melbourne – Melbourne School of Engineering

Engineers Australia

University of Southern Queensland

RMIT University

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This Guide is a deliverable from the DYD project. The other key deliverable was the publication:
A Graduate Capability Framework for Environmental Engineering Degree Programs: A Guide for Australian Universities
which is available from the Office for Learning and Teaching website: **http://www.olt.gov.au**.

FOREWORD

Foreword

Over recent years Australian tertiary education institutions have had to respond to ever increasing demands from both government and industry to better define graduate outcomes and to implement quality systems that ensure that their graduates achieve those outcomes. Initially, the focus was on employability skills.

In the vocational education and training sector, employability skills are embedded in all of the qualifications included in the National Training Packages developed by the Skills Councils. In the higher education sector, employability skills are included in the set of graduate attributes defined by each university. The graduate attributes are generic in nature as they define the outcomes for graduates from all of the undergraduate programs offered by the university.

Following the Bradley review of higher education in 2009, the Commonwealth government requested the Australian Learning and Teaching Council (ALTC) to facilitate the development of a more comprehensive and detailed set of learning standards for demonstration disciplines across nine disciplinary groups. This resulted in a set of Threshold Learning Outcomes (TLOs) being defined in eleven disciplines.

As ALTC Discipline Scholar (Business, Management and Economics) I facilitated the development of a set of TLOs for accounting, one of 14 disciplines in the discipline group. In fact, we reached agreement across the academic and professional community about the TLOs for both bachelors and coursework masters degrees in accounting. As the TLOs are defined for a specific discipline they are more useful as they provide substance to the generic graduate attributes which apply to all disciplines or the generic descriptors for bachelor and masters awards in the Australian Qualifications Framework.

Upon the establishment of a national regulator in January 2012, higher education providers are required to demonstrate to the Tertiary Education Quality and Standards Agency that they meet various standards. Amongst other requirements, providers must evidence robust internal processes for program design and approval that take account of external standards and requirements such as published discipline standards. Providers must also evidence achievement of academic standards including by benchmarking with other providers. So, it is not just important to have discipline standards used in designing programs, we need to have evidence graduates achieve them. Therefore, the next crucial step is to translate the TLOs into the curriculum. The DYD Stakeholder Consultation Process is proving to be an ideal tool for this purpose. It is a simple, but elegant process that can be used by a discipline to engage with all relevant stakeholders to develop an authentic Graduate Capability Framework for each of the programs within the discipline. The DYD Process is flexible and can be adapted to suit the contexts in which it is applied. The DYD Project Team has demonstrated the flexibility of the DYD Process by using it in six disciplines and at two AQF levels.

As a member of the DYD Project Reference Group I have witnessed first-hand the development of the DYD Process. The success of the first deployment of the process, in the environmental engineering discipline, meant that other disciplines asked the Project Team to consider their discipline for another trial. The dissemination of the DYD Stakeholder Consultation Process continues, as the Project Team is currently conducting consultations to gather the data required to develop Capability Frameworks for graduates of two new national associate degrees being developed by the Minerals Tertiary Education Council.

I commend the DYD Process to you and congratulate the Project Team on their achievements.

Associate Professor Mark Freeman
Discipline Scholar (Business, Management and Economics)
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PURPOSE

Purpose

This Guide was prepared to enable education institutions and industry organisations to use the Define Your Discipline (DYD) Stakeholder Consultation Process to develop practitioner-authenticated Graduate Capability Frameworks for the programs in their discipline

The Graduate Capability Framework can then be used to guide the development of curriculum for a program, to inform a review of existing curriculum, or to guide reviews by external accrediting organisations.

The DYD Process is an efficient, effective, and inclusive consultation process that has been trialled in six disciplines and at two Australian Qualification Framework (AQF) levels. The DYD Process is also flexible, as users may adapt it to suit their contexts and their needs.

BACKGROUND

Government standards

The Australian Government, employer organisations, and accrediting bodies, such as Engineers Australia, have called for more clearly defined 'program outcomes' or 'exit standards' for tertiary education programs in both the higher education and vocational education and training (VET) sectors.

The aim of defining these exit standards is to improve:

- Graduate employability skills;
- The quality of educational programs;
- The international transferability of graduates and qualifications; and
- The marketability of Australia as a provider of high quality tertiary education.

Since the late 1990s there has been an increasing focus on employability skills. York (2006) defined employability skills as being those 'skills, understandings and personal attributes that make an individual more likely to secure employment and be successful in their chosen occupation to the benefit of themselves, the workforce, the community and the economy' (York, 2006, p. 8).

One of the key drivers for the focus on employability skills was the publication of *The Employability Skills Framework*, which was developed by the Australian Chamber of Commerce and Industry and the Business Council of Australia and published by the Department of Education, Science and Training in *Employability skills for the future* (DEST, 2002). The project identified the key generic employability skills that graduates should have, in addition to the job-specific, or relevant, technical skills. The Employability Skills Framework includes both the *Personal attributes* and the *Key skills* that contribute to overall employability.

The personal attributes listed were: *commitment; honesty and integrity; enthusiasm; reliability; personal presentation; common sense; positive self-esteem; sense of humour; balanced attitude to work and home life; ability to deal with pressure; motivation; and adaptability.*

The key skills listed were: *communication skills; teamwork skills; problem-solving skills; initiative and enterprise skills; planning and organising skills; self-management skills; learning skills; and technology skills.* (DEST, 2002)

A later study (Precision Consulting, 2007) confirmed that the skills defined in the Employability Skills Framework were still relevant to industry needs. In the VET sector, these skills are referred to as *employability skills* and they have been embedded in the relevant qualifications in the national Training Packages developed by Skills Councils.

In the higher education sector they are normally incorporated in a set of *graduate attributes* defined by a university. Barrie (2004) suggests that '... generic graduate attributes in Australia have come to be accepted as being the skills, knowledge and abilities of university graduates, beyond disciplinary content knowledge, which are applicable to a range of contexts.'

Most Australian universities have defined and published a set of graduate attributes that they expect all undergraduate students to acquire in their programs. However, these graduate attributes tend to be bland and generic because they normally apply to all of the undergraduate programs offered by the university.

A review of the relevant literature shows that many other terms are also used to describe these non-discipline generic skills that employers expect graduates to have acquired. For example: core skills, essential skills, generic skills, generic professional skills, generic graduate attributes, non-technical skills, soft skills, and transferable skills (Gilbert et al., 2004; Johnston & McGregor, 2004; Oliver, 2010).

Some government agencies and industry organisations, particularly accrediting organisations, have also defined a set of graduate attributes for their discipline. These then become the benchmark for programs in these disciplines, as universities seeking accreditation for a program would be expected to demonstrate how their students acquire and demonstrate achievement of those attributes. For example, Engineers Australia's Stage 1 Competency Standard for Professional Engineer (Engineers Australia, 2011).

However, like the sets of graduate attributes defined by universities, some of the sets of industry defined attributes are also bland and generic as they apply to a broad discipline, such as engineering, rather than a specialisation within the discipline, such as environmental engineering. Thus, they are likely to lack the detail required for them to be useful as a driver of curriculum renewal, or to inform the development of instruments to assess student achievement of the attributes.

TEQSA standards

Following a review of Australia's higher education system (Australian Government, 2009) the Australian government established the Tertiary Education Quality and Standards Agency (TEQSA) in 2011 to 'register and evaluate the performance of higher education providers against the new Higher Education Standards Framework. The Standards Framework comprises five domains: Provider Standards; Qualification Standards; Teaching and Learning Standards; Information Standards; and Research Standards' (TEQSA, 2012). Two of the Standards are relevant to this document: the Qualifications Standards; and the Teaching and Learning Standards.

The Australian Qualifications Framework

The Qualifications Standards were published in 2012 and were based on the Australian Qualifications Framework (AQF) (AQFC, 2013). At the time of writing, the final version of the Teaching and Learning Standards is still being developed. These Standards will define the threshold learning outcomes for each of the major disciplines, for example, Engineering and ICT. In the current drafts of the National Learning and Teaching Standard, the standards are defined in general terms as the frameworks are not intended to provide a detailed set of disciplinary requirements. The framework for the Engineering and ICT discipline is one of the published Standards (Cameron & Hadgraft, 2010).

These examples highlight the increasing pressure higher education providers are facing to more clearly define what the graduates from their programs should know and be able to do, in both the generic (employability) and discipline-specific domains. This is not an easy task for individual institutions, schools or departments because of tight timelines, competing priorities and limited resources.

Clearly it would be more effective and efficient to adopt a national (or multi-institution) approach when defining graduate outcomes for a discipline. The resulting set of graduate outcomes would then be a valuable resource for all of the education providers that offer programs in that discipline.

Graduate Capabilities

To avoid problems with the multiple meanings of the commonly used words *attribute* and *competency*, some practitioners have adopted the term *capability* (Stephenson & Yorke, 1998; Dowling, 2004; Oliver, 2012). Stephenson and Yorke define a capability as 'an integration of knowledge, skills, personal qualities and understanding used appropriately and effectively – not just in familiar and highly focused specialist contexts, but in response to new and changing circumstances' (Stephenson & Yorke, 1998, p. 2).

They suggest that one way of understanding capability is through a personal autonomy lens. This is achieved by describing a continuum between *dependent capability* and *independent capability*. This continuum is illustrated in Figure 1, where one axis represents the continuum between familiar problems and unfamiliar problems, while the other axis represents the continuum between familiar contexts and unfamiliar contexts. The capability continuum stretches from solving simple problems in well-known contexts (quadrant A in the figure) through to solving unknown and unbounded problems in unfamiliar contexts (quadrant Z).

Stephenson and Yorke (1998) describe the capabilities in quadrant A as dependent capabilities as they involve the solution of familiar problems in familiar contexts. Effective performance in quadrant A 'may require technical skills of the highest order, or at the simplest level' (Stephenson & Yorke, 1998, p. 4). In the Australian context, the capabilities in quadrant A may be called *competencies*, particularly in the VET sector.

They describe the capabilities in quadrant Z as independent capabilities, as they involve the solution of unfamiliar problems situated in unfamiliar contexts. Effective performance in quadrant Z 'is likely to draw on all components of capability – specialist knowledge and skills, values and personal qualities, such as intuition, judgement and courage' (Stephenson & Yorke, 1998, p. 6).

Stephenson and Yorke's original diagram has been adapted (Dowling, 2012b) to show that in addition to the capabilities represented by quadrants A and Z, there are the capabilities that fall into quadrants M and N. Effective performance in quadrant N requires the capability to solve unfamiliar problems in familiar contexts, while effective performance in quadrant M requires the capability to solve familiar problems in unfamiliar contexts.

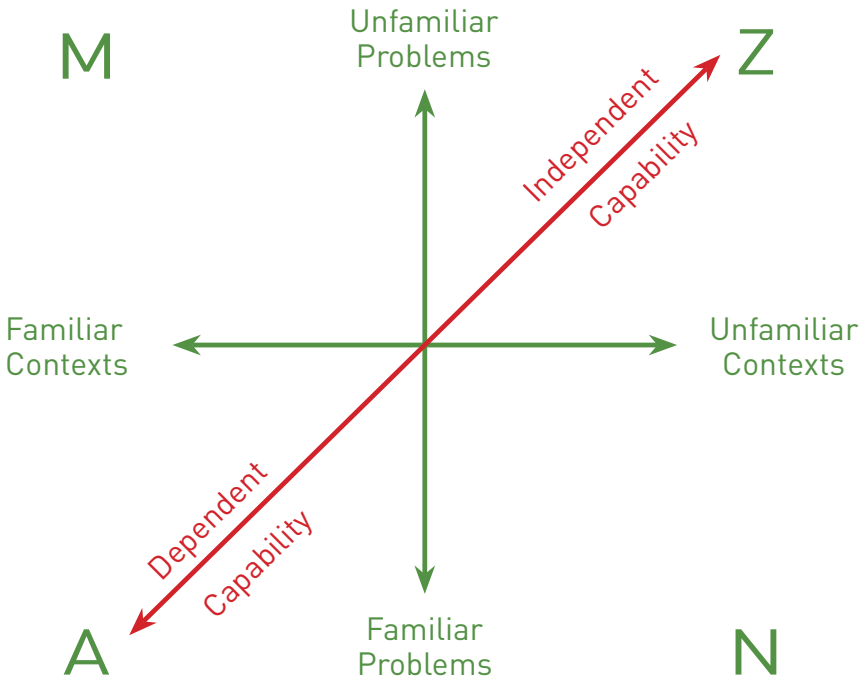

Figure 1: Dependent and independent capabilities (Adapted from Stephenson & Yorke, 1998, p. 5)

The level of dependency is important when defining capabilities. For example, the majority of the graduate capabilities for AQF level 1 to 6 qualifications would fall into quadrant A, with others falling into quadrants M and N. This contrasts with the graduate capabilities for AQF level 7 to 10 qualifications, which would include the capabilities required to perform in quadrant Z as well as the capabilities to perform relevant tasks in the other three quadrants.

A national approach

A nationally agreed set of detailed Graduate Capabilities for a program would be a valuable resource for discipline leaders tasked with reorienting their undergraduate programs to meet current and emerging trends in their discipline. A national approach is recommended because:

- It is more efficient for a discipline to undertake this work at a national level rather than at the single institution level;
- It provides a discipline with the opportunity to develop a shared understanding about the capabilities of graduates from the various programs offered in their field; and
- It overcomes the risk of a School's locally-defined Graduate Capabilities not being aligned with the views of the members of an industry accreditation panel that are from other states or territories.

The DYD Stakeholder Consultation Process is a user-friendly tool that can be used by a discipline to develop a Graduate Capability Framework for an AQF qualification in their field. The resulting Graduate Capability Framework, which includes a set of clear and detailed Graduate Capabilities, can then be used by individual Schools or Departments to inform curriculum renewal.

The educational context

The educational context of the Graduate Capabilities defined by the DYD Process is illustrated in Figure 2, which shows the four phases of a policy-driven cyclical process for the review, design, delivery and evaluation of the curriculum for a program. The cycle may be aligned with a program accreditation cycle, for example Engineers Australia's five year cycle.

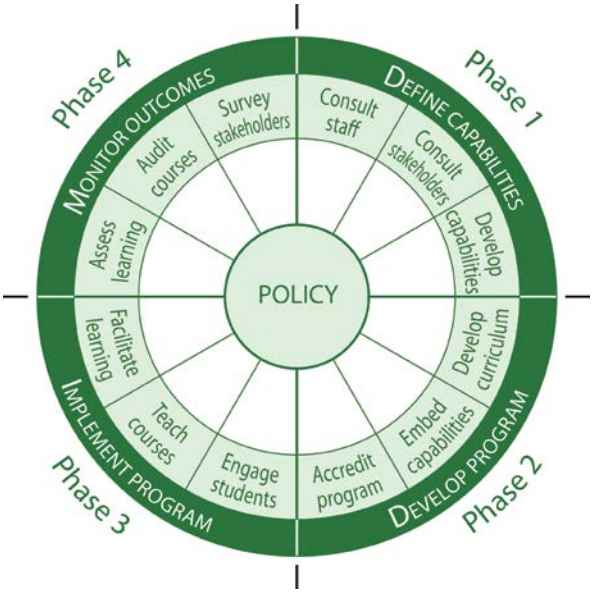

Figure 2: A graduate capability driven curriculum design and delivery process (Adapted from Dowling, 2004)

The four phases of the cycle are:

Phase 1: A set of Graduate Capabilities is defined for a program, or an existing set is reviewed.

Phase 2: The Graduate Capabilities are used to inform the development of the curriculum for a new program or to review the existing curriculum for a program.

Phase 3: Students acquire the Graduate Capabilities through their engagement with learning and teaching activities.

Phase 4: Student capabilities are assessed and the stakeholders evaluate the program.

The DYD Stakeholder Consultation Process can be used to inform Phase 1 of the cycle, i.e. the definition or review of the Graduate Capabilities for a program.

THE DYD PROJECT

Purpose

The purpose of the DYD Project was to develop and test a stakeholder consultation process that could be used by the members of a discipline to develop a detailed Graduate Capability Framework for a program in their discipline.

The detailed aims of the DYD Project were:

1. To identify and develop an efficient, effective, and inclusive consultation process that can be used by discipline stakeholders to define Graduate Capabilities for their discipline.
2. To use the consultative process to deliver a set of nationally agreed Graduate Capabilities for at least two engineering disciplines.

The Development of the DYD Stakeholder Consultation Process

Objective

There are three principle forms of consultation, each designed to achieve a different objective:

- **Stakeholder consultation:** The objective here is to gather the full range of views from people or groups who have a stake in the situation or issue under consideration. This approach aims to canvas and document the diversity of views but, on its own, has no mandate to arrive at consensus or to affect change based on the views canvassed.
- **Consensus building:** The objective here is to bring a group of stakeholders to an agreed position on the situation or issue under consideration. Consensus building is necessarily founded on gathering a range of views, however, the practicalities of generating consensus mean that it is necessary to either limit the initial consultation to those who will actively generate the consensus position, or to recruit a representative group to construct consensus based on an earlier, wider consultation process.
- **Engagement for change:** The objective here is to engage stakeholders in a (future) change process. While this is not a form of consultation *per se*, the engagement of stakeholders is an important consideration when designing consultation processes. Various authors on effecting change in higher education (and other fields) draw a clear link between the act of consulting stakeholders and the prospects for a successful change process (Trowler et al., 2005). This type of consultation can be designed to generate awareness of an issue and catalyse personal investment in the proposed change process.

The DYD Process seeks to achieve all three of these objectives. This is because tertiary education programs generally serve the needs of a diverse range of stakeholders (e.g. practitioners, employers, students, prospective students, recent graduates, professional bodies, and teaching staff) and each stakeholder group can claim a legitimate place at the table in terms of providing input on appropriate standards for graduates. Therefore, a broad ranging **stakeholder consultation** is warranted to gather, value, and benefit from the knowledge and perspectives of the many stakeholder groups.

It is also important that representatives of all stakeholder groups participate in **consensus building** to arrive at a nationally agreed set of Graduate Capabilities. And, because the definition of an agreed set of Graduate Capabilities has substantial implications for the future practices and prospects of each key stakeholder group, particularly for those directly involved in education, **engagement** in the process of formulating the Graduate Capabilities will be a key factor in the success (or otherwise) of their adoption and implementation across the sector.

Design approach

Numerous tools have been used to develop and authenticate Graduate Capabilities, particularly for the development of competency-based curriculum in the vocational education and training sector. For example: occupational analysis tools can be used to observe and document the tasks undertaken by workers; a curriculum can be developed using the DACUM job analysis process (CETE, 2011); or the Delphi Technique (Custer, Scarcella & Stewart, 1999) can be used to iteratively gather and synthesise data from stakeholders until consensus is reached.

The DYD Stakeholder Consultation Process is based on the Modified Delphi Technique (Custer, Scarcella & Stewart, 1999), and uses aspects of the DACUM job analysis method. The design of the Process was based on an issue (the definition of a set of Graduate Capabilities) rather than a method (Gregory, Fischoff, Thorne & Butte, 2003), and was informed by the results of a stakeholder analysis (Reed et al., 2009). The stakeholder analysis undertaken for a DYD Project determines who has a legitimate stake in the process of defining a set of Graduate Capabilities for a discipline, based on their knowledge and interest. Finally, the self-appointment method is used to recruit workshop participants and a selection method is used to form the group of experts who oversee the process (Catt & Murphy, 2010).

The DYD Process ensures that the input from each stakeholder is equally valued so that the opinions or biases of individuals or groups do not impact on the Graduate Capability Framework or the individual Graduate Capabilities. For example, the individual nature of the data-gathering process ensures that dominant personalities, the professional standing of individuals, or group thinking do not influence the raw data. The Process also ensures that the contributions from each participant are captured and these can be tracked though all stages of the synthesis process.

Development activities

A prototype of the DYD Stakeholder Consultation Process was developed by the DYD Project Team at the beginning of 2010 and then trialled in six disciplines during the period 2010–2013:

1. During 2010 and 2011 the Project Team worked with members of Engineers Australia's Environmental Engineering College to produce a set of Graduate Capability Framework for AQF Level 8 Environmental Engineering programs. The Framework was incorporated in a user guide that was endorsed by the College Board in June 2012 and published in March 2013 (Dowling & Hadgraft, 2013).
2. During 2011 and 2012 Professor Dowling collaborated with members of the federally funded Integrated Articulation and Credit Transfer (IACT) Project and Queensland Health staff to define a set of Graduate Capabilities for an Associate Degree for Pathology Technicians (AQF level 6). This project is ongoing and was initially funded by the IACT Project (IACT, 2011).
3. During 2012 Professor Dowling used the DYD Stakeholder Consultation Process to develop a Senior Executive Capability Framework for the Queensland Fire and Rescue Service (QFRS) (Dowling, 2012b). The Framework defines the Capabilities for three QFRS roles: Chief Superintendent, Superintendent and Inspector. The Framework will be used by the QFRS to identify appropriate education and training activities to prepare people for these roles. This collaboration was funded by Queensland Fire and Rescue Service.
4. During the latter half of 2012 Ms Marita Basson (a town planning lecturer) and Professor Dowling used the DYD Stakeholder Consultation Process to develop a draft set of Graduate Capability tables for Urban and Regional Planning programs (AQF Level 7). This pilot study was conducted in Queensland in collaboration with

the Planning Institute of Australia (PIA). The resulting report will be used by PIA to assess the need for a national set of Graduate Capabilities and the feasibility of using the DYD Process to engage with stakeholders in other states and territories. This collaboration was partially funded by the Faculty of Engineering and Surveying, University of Southern Queensland (USQ).

5. During the first two months of 2013 Professor Dowling and members of the Minerals Industry National Associate Degree (MINAD) project team used the DYD Stakeholder Consultation Process to develop draft Graduate Capability Frameworks for two new AQF Level 6 programs: An Associate Degree of Mining Engineering and an Associate Degree of Geosciences.

The diversity of the five projects demonstrates the flexibility of the DYD Process as it was able to be adapted to accommodate the discipline and contextual factors associated with each project. The effectiveness of each adaption was evaluated and used to inform the further development of the DYD Stakeholder Consultation Process. In addition, after each set of stakeholder workshops, the information provided by participants using anonymous evaluation forms was used by the Project Team to review the activities and schedule for each type of Workshop.

The development of a Graduate Capability Framework

A Graduate Capability Framework normally includes the following components, although this may vary for different disciplines and contexts.

- An overview of the discipline or specialisation;
- Instructions and notes for users, including any accreditation or other requirements; and
- The set of Graduate Capabilities.

The Graduate Capability Framework should be published as part of a *User Guide* that includes information about the development of the Framework and the client or sponsoring organisation(s).

Defining Graduate Capabilities

The Graduate Capabilities for an educational program are defined by *clusters of tasks* that together define what a graduate from the program should be able to do in their first two or three years after graduation, including supervised tasks. For the DYD Project, the meaning of the term *task* was adopted from the work of Brannick et al. (2007) in the job analysis field:

Element: The smallest unit of work – it must have a clear beginning, middle and end. For example: *Dial a telephone*.

Activity: A cluster of elements that fulfil a work requirement. For example: *Answering calls related to housing disputes.*

Task: A collection of activities that are directed toward the achievement of a job objective. For example: *Talks to parties to settle disputes.* (Brannick et al., 2007, pp. 6-7)

Some examples of the tasks defined during the DYD Project are listed below. An example of a Graduate Capability table is included as Appendix A.

Environmental Engineer tasks:

- Designs components of a sewage treatment plant based on influent quality and required effluent standard.
- Gathers and documents background information and context of project.

Pathology Technician tasks:

- Operates laboratory instruments within established procedures and as required by their role.
- Makes and records critical observations according to regulatory requirements.

QFRS Inspector tasks:

- Provides support for major incidents by forming strike teams and task forces.
- Oversees the management of day-to-day staffing and on-call programs to ensure the required emergency response protocols are met.

Urban and Regional Planner tasks:

- Critically analyses development proposals.
- Recognises and determines land-use suitability and capacity.

Mining Engineering Technician tasks:

- Optimises open pit designs by cut-off grade, strip ratio or economic analysis.
- Schedules weekly and three-monthly production for the mine using software (open cut and underground).

Geosciences Technician tasks:

- Categorises and labels drill core samples.
- Checks assay test results against the geologist's logging data.

AN OVERVIEW OF THE DYD STAKEHOLDER CONSULTATION PROCESS

The DYD Stakeholder Consultation Process

There are ten steps in the DYD Stakeholder Consultation Process and these are described in detail in the following sections.

Some of these steps may be repeated to ensure information is gathered from all of the stakeholder groups, and to refine the Graduate Capabilities.

Establishing a DYD Project – Steps 1-4

The four steps in this part of the DYD Process are shown in Figure 3.

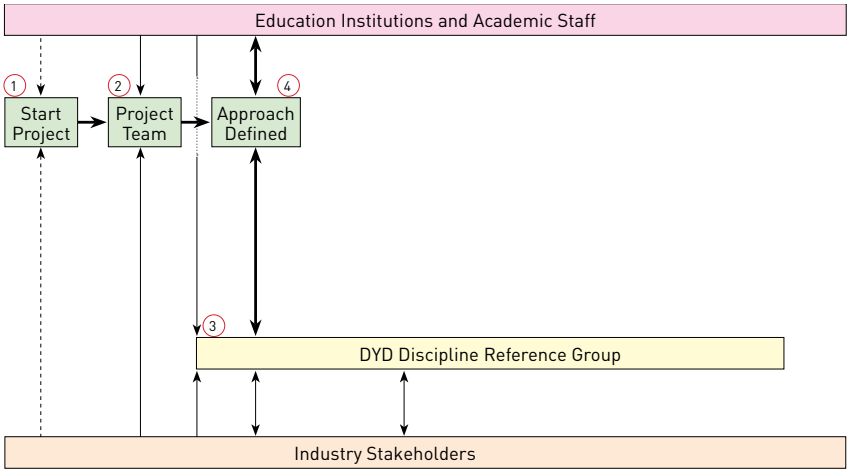

Figure 3: Establishing a DYD Project (Dowling, 2012a)

Step 1 **Project initiation:** The ***Client*** decides to use the DYD Stakeholder Consultation Process to develop a Graduate Capability Framework for a program. The Client may be an industry organisation, a discipline group from one or more educational institutions, or a combination of these.

Step 2 **Appointment of the Project Team:** The Client appoints a ***Project Team*** to lead the project and facilitate the development of the Graduate Capability Framework for a qualification. Funding arrangements and reporting guidelines are agreed at this stage.

Step 3 **Formation of the Reference Group:** The Client appoints a ***Reference Group*** to advise the Project Team and oversee its work.

Step 4 **Approach selected:** The Project Team consults with the key stakeholders and then decides on the approach to be used to develop the Graduate Capability Framework. This includes the decision to either start with a clean slate, or to base the Graduate Capabilities on existing documents such as job descriptions, graduate attributes, etc.

Consulting stakeholders – Steps 5-7

The three steps in this part of the DYD Process are shown in Figure 4.

Step 5 **Phase 1 Stakeholder Consultation Workshops:** The Project Team organises a series of Stakeholder Consultation Workshops to gather information about the tasks that graduates undertake in their first few years of employment in the industry. The Project Team works with the Client and the Reference Group to identify and recruit participants for the workshops, which should include practitioners, recent graduates and teaching staff.

Step 6 **Preparation of a draft of the Graduate Capability Framework:** A draft set of Graduate Capability tables is developed from the information gathered during the workshops and/or from existing documents.

Step 7 **Phase 2 Stakeholder Consultation Workshops:** The Project Team organises a second series of Stakeholder Consultation Workshops to receive feedback on the draft Graduate Capability Framework. The Project Team works with the Client and the Reference Group to identify and recruit participants for the workshops, including: people who attended the Phase 1 Workshops; teaching staff from relevant educational institutions; and additional people from the stakeholder groups.

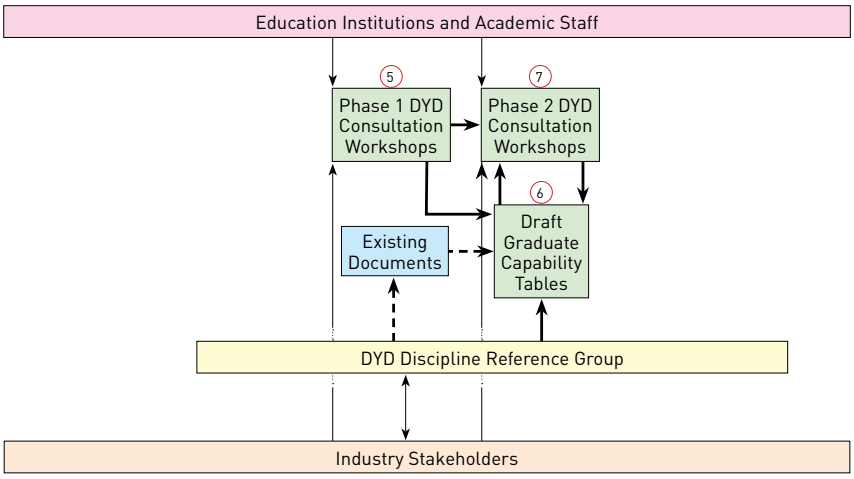

Figure 4: Consulting stakeholders (Dowling, 2012a)

Preparing and publishing the User Guide – Steps 8-10

The three steps in this part of the DYD Process are shown in Figure 5.

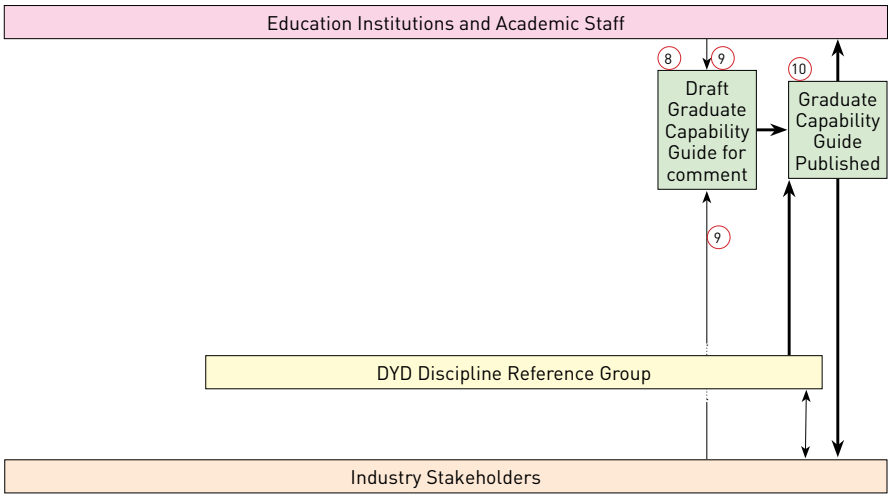

Figure 5: Preparing and publishing the User Guide (Dowling, 2012a)

Step 8 **Preparation of draft Graduate Capability Guide:** The Project Team liaises with the Reference Group to review the responses from the Phase 2 Workshops, and to finalise the Graduate Capability Framework. These are then integrated into the draft user Guide.

Step 9 **Stakeholder review of the draft Guide:** The draft Guide is circulated to all stakeholders for comment.

Step 10 **Publication and dissemination of the Graduate Capability Guide:** The Project Team liaises with the Reference Group to review the responses from the stakeholder consultation and then finalises the user Guide for the Graduate Capability Framework. The Guide is then published and disseminated to all relevant stakeholders.

The ten-step DYD Stakeholder Consultation Process

All of the steps in the DYD Stakeholder Consultation Process are shown in Figure 6. A full description of each step in the Process, including examples, tips and techniques, is given in the following sections.

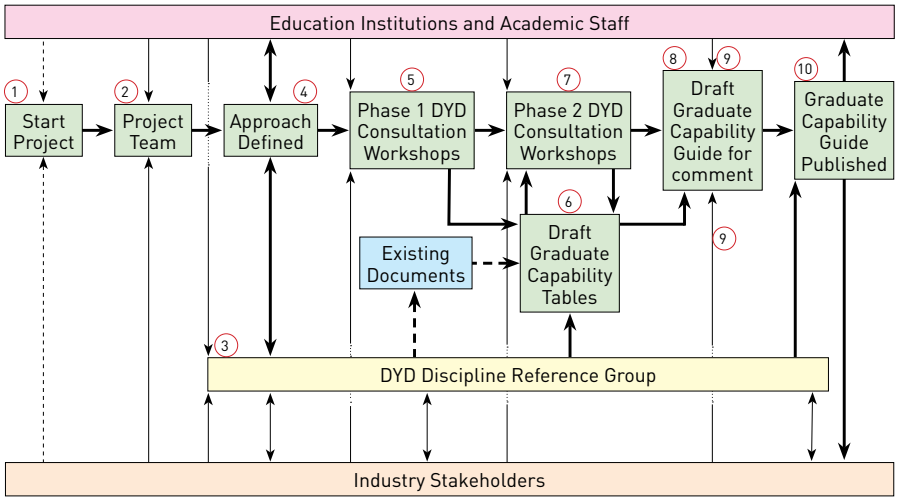

Figure 6: A schematic showing all of the steps in the DYD Stakeholder Consultation Process (Dowling, 2012a)

A DETAILED DESCRIPTION OF THE DYD STAKEHOLDER CONSULTATION PROCESS

Step 1 Project initiation

A project will normally be initiated by a discipline group such as a professional organisation, an educational institution, a university department, or a combination of these. The key questions to be answered during the project initiation stage are:

a. Clarify the objectives of the project

- What is the spatial scope of the project – national, state, or regional?
- Who are the stakeholders?
- What are the proposed project deliverables?
- What form/format/media should be used for the project deliverables?
- Who will use the deliverables?
- What will they be used for?
- Who will 'own' the deliverables and maintain them into the future?
- Where will the documents be located so that all stakeholders have easy access to them?
- Who will review and update the documents in the coming years?

b. Clarify roles and responsibilities

- Who is the Client and what role will they play?
- What role will the Project Team play?
- What role will the Reference Group play?
- Who will communicate project outcomes to the stakeholders?

c. Establish project reporting guidelines

- Who will the Project Team report to?
- Who will handle day-to-day queries?
- Should a website be established?

d. Establish project timelines

- What are the reporting timelines for the Project Team?
- What are the project milestones?

e. Establish project funding

- What is the funding source?
- What is the project budget?
- Who will manage the budget?
- Who will audit and report on budget outcomes?

Discussing these questions will help to clarify the aims of the DYD Project and ensure that the members of the client group(s) have a shared understanding of what is being proposed. The discussions will also lead to the identification of the key issues to be addressed and the actions to be taken to formally establish the project. The answers to these questions will also inform decisions about the appointment of the Project Team and the Project Reference Group – the next two steps in the DYD Stakeholder Consultation Process.

The client

The person/people who will act as the 'client' for the project should be clearly identified and, where appropriate, officially appointed to the role. This will ensure that there is no confusion during the life of the project. Some examples are:

- An Associate Dean from the relevant university School
- A Skills Council
- An executive or administrator from an initiating organisation
- The Board of the initiating organisation
- A Project Committee established to oversee the conduct of the project, with members drawn from the initiating organisation(s)
- A person specifically appointed to undertake the role

The stakeholders

The stakeholders for the project may include:

- Teachers
- Practitioners
- Recent graduates
- Students
- Government agencies
- Professional organisations
- Unions
- Etc.

Step 2 Appointment of the Project Team

While the roles and responsibilities of the Project Team were established in Step 1, the following questions should be addressed before appointing the Project Team:

a. Identify the tasks to be undertaken

- What are the management tasks?
- What are the workshop facilitation tasks?
- What are the data management and integration tasks?
- What are the educational tasks, e.g. writing graduate capability statements?
- What are the communication tasks?
- What are the financial tasks?

b. Identify the timelines for the project

- When is the project expected to be completed?
- What are the timelines for each phase of the project?

c. Clarify the capabilities required to complete each task

- What qualifications are required?
- What experience is required?
- What personal skills are required?

d. Define the role of each member of the Project Team

- How many people will be required?
- Will they be paid or voluntary positions?
- Will they be full-time, part-time or casual positions?

e. Recruit the members of the Project Team

- Are there people in the initiating organisation(s) who can be seconded?
- Who has undertaken these roles in the past?
- What other recruitment strategies can be used?

The selection of the members of the Project Team is critical to the success of the project. Each member of the Team must have the capabilities to undertake their role, as well as the commitment and time to complete their tasks within the required time-frame.

The Project Team

The Project Team members will, together, require the following capabilities:

- **Project management:** Leadership, organisational, time management, and financial management skills.
- **Workshop facilitation:** Broad discipline knowledge and understanding; listening skills; and presentation skills.
- **Data integration and definition of Graduate Capabilities:** Analysis and synthesis skills; and capability drafting skills.
- **Publication of outcomes:** Report writing, graphics, formatting, and publishing skills.

Step 3 Formation of the Reference Group

The Reference Group is an important part of the DYD Stakeholder Consultation Process as it undertakes the following roles:

a. It oversees the project on behalf of the Client.

b. It advises the Project Team about the following matters

- The approach to be taken;
- The number and location of workshops;
- The recruitment of workshop participants;
- The names of the Graduate Capability clusters; and
- The structure and format of the Graduate Capabilities.

c. It provides technical advice about the content of each Graduate Capability statement

d. It reviews draft sets of Graduate Capability statements and identifies any gaps or inconsistencies

e. It advises on the structure, content and format of the Graduate Capability Framework

f. It advises on structure, content and format of the published Graduate Capability Guide

The Client should ensure that the Reference Group reflects the breadth and depth of the discipline and that each of the key stakeholder groups is represented. To ensure that their recommendations are accepted, the expertise and standing of the members of the Group should be recognised in the discipline. The members should also be: committed to the project; able to attend both full- and half-day meetings; and able to make meaningful contributions to the project.

The Reference Group

The Reference Group should include representatives of the client organisations and discipline professionals from the following groups:

- Teachers
- Practitioners
- Recent graduates

Step 4 Approach selected

The Project Team should work with the Reference Group to decide on the approaches that will be used and then prepare detailed plans for the workshops. The key questions to be addressed are:

a. The scale of the proposed consultation program

- Which stakeholder groups should be invited to participate in the workshops?
- How many participants are required overall? How many from each stakeholder group?
- Will separate workshops be held for each stakeholder group?
- In which cities will workshops be held?
- What are the most appropriate venues in each city?
- At what time of the day should the workshops be held to maximise the participation of each stakeholder group?

b. Workshop organisation

- Who will organise the venues?
- Who will arrange and pay for any catering?

c. The recruitment process

- Who will recruit the participants?
- How will they be recruited – by letter, by email, by phone?
- What information will be provided in the invitation?

d. Pre-workshop activities

- Will those who accept the invitation be provided with additional information to prime their thinking about the project?

e. Cancellation policy

- What is the minimum number of attendees for a viable workshop?
- Who will make the decision to cancel a workshop due to low numbers?

Once these questions have been decided the Project Team should prepare a schedule that shows the activities to be undertaken during the planning, recruitment, and facilitation phases of the workshop program. The schedule should clearly show: the purpose of each activity; the budget (if any) for each activity; the people who will undertake each activity; and the timelines for each activity.

The Project Team should ensure that there is sufficient lead time in the schedule for prospective participants to receive their invitations at least six weeks prior to a workshop (see Appendix B).

Finally, a day or two before a workshop a notice should be sent to the people who accepted the invitation, asking them to confirm their attendance. The final estimate of the number of workshop participants will then be more accurate and used with confidence to prepare the resources needed for the workshop and to finalise any catering requirements.

Workshop strategies

1. Normally workshop participants would include academics, recent graduates and practitioners.
2. Workshops should be held in easily accessible and low cost locations. For example, in meeting rooms at: educational institutions, professional organisations, or large companies. Another alternative is to run a workshop in conjunction with a conference.
3. Workshop invitations should be personalised, timely and followed up with a personal contact nearer the event. This will avoid a problem often encountered during the DYD Project Workshops where only 50%–60% of those who had confirmed their attendance prior to the event actually attended.
4. DYD workshops have been held:
   - From 7 – 8.30am with breakfast
   - From 9 – 12am
   - From 12 – 1pm with lunch
   - From 2 – 4pm
   - From 6 – 8pm with finger food and refreshments
5. One advantage of having separate workshops for each stakeholder group is that the opinions of one group do not influence or dominate those of another group. For example, recent graduates may be reluctant to share their opinions in the presence of their workplace supervisors or university teachers.
6. One advantage of having combined workshops is that it can be an educative experience listening to the opinions of people from other stakeholder groups.
7. A 4–6 week break may be scheduled half-way through the workshop series to enable the Team to evaluate the data, the process, and the workshop activities.
8. Where appropriate, participants can complete both Phase 1 and Phase 2 workshops over a 3–4 hour period (see Step 7).

Step 5 Phase 1 – Stakeholder Consultation Workshops

The program for a Phase 1 Workshop normally includes the following activities, although these may be modified to suit the time available and the context in which the workshop is presented.

a. Introduction

The workshop normally begins with some introductory and welcoming comments from the Client who then introduces the workshop facilitator(s), who is normally a member of the Project Team. When time permits, the participants are then given the opportunity to introduce themselves. During this stage the facilitator may also group the participants into stakeholder groups.

b. Overview of project

The workshop facilitator gives a brief description of the project, an overview of the workshop activities, and answers any questions.

c. Divergent stage

Each participant is asked to write down at least 20 ***tasks*** that they believe a graduate should be able to do in their first three to five years after graduation, including supervised tasks. This is a relatively easy and authentic activity for practitioners, particularly those who supervise young graduates, as they know the sorts of tasks that a recent graduate should be able to complete. This task identification process is more difficult for teachers, particularly those with no industry experience.

The participants are asked to keep a *future-proofing* mindset while writing their tasks, one that focuses on the tasks graduates may complete in 10 years time as well as current expectations. They are also advised to write each task on a separate sheet of self-stick note paper (e.g., a 76 mm by 126 mm yellow sticky), and to write their name or initials on each sheet. Finally, they are encouraged to begin each task with an action verb, for example: *Writes monthly reports for their supervisor.*

After an initial period of 15–20 minutes the participants will begin to run out of ideas. They should then be encouraged to share the tasks they have written with one or two people on their table. During these informal collaborations they may generate additional tasks.

d. Convergent stage

Once the majority of the participants have stopped writing tasks the facilitator briefs them about the second stage of the workshop, where they will cluster the tasks. This involves laying out all the tasks on a large flat surface and looking for commonalities and then grouping the tasks into 6–10 clusters (see photograph). This clustering process may take some time as the participants discuss and seek agreement on the content of each cluster. It is important that the facilitator allows the participants sufficient time to discuss, identify and then name the clusters. The tasks in each cluster are then ordered and stuck onto a sheet of flip-chart paper, generally one cluster on each sheet. The participants then review the lists of tasks and write new tasks to cover any perceived gaps.

e. Report back

Where there are more than 10 participants at a workshop then they may be split into groups of 5-10 people for the previous activity (d). In this case, each group should report back on the clusters they adopted and any issues that arose during the clustering process.

f. Generic qualities and technical knowledge questionnaire

This optional activity can be used to gather data from practitioners and recent graduates about the most important topics in a program (See Appendix C).

g. Discussion and evaluation

If time permits, the participants are encouraged to share their experience of the process, and the outcomes the group achieved. During this time the participants may complete a formal evaluation of the workshop.

h. Close

The workshop facilitator briefly describes the next stages in the project, as well as the anticipated timelines, and then thanks the participants for their contributions.

The MINAD Project

The Minerals Industry National Associate Degree Project defined Graduate Capabilities for two Associate Degrees, one in mining engineering and the other in geosciences. As the graduates will work in new roles within the industry the Project Team was, in effect, defining those roles. Therefore, the time for the project overview was extended so participants could be briefed about, and then discuss, the proposed roles, the qualifications, articulation pathways, and accreditation.

Step 6 Preparation of the draft Graduate Capability Framework

The following process describes one way of analysing and synthesising the data gathered at the workshops to develop the first draft of the Graduate Capability tables which together form the basis of the Graduate Capability Framework. It is recommended that an initial synthesis be carried out halfway through the workshop series so that the Project Team can:

- gain an understanding of the information gathered to date;
- identify any gaps in the data or other issues; and
- review the level of engagement of each stakeholder group.

The activities undertaken in this step in the DYD Process are:

a. Review existing documentation

- Consult the Client and the members of the Reference Group to identify any existing documentation relating to graduate outcome or the discipline's body of knowledge.
- Review the structure and content of any existing documentation to assess its relevance to the project and whether it could be used to inform the development of the Graduate Capabilities. For example, are the existing clusters or categories appropriate or required?
- Discuss the review findings with the Client and the members of the Reference Group and agree on a suitable course of action.

b. Adopt a set of clusters

- Analyse and collate the cluster names recommended by the workshop participants.
- Develop a draft set of clusters, and a name for each cluster. If required, use existing clusters and names, modifying them where appropriate to enable all of the workshop data to be included in the tables.
- If appropriate, sort the clusters into categories, for example: generic capabilities; technical capabilities; and process capabilities.
- Seek advice from the members of the Reference Group regarding the draft set of clusters and names.
- Refine the clusters and names.
- Develop a capability statement and description for each cluster in the Capability Framework.

The Environmental Engineering Capability Framework

More than 20 Phase 1 workshops were held across Australia and more than 1000 tasks and comments were collected. The participants consistently clustered the tasks into processes (rather than the expected knowledge and skill fields) with between six and ten process clusters being adopted at each workshop. These were synthesised into six Process Clusters by the Project Team and the Reference Group.

To accommodate all of the submitted tasks, the Reference Group defined another 14 clusters: seven Technical Clusters and seven Generic Clusters.

c. Develop a task database

- Prepare a table that maps each of the clusters adopted in the workshops to one of the clusters in the Capability Framework.
- Allocate each of the submitted tasks to the most appropriate cluster and enter them into the database. Where necessary, use the name or initials on the task sheet to contact the relevant workshop participant to clarify the meaning of a task they wrote.
- Collate and file the data gathered from the workshops.

d. Analyse and synthesis the tasks

- Review the tasks in each cluster and group similar tasks.
- Develop a task statement by adopting or adapting an existing task, or by synthesising a group of similar tasks.
- Use a consistent style and format for the task statements.
- Develop the draft set of Graduate Capability tables.

e. Develop the draft Graduate Capability Framework

The Project Team writes statements that describe the Graduate Capability Framework and any accreditation or other requirements. The Team then meets with the members of the Reference Group: to review the introductory statements; to review the draft set of Graduate Capability tables, to identify any gaps in the lists of tasks; and to refine the task statements. Once they are satisfied with the content and structure of each table, they formally approve the draft Graduate Capability Framework.

Linking to knowledge and skill fields

The cluster and task database can be extended to include a column where a code can be allocated for each task statement to link it to a *knowledge field*. The tasks can then be sorted into knowledge and skill fields and used to inform curriculum development.

The knowledge fields (or streams) can be identified in a number of ways:

- By reviewing a body of knowledge (BOK) document published by the discipline;
- By reviewing the curriculum of an existing program; or
- For new programs, the data can be obtained by asking workshop participants to complete a *Generic Qualities and Technical Knowledge Requirements* questionnaire (See Appendix C).

Once the tasks have been allocated to knowledge fields the resulting information can be used to:

- Inform the development of courses in a program through a process of grouping the tasks from various knowledge fields in different combinations until an appropriate mix is achieved. Of course, this process will be easier for existing programs where the tasks in each knowledge field can be used to review the curriculum in the relevant courses.
- Inform a review of an existing BOK for programs at the relevant AQF level.
- Inform the development of a new BOK for programs at a different AQF level.

It should be noted that, because the tasks represent graduate capabilities, it is unlikely that many of the tasks will be allocated to the fundamental knowledge fields that underpin practice in the discipline such as mathematics or science.

Step 7 Phase 2 – Stakeholder Consultation Workshops

The main aim of the Phase 2 Workshop program is to consult all of the stakeholder groups and authenticate the draft Graduate Capability Framework. Where appropriate, the scope of the workshops may be broadened to gather information from recent graduates about how they acquired the capabilities required to perform the listed tasks: during their studies; through formal workplace training; or in the workplace. To be able to analyse this data correctly, each participant would also need to identify the educational institution where they completed their qualification.

a. Introduction

The workshop normally begins with some introductory and welcoming comments from the Client who then introduces the workshop facilitator(s), normally a member of the Project Team. When time permits, the participants are then given the opportunity to introduce themselves.

b. Overview of project

The workshop facilitator gives a brief description of: the project; the activities undertaken to date; the process used to develop the draft Graduate Capability Framework; and the purpose of the workshop. This is followed by an overview of the workshop activities and a question and answer session.

c. Review of the Graduate Capability tables

The participants are given hard copies of the draft Graduate Capability tables. To assist understanding, the tables should be printed on one side of the paper only, and with a large margin so that the participants have space to write additions, comments and corrections. Where appropriate, the participants may be split into small groups so they can concentrate on reviewing the Graduate Capability tables associated with their area of specialisation.

The participants are then asked to carefully review the draft Graduate Capability tables: to identify and note any errors of fact, gaps or omissions; to refine the task statements; and to order the tasks. The participants should write their names on the sheets they have amended so that they can be contacted after the workshop if their comments require clarification.

d. Review of the statements

The participants are then asked to review the descriptive components of the Graduate Capability Framework, which may include:

- Introductory statements that describe the Graduate Capability Framework.
- Statements about the practice of the discipline. For example, any underlying concepts, principles, or skills.
- Statements that describe the accreditation requirements for the relevant qualification.

e. Discussion and evaluation

If time permits, the participants are invited to discuss their experience of the process, and the outcomes the group achieved. During this time the participants may also be asked to complete a formal evaluation of the workshop.

f. Close

The workshop facilitator briefly describes the next stages in the project, informs them about the anticipated timelines, and then thanks the participants for their contributions.

Combined workshops

If the Phase 1 Workshops have not been completed, or if more data is required, then the participants may complete both Phase 1 and Phase 2 Workshops over a three to four hour period.

A Senior Executive Capability Framework for the Queensland Fire and Rescue Service

This application of the DYD Process incorporated a number of adaptations:

1. Two groups of Senior Executives (Inspectors and Superintendents) completed a combined Phase 1 and Phase 2 Workshop for their rank over a six hour period. The workshop began with a standard Phase 1 workshop. This was followed by an extended Phase 2 workshop where the participants reviewed and commented on two sets of tables:
   - **The LCF tables:** The Australasian Fire Authorities Council's Leadership Capability Framework (LCF) (AFAC, 2007) was adapted to gather the information required to align each of the QFRS roles with one of the four roles defined in the LCF.
   - **The draft Capability tables:** Prior to the workshops the relevant duty statements for each role had been synthesised to develop a draft set of Capability tables for each of the Senior Executive roles. The workshop participants then reviewed and commented on the tasks in the draft capability tables for their role. They also noted whether they had received and/or required training for each task.

   To complete the Phase 2 Workshop they discussed both the current and future education and training requirements for their role.
2. Due to the difficulty of arranging a suitable time for a workshop, the members of the Chief Superintendent group used emails to participate in the project. Firstly, they were asked to list the 20 most important tasks they undertake (the equivalent of the first part of a Phase 1 Workshop). Secondly, they reviewed and commented on the LCF tables and the draft Capability tables for Chief Superintendents. They then scanned the annotated tables and emailed the PDF file to the QFRS Project leader.
3. At the end of the QFRS Project the Capability tables for each Senior Executive role were combined to highlight both the differences and the similarities of the roles. This approach could be used to compare the Graduate Capabilities defined for programs at different AQF levels in the same discipline (See Appendix D).
4. Finally, a four-point scale was used in the Capability tables to indicate, for each task, the number of officers who had received training and the number who require training to perform the task (See Appendix D).

Step 8 Preparation of the draft Graduate Capability Guide

The structure, content and style of a Graduate Capability Guide will depend on the purpose of the Guide, the Client's requirements, and the way it will be used by each of the stakeholder groups (see case study below). As these requirements will vary from discipline to discipline it is important that they are discussed with the Reference Group prior to commencing the task, and at key stages in the development of the Guide.

Case Study

One of the deliverables from the DYD Project was: *A Graduate Capability Framework for Environmental Engineering Degree Programs: A Guide for Australian Universities* (Dowling and Hadgraft, 2013). It is expected that the members of each stakeholder group will use the Guide in different ways:

- **Engineering Schools** will use the Guide to support the review and revitalisation of the curriculum in their environmental engineering programs, and to prepare for accreditation reviews by Engineers Australia.
- **Environmental Engineering College** members will use the Guide as a companion resource to the Engineers Australia Stage 1 Competency Standard when they participate in an Engineers Australia accreditation panel.
- **Environmental engineering students** may use the Guide: to gain a better understanding of environmental engineering; to inform decisions about their career and specialisations; and to help manage their learning so they acquire the knowledge and skills required to commence practice in their chosen specialisation.
- **Employers** may use the Guide: to define graduate roles in their organisation; to assess capabilities during the recruitment process; and to prepare staff development and training activities.

The Graduate Capabilities were grouped into ***three*** categories, and a Capability Cube was developed to illustrate the relationships between the Capabilities in each category (see Appendix E).

1. **Technical Capabilities:** There are seven environmental engineering Technical Domains: Water resources and supply; Stormwater management and reuse; Water and wastewater treatment; Soils and geology; Resource and waste management; Air and noise; and Energy systems and management.

   Practice Contexts: Seven environmental engineering Practice Contexts were also identified: Natural environments and systems; Agricultural environments and systems; Industrial environments, processes and systems; Built environments and systems; Natural resources and extraction systems; Utility infrastructure and systems; and Transport infrastructure and systems.
2. **Process Capabilities:** There are six **Process domains:** Investigation; Modelling and analysis; Integrated design and implementation; Assessment of impact, risk and sustainability; Environmental planning and management; and Audit, compliance and review.
3. **Generic Capabilities:** There are seven **Generic domains:** Project Management; Ethics; Communication; Innovation; Information; Self-management; and Teamwork.

The structure and content of the Environmental Engineering Guide

The main sections of the Guide are:

1. Background

- Government standards
- The DYD project
- The educational context
- The engineering context
- An overview of environmental engineering
- Area of practice
- Developing the Graduate Capability Framework for Environmental Engineering programs

2. The Graduate Capability Framework

- The four underpinning principles
- Overview of the Graduate Capabilities
  - The Capability Cubes
- The Technical Capabilities
  - Engineering and science fundamentals
  - The Technical Domains
  - Environmental engineering contexts
- The Process Capabilities
  - The Processes
- The Generic Capabilities
  - The Generic Domains

3. References

4. Appendices

- The Technical Capability tables
- The Process Capability tables
- The Generic Capability tables

Step 9 Stakeholder review of the draft Graduate Capability Framework Guide

This step in the DYD Process is designed to provide all of the relevant stakeholders with an opportunity to review and comment on the draft Guide before it is published. A well planned and comprehensive review process will also promote the future use of the Guide.

a. Review strategies

Some of the strategies that may be used to engage stakeholders in the review process are:

- Copies of the draft Guide can be sent by email to all of the people who attended one of the workshops.
- Copies of the draft Guide can be sent to all of the members of the Client organisation(s) for comment.
- Copies of the draft Guide can be sent to the relevant educational institutions for comment.
- One or more forums can be held to present and discuss the Guide with one or more groups of stakeholders.

b. The stakeholder review process

The Project Team develops a draft of the Review Plan that includes details about the review process, such as:

- How the stakeholder groups will be asked to participate;
- How each group will be recruited;
- How each group will participate; and
- The timelines for the review process.

The Project Team then sends copies of the draft Guide and the proposed Review Plan to the Client and the members of the Reference Group for comment and approval.

c. Implementation of the Review Plan

The Project Team implements the Review Plan, adapting it where necessary to accommodate changing circumstances such as delays in mail-outs, etc.

d. Responding to the submissions

At the end of the consultation period the Project Team should:

- Prepare a Submission Table that shows each of the submissions received, and each of the issues raised in those submissions.
- Develop a response to each of the issues raised and note it in the Submission Table.
- Amend the Guide in accordance with the responses.
- Forward copies of the amended Guide and the Submission Table to the Client and the members of the Reference Group and seek their endorsement of the adopted responses.

Once the Client and Reference Group have approved the changes, the Guide is ready to be published.

The Environmental Engineering Review

The Review Plan included the following strategies:

- A copy of the draft Guide was emailed to all of the members of the Environmental College of Engineers Australia.
- A copy of the draft Guide was emailed to all of the university schools that offer an environmental engineering degree program.
- A full-day forum was held in Melbourne for the Coordinators of the university degree programs.

Step 10 Publication and dissemination of the Graduate Capability Framework Guide

In Step 1 of the DYD Process the project initiators discussed the strategies that would be used to publish the project deliverables and sustain them into the future. In Step 10 of the Process, the Project Team and the Client should review and refine those strategies and then agree on the publishing strategies that will be used to disseminate the Guide both within the discipline and to other stakeholders. Some strategies that may be used are:

- Printed copies of the Guide can be distributed to key stakeholders.
- Digital copies of the Guide can be emailed to all stakeholders.
- A digital copy of the Guide can be published on an appropriate website to enable people to download a copy. Negotiations can be held with other organisations to ensure their websites include a link to the site where the Guide is located.

Finally, the Project Team should provide the Client with a master copy of the Guide so that it can be reviewed and updated on a regular basis.

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APPENDIX A:

An Environmental Engineering Graduate Capability Table

Graduate Capability P1: Investigation

PROCESS PHASE	INDICATIVE TASKS
1. Defines the scope of the investigation and identifies systems	a. Reaches agreement with client on the goals, objectives, constraints, deliverables and acceptance criteria for the investigation b. Identifies, defines and reaches agreement with the client on the system boundaries – particularly space, time and cost c. Identifies the likely stakeholders and their areas of interest d. Documents the preliminary scope of the investigation
2. Plans the investigation	a. Selects appropriate investigation methods after considering current, new and emerging methods b. Identifies data and information needs, and any knowledge gaps c. Identifies sources of appropriate knowledge and information d. Identifies relevant regulatory frameworks, codes and standards e. Identifies data to be gathered f. Develops sampling strategies, methods, locations and sizes and any specialist input required g. Assesses the resources that may be required for the investigation h. Performs a risk assessment for the investigation (e.g. environmental, financial, legal and OH&S) i. Plans communication strategies for interactions with stakeholders j. Produces a program of activities for the investigation k. Costs the investigation l. Confirms the scope and cost of the investigation and acceptance criteria with the client
3. Gathers information	a. Gathers plans, maps and existing data sets b. Obtains relevant codes, guidelines and standards c. Obtains reports, articles and research papers to assess the state of knowledge and opinion on environmental issues d. Consults relevant regulatory bodies and stakeholders e. Reviews findings against the scope of the investigation defined in Phase 1
4. Collects data	a. Establishes quality control procedures for data collection and storage b. Selects appropriate equipment and instruments to collect field data c. Identifies OH&S and quality issues prior to fieldwork and manages them during data collection d. Conducts, or arranges for, sampling, monitoring, and measuring activities to gather data (e.g. air, flora, fauna, noise, soil, water or waste) e. Accurately records field observations and metadata f. If appropriate, manages field staff during data collection activities
5. Critically analyses and synthesises information	a. Assesses the quality of data and information b. Collates and analyses data from diverse sources c. Identifies, develops and uses models to inform analysis d. Analyses data using appropriate techniques e. Uses GIS systems to spatially analyse information f. Critically analyses data and information to gain an in-depth understanding g. Tests the reality of the results against knowledge of the underlying processes h. Assesses levels of uncertainty of results
6. Uses predictive models	a. Refines computer models of environmental systems and events b. Uses models to predict system performance c. Undertakes sensitivity analysis of assumptions and recognises the limitations in modelled outputs
7. Draws conclusions and makes recommendations	a. Develops conclusions after considering all aspects of the investigation b. Costs the recommendations c. Provides recommendations to the client including ongoing monitoring d. Seeks feedback on deliverables to ensure that the brief is satisfied e. Reviews the conclusions and recommendations with stakeholders f. Arranges for independent checks of findings or results
8. Reports investigation outcomes	a. Prepares investigation report in accordance with client requirements b. Presents data in a concise, logical and neat manner using tables, charts and other graphics c. Presents findings to clients and other stakeholders in meetings and workshops d. With the client's permission, disseminates findings to extend current knowledge base

APPENDIX B:

Invitation to a PIA Stakeholder Consultation Workshop

Are our graduates meeting expectations?

"The Planning Institute of Australia (PIA) has a new strategic focus to re-position planning to enhance the capacity and capability of the planning profession to deliver better planning for Australia communities (Dy Currie, PIA National eNews – June 2012)."

One way to ensure better planning is to give our planning students a sound, industry-relevant education. PIA has therefore strongly endorsed a pilot project in Queensland to define graduate capabilities for planners. Graduate capabilities are the tasks planning graduates will be expected to perform during their first three years out of university. A set of graduate capabilities can be used for the following purposes:

- By universities, for:
  - curriculum renewal that addresses industry needs
  - preparing for accreditation visits by the PIA Accreditation Panel
  - designing planning programs with unique characteristics or specialisations (for example, an environmental focus)
- By the Planning Institute of Australia, as
  - a benchmarking tool during accreditation
  - proof of the quality of planning in Australia

PIA is therefore calling on members to actively participate in **ONE** of five two-hour workshops to be held during July 2012 in both Toowoomba and Brisbane.

We are calling for interest from three categories of planners:

1. Recent graduates (no more than five years' experience)
2. Planning practitioners (five or more years' experience)
3. Academics – those educating our planners of tomorrow

Wednesday 18 July 2012 – Toowoomba (USQ)

- SESSION 1 – 7:30am – 9:30am Planning Practitioners (including breakfast)
- SESSION 2 – 11:00am– 14:00pm Recent Graduates (including lunch)

Monday 23 July – Brisbane (DSDIP)

- SESSION 3 – 12:00pm – 14:00pm Recent Graduates (including lunch)
- SESSION 4 – 15:00pm – 17:00pm Academics (including afternoon tea)
- SESSION 5 – 17:30pm – 20:00pm Practitioners (including refreshments)

Your support of this important project is appreciated.

Participation in the workshops will attract 2 CPD points.

This pilot project is one of four sub-projects of the Australian Learning and Teaching Council (ALTC) funded "Defining Your Discipline to Facilitate Curriculum Renewal in Undergraduate Programs". The DYD Project leaders are Professor David Dowling from the University of Southern Queensland and Professor Roger Hadgraft from Melbourne University.

The project manager is Marita Basson from the University of Southern Queensland.

To nominate for a workshop please reply directly to Marita Basson – **marita.basson@usq.edu.au** *by Friday 13 July.*

Planning Institute of Australia
QLD Division
PO Box 295
Lowood QLD 4311

Phone: (07) 5465 7331
Fax: (07) 5465 7336

APPENDIX C:

An example of a Generic Qualities and Technical Knowledge questionnaire

Minerals Industry National Associate Degree (MINAD) Project

DYD Workshop for Mining Associate Degree Programs

Generic Qualities & Technical Knowledge Requirements

Name _____ Mining Engineering / Geoscience *(Please circle one)*

Please rank the top six in each column using the rating scale: **1** *(most important) to* **6** *(least important).*
You may also indicate other important topics with an asterisk (*)

GENERIC QUALITIES	
Quality	*Rating*
Communication – verbal	
Communication – written	
Interpersonal skills	
Teamwork	
Problem solving	
Computing skills	
Analytical skills	
Work ethic	
Professional ethics	
Lifelong learning skills	
Critical thinking	
Honesty / integrity	
Flexibility / adaptability	
Detail oriented	
Leadership	
** Add other qualities considered important*	

TECHNICAL KNOWLEDGE	
Knowledge	*Rating*
Geology – basic	
Geology – advanced	
Exploration methods	
Planning	
Scheduling	
Computer aided drafting	
Application computer software	
Law	
Hydrology	
Project management	
Mining methods	
Industrial relations	
Personnel management	
Sampling and testing	
Materials handling	
Statistics	
Environmental science	
Geomechanics	
Surveying	
Financial management	
** Add other knowledge areas considered important*	

APPENDIX D:

An extract from the
QFRS Senior Executive Capability Table –
Operations Management Capabilities

KEY ASPECTS OF THE CAPABILITIES	DETAILED DESCRIPTORS FOR EACH QFRS SENIOR EXECUTIVE LEVEL			TRAINING					
				HAD			NEED		
	CHIEF SUPERINTENDENT	SUPERINTENDENT	INSPECTOR	CS	S	I	CS	S	I
1. Command, control and coordination	1. Establish and maintain strategic partnerships with the Assistant Commissioners, Directors of Regional Operations and the Director Rural Operations to provide high quality responsive fire and rescue services that are consistent with QFRS objectives and community and industry risk profiles.	1. Lead and manage large-scale deployments of QFRS resources on intrastate and interstate operations.	1. Respond to large-scale urban and rural fires and other emergency incidents.	3	2	3	0	3	1
	2. Establish and maintain strategic partnerships with the relevant Process Directors, Process Facilitators and Content Experts to ensure a coordinated and integrated approach to operations management and the effective, efficient and safe delivery of front-line urban, rural and specialist operational services.	2. Provide high level advice and direction to the Director – State Operations regarding QFRS operational readiness and capability for current and emerging incidents attended by QFRS personnel.	2. Takes charge and directs operations in accordance with Command, Leadership and management (CLM) principles and QFRS legislative requirements, including operations management standards, policies, tactics and procedures.	3	2	3	1	3	3
	3. Ensure appropriate "on call" arrangements are managed, including rostered regional requirements and State Operations (SOCC) call up requirements.	3. Ensure appropriate "on call" arrangements for specialist units or SOCC are managed, including rostered regional requirements and State Operations (SOCC) call up requirements.	3. Oversees the management of day-to-day staffing and on-call programs to ensure the required emergency response protocols are met.	3	2	2	0	2	1
	4. Provide expert advice and strategic leadership and direction in managing all aspects of command and control for incidents, including the correct use and operation of special fire services within buildings.	4. Lead and manage the development and implementation of high-level incident coordination services within the Regional Operations Coordination Centre, through: policy development and implementation; providing planning and logistical support to Incident Controllers; supporting the activities of the State Operations Coordination Centre; media management; multi-agency liaison and cooperation; and information management.	4. Provides support for major incidents by forming strike teams and task forces.	3	2	3	2	2	1

Note: Three levels of colour shading were used to show the number of participants who indicated (1) a task is part of their current role or (2) had or require training for a task. The darker the shading the more participants selected that option.

APPENDIX E:

Overview of a Graduate Capability Framework

Extracted from: A Graduate Capability Framework for Environmental Engineering Degree Programs: A Guide for Australian Universities. Pages 14–19

THE ENVIRONMENTAL ENGINEERING GRADUATE CAPABILITY FRAMEWORK

Introduction

The major outcome from the DYD Environmental Engineering Project was the development of a ***Graduate Capability Framework*** that defines the Environmental College's requirements for a graduate to be able to claim in-depth technical competence in the environmental engineering discipline.

The four underpinning principles

The Graduate Capabilities are underpinned by four principles that inform environmental engineering practice:

- **Sustainability:** Environmental engineers produce outcomes based on the principles of sustainable development including, but not limited to: Applying the precautionary principle; Undertaking full life-cycle analyses; Minimising impacts; Using resources economically and efficiently, particularly non-renewable resources; Appreciating the effect of climate change; Ensuring socially equitable outcomes; and Evaluating engineering outcomes using triple bottom line techniques.
- **Systems thinking**: Environmental engineers use holistic systems thinking and approaches to understand, investigate, model and design natural, constructed and engineering systems, and the interactions between those systems, while accounting for the interconnected social and economic systems that lie within the scope of a project. This understanding enables them to explicitly acknowledge inherent uncertainties and risks and ensure that the benefits of a project on natural and constructed environments are maximised and negative impacts are minimised.
- **Integrated approach:** Environmental engineers often play a leading role in integrating the work of the members of multi-disciplinary teams. They have a 'big picture' perspective that enables them to analyse, evaluate and synthesise inputs from a range of disciplines to achieve integrated outcomes.
- **Critical thinking:** Environmental engineers use critical thinking skills to resolve complex and multi-disciplinary problems.

These four principles are explicitly included in some of the 'Evidence of Attainment' statements associated with the Elements in Engineers Australia's Stage 1 Competency Standard for Professional Engineers. They also appear in many of the 'Tasks' in the Environmental Engineering Graduate Capability Tables in the appendices in this Guide. The following examples, each from a different field, illustrate how these four principles may be applied in environmental engineering practice.

1. **Clean and efficient resource utilisation and recovery**: For example, the ability to apply these principles to reduce water and energy consumption, and waste production.
2. **Green infrastructure:** For example, the ability to assess and specify priorities for green infrastructure in buildings; communications systems; eco-technologies; energy systems; transport systems; and urban environments.
3. **Sustainable communities:** For example, the ability to apply their knowledge of how the following cycles, frameworks and principles interact and impact on the processes which sustain life and healthy communities: Biochemical; Carbon, nutrient and water cycles; Ecological impacts of development proposals; Economic, legal and regulatory frameworks; Social justice and social science principles; and Urban and regional planning principles.

The Graduate Capabilities

The Stage 1 Competency Standard for Professional Engineer defines the expectations for all engineering graduates, including Environmental Engineering graduates (see Table 1). It is important to note that the Environmental Engineering Graduate Capabilities ***do not replace*** the Stage 1 Competency Standard. Rather, the Graduate Capabilities are to be used in conjunction with the Stage 1 Competency Standard as they provide an insight into how Stage 1 Competency may be assessed in the Environmental Engineering discipline.

The Graduate Capabilities have been grouped into ***three sets of capabilities***, with the Technical Capabilities being accompanied by a ***set of practice contexts***:

1. **Technical Capabilities:** Seven environmental engineering Technical Domains were identified: Water resources and supply; Stormwater management and reuse; Water and wastewater treatment; Soils and geology; Resource and waste management; Air and noise; and Energy systems and management.
2. **Environmental Engineering Contexts:** Seven environmental engineering Practice Contexts were identified: Natural environments and systems; Agricultural environments and systems; Industrial environments, processes and systems; Built environments and systems; Natural resources and extraction systems; Utility infrastructure and systems; and Transport infrastructure and systems.
3. **Process Capabilities:** Six environmental engineering Processes were identified: Investigation; Modelling and analysis; Integrated design and implementation; Assessment of impact, risk and sustainability; Environmental planning and management; and Audit, compliance and review.
4. **Generic Capabilities:** Seven Generic Domains were included: Project management; Ethics; Communication; Innovation; Information; Self-management; and Teamwork.

Table 1 shows the relationship between the three sets of Graduate Capabilities and the three competencies in the Stage 1 Competency Standard.

Table 1: Environmental Engineering Graduate Capabilities and the Stage 1 Competency Standard

STAGE 1 COMPETENCY STANDARD	ENVIRONMENTAL ENGINEERING GRADUATE CAPABILITIES
1. Knowledge and skill base	***Technical Capabilities***
1.1 Comprehensive, **theory-based understanding** of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. 1.2 **Conceptual understanding** of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. 1.3 **In-depth understanding** of specialist bodies of knowledge within the engineering discipline. 1.4 **Discernment** of knowledge development and research directions within the engineering discipline. 1.5 **Knowledge** of contextual factors impacting the engineering discipline. 1.6 **Understanding** of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.	The graduate capabilities are listed in seven *technical domains:* 1. Water resources and supply 2. Stormwater management and reuse 3. Water and wastewater treatment 4. Soils and geology 5. Resource and waste management 6. Air and noise 7. Energy systems and management
2. Engineering application ability	***Process Capabilities***
2.1 **Application** of established engineering methods to complex engineering problem solving. 2.2 **Fluent application** of engineering techniques, tools and resources. 2.3 **Application** of systematic engineering synthesis and design processes. 2.4 **Application** of systematic approaches to the conduct and management of engineering projects.	The graduate capabilities are listed under six *processes:* 1. Investigation 2. Modelling and analysis 3. Integrated design and implementation 4. Assessment of impact, risk and sustainability 5. Environmental planning and management 6. Audit, compliance and review
	Generic Capabilities
3. Professional and personal attributes	The graduate capabilities are listed in seven *generic domains,* each closely aligned with a Stage 1 Element: 1. Project management 2. Ethics 3. Communication 4. Innovation 5. Information 6. Self-management 7. Teamwork
3.1 Ethical conduct and professional accountability. 3.2 Effective oral and written communication in professional and lay domains. 3.3 Creative, innovative and pro-active demeanour. 3.4 Professional use and management of information. 3.5 Orderly management of self, and professional conduct. 3.6 Effective team membership and team leadership.	

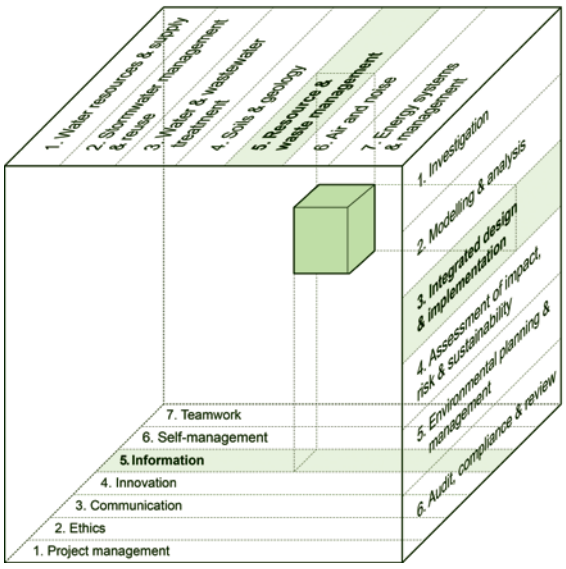

Figure 2: The Environmental Engineering Capability Cube

The Environmental Engineering Graduate Capability Cube shown in Figure 2 shows the interrelationships between the three sets of Capabilities which make up the axes of the Cube. When undertaking a project, a graduate uses ***Generic Capabilities*** when applying a ***Process*** in one or more ***Technical Domains***. For example, as shown in Figure 2, a graduate may be gathering information (a *Generic Capability*) to prepare a design (*a Process*) for a resource management and remediation project (a *Technical Domain*) at a mine site (a *Practice Context*).

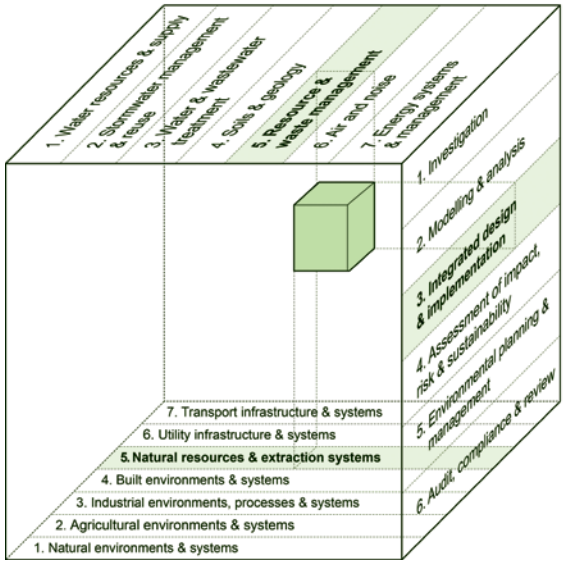

Figure 3: The Environmental Engineering Practice Cube

The Environmental Engineering Practice Cube shown in Figure 3 was adapted from Figure 2 by replacing the seven Generic Domains with the seven Practice Contexts. This Figure can be used to show the scope of the work undertaken by an individual environmental engineering practitioner, i.e. their ***specialist practice domain***, which is *'is a specific area of knowledge and practice within an engineering discipline'* (Engineers Australia, 2011). A person's *specialist practice domain* is a combination of their *Process* and *Technical Capabilities*, and their knowledge and skills of the *Practice Contexts* in which they are applied.

The Environmental Engineering Graduate Capabilities

The three sets of Environmental Engineering Graduate Capabilities are described in detail in the following sections and the Graduate Capability tables are included as Appendices in the Guide.

The Technical Capabilities

Accreditation requirement

It is expected that Environmental Engineering graduates would normally have basic knowledge and skills in all seven Technical Domains, and in-depth understanding of the bodies of knowledge in at least three of the Technical Domains.

Generally environmental engineers practice in one or more *specialist practice domains*. Their work in these domains is underpinned by:

- The breadth and depth of their knowledge of core environmental engineering and science fundamentals;
- Their in-depth knowledge and skills in a number of Technical Domains; and
- Their knowledge of, and experience of working in one or more Practice Contexts.

Engineering and science fundamentals

The fundamental engineering and science domains normally studied by environmental engineering students include: Biology, bio-chemistry, bio-technology, bio-energy, chemistry, ecology, fluid mechanics, geology, hydraulics, hydro-geology, mass-balance, micro-biology, physics, soil science, soil mechanics, and statics (See Elements 1.1 and 1.2, Stage 1 Competency).

The Technical Domains

The Technical Domains are indicative as environmental engineers may work across two or more of these domains and new domains will emerge from time to time. The fields included within each of the Technical Domains are:

T1. **Water resources and supply:** Surface water systems; water supply systems; integrated catchment management, flood management systems; groundwater systems; coastal and marine systems; irrigation systems; retrofitted systems; and smart water grids.

T2. **Stormwater management and reuse:** Water sensitive urban design; hydrology; stormwater systems; design of wetlands and sediment ponds; and retention basins.

T3. **Water and wastewater treatment:** Water treatment; water quality; water quality management; environmental toxic effect of water contaminants; water pollution assessment and control; design of wetlands; wastewater treatment; sediment ponds; and agricultural waste.

T4. **Soils and geology:** Acid-sulphate soils; hydrogeology; de-watering; soil productivity and properties; contaminated land assessment and remediation; geological contexts; groundwater isolation; management of contamination plumes; agricultural chemicals and by-products; erosion and sediment control; soil conservation; soil pollution and control; salinity; sodicity; and cracking clays.

T5. **Resource and waste management:** Eco-efficiency; clean production; industrial ecology; life-cycle assessment; solid and liquid waste minimisation, recovery, treatment, reuse and disposal; radioactive waste and protection; recycling processes; biogas generation; hazardous waste; hazardous material storage; spill bunding; landfill design, containment, liners and management; leachate control; waste transfer station design and management; infrastructure waste; and transport waste.

T6. **Air and noise:** Air quality; air pollution assessment and control; air pollution control devices (e.g. filters, electro-static precipitators); application of climate change assessments/forecasts; climate change mitigation; noise pollution (industrial, transport, residential, commercial, agricultural, etc.); vibration; light pollution; indoor air pollution; industrial ventilation; particulate control (e.g. baghouse, cyclones); pollutant dispersal; and prediction of pollutant transport.

T7. **Energy systems and management:** Energy production, utilisation, and optimisation; energy recovery, processing and impact assessment; embodied energy; sustainable energy planning and design; greenhouse gas mitigation and management; renewable energy; energy efficiency; bio-energy; and carbon reduction.

A Graduate Capability table for each of these Technical Domains is included in Appendix A.

Environmental Engineering Practice Contexts

Environmental engineering projects are situated in one or more of the Practice Contexts listed below. Therefore, Environmental Engineers need to understand these contexts and the factors that may impact on their projects (See Element 1.5, Stage 1 Competency). The seven *Environmental Engineering Practice Contexts* are:

1. **Natural environments and systems**
2. **Agricultural environments and systems**
3. **Industrial environments, processes and systems**
4. **Built environments and systems**
5. **Natural resources and extraction systems**
6. **Utility infrastructure and systems**
7. **Transport infrastructure and systems**

The Process Capabilities

Accreditation requirement

It is expected that Environmental Engineering graduates would, under appropriate supervision, be able to apply each of these processes in their practice.

Environmental engineers apply their knowledge and skills using one or more environmental engineering processes, all underpinned by integrated systems thinking and critical analysis skills. The six inter-connected Processes are briefly described below:

P1: **Investigation:** Environmental engineers undertake investigations to understand the characteristics of natural and constructed environments and systems, how they operate, and the interrelationships between them.

P2: **Modelling and analysis:** Environmental engineers develop and apply modelling and analysis tools to understand existing natural and constructed systems, and proposed engineering systems. They identify controlling variables, compare the spatial and temporal scales on which they act, and assess the implications of feedback and interactions within the systems. Models are also used for scenario assessment and to identify potential impacts of proposed changes to the systems.

P3: **Integrated design and implementation:** Environmental engineers use their understanding of natural and constructed systems to bring together multi-disciplinary teams to develop integrated designs, and implementation strategies, that together result in sustainable outcomes.

P4: **Assessment of impact, risk and sustainability**: Environmental engineers conduct studies to assess the sustainability of proposals, the potential risks of implementing those proposals and the impacts they may have on natural, constructed and community environments and systems.

P5: **Environmental planning and management:** Environmental engineers prepare plans to manage natural, constructed and community environments and systems to achieve sustainable outcomes.

P6: **Audit, compliance and review:** Environmental engineers collect appropriate data and information to critically review the status of natural and constructed systems to evaluate their compliance with regulations or Environmental Management Statements, and to identify opportunities to enhance sustainable outcomes.

A project may consist of a single process, or two or more processes. A large, ongoing project may include all of the processes. This highlights the inter-connectedness of the processes, which together represent a life-cycle approach to environmental engineering.

A Graduate Capability table for each of these Processes is included in Appendix B.

The Generic Capabilities

Accreditation requirement

It is expected that Environmental Engineering graduates would, under appropriate supervision, be able to demonstrate competency in each of these generic domains.

Environmental Engineering graduates are expected to have acquired the knowledge and skills required to be able to demonstrate Stage 1 Competency in seven Generic Capability domains (See Element 2.4 and Elements 3.1–3.6, Stage 1 Competency Standard). The seven Generic Capabilities are:

G1: **Project Management**

G2: **Ethics**

G3: **Communication**

G4: **Innovation**

G5: **Information**

G6: **Self-management**

G7: **Teamwork**

A Graduate Capability table for each of these Generic Capability domains is included in Appendix C.

Define Your Discipline > Stakeholder Consultation Process

The DYD Stakeholder Consultation Process: A User Guide