Module 1: Research Strategy and Planning

Introduction

Successful researchers build a body of research work that builds on their strengths and draws on the strategic priorities of their university, their funding bodies, and the critical mass of expertise around them. They also adopt an effective approach to planning that strategically places them in the best position to be adequately funded over a long period of time to undertake research projects about which they feel passionate. This module explores the mechanisms by which successful researchers build their strategies and plans.

Aims

This module guides you through the process of designing, planning, implementing, and completing a research project. It outlines the main principles for building a strategic approach to your research. The earlier sections of the module offer a valuable guide to new or emerging researchers who are developing their research strategy. The latter sections on project management are important sources of information for all researchers – no matter how experienced. The sections draw on the experience of over 200 researchers and research managers to offer a professional approach to research management.

Learning outcomes

After completing this module you should be able to:

- identify the strategic pressures affecting research in your university and how to take advantage of them;
- identify key steps in scoping your project proposal, including building an effective grant funding approach;
- implement a basic research project management process;
- develop a work breakdown structure; and
- prepare a research project plan.

Content overview

The module comprises the following topics:

Topic 1: Research strategy – an introduction
This topic identifies factors in the research context that influence the choice of research direction.

Topic 2: Research planning – scope and concept
This topic discusses the key components to consider when scoping the concept, and provides some ideas on how to describe the project scope.

Topic 3: Project funding – grant seeking
This topic provides an introduction to granting bodies and the issues to consider in framing your proposal.

Topic 4: Basic research project management principles
This topic introduces project management tools that assist you to effectively plan and then manage the research project. It offers a four-phase overview and a very useful checklist that you will be able to apply to manage any future projects.

Acknowledgements

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The 'Research Project Management Principles' topic in Module 1, including the checklists, is drawn and adapted from: Debowski, S. (in press). The New Academic. OUP / McGraw-Hill, Philadelphia.

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Accessing the module material

Now that you have read the module introduction you can access and navigate your way through the module content via the Module 1 Organiser link in the navigation bar at the top left of this page or in the bar below.

If you wish to print this page you can generate a pdf file via this printer icon []. A pdf file for each topic in this module can be generated using the printer icon to the left of each topic title on the Organiser page.

Module 1: Research Strategy and Planning

Organiser

Topic	Subtopics	Activities	At your University
Introduction			
1. Research strategy – an introduction For each topic, read the topic material via the link in this column before reading the subtopic material.	1.1 National and institutional research strategies	Activity 1: Looking at your university's strategic plan	At your University 1.1
	1.2 Research strengths and critical mass		
	1.3 Your research strategy	Activity 2: Your research strategy	
	1.4 Research teams		
2. Research planning – scope and concept	2.1 The idea	Activity 3: Prepare a SWOT analysis	At your University 2.1
	2.2 Building blocks		At your University 2.2
	2.3 People support		
	2.4 Clarifying your project scope		
	2.5 Funding considerations		At your University 2.5
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3. Project funding – grant seeking	3.1 Understanding the grant scheme		At your University 3.1
	3.2 Promoting your proposal	Activity 4: Prepare a sound bite	At your University 3.2
	3.3 The politics of funding		At your University 3.3
	3.4 The consequences of success		
4. Basic research project management principles	4.1 Research project management	Activity 5: Managing research projects – a self-review	
	4.2 Project management process		
	4.3 Project management areas	Activity 6: What makes projects challenging?	
	4.4 Developing a Work Breakdown Structure (WBS)		
	4.5 Employing the WBS in your project planning and management		
	4.6 Overview of project management strategies – design phase		At your University 4.6
	4.7 Overview of project management strategies – planning phase		At your University 4.7
	4.8 Overview of project management strategies – implementation phase		
	4.9 Overview of project management strategies – closeout and evaluation phase		
	4.10 Creating a project plan	Activity 7: Create your own project plan	
Module review and completion	Frequently asked questions		
	Checklist		
	Record of completion	Guided conversation	At your University

	The instructions for the guided conversation are in the "Record of completion" document.

Module 1: Research Strategy and Planning

Topic 1: Research strategy – an introduction

The need to plan your research project sounds obvious, but this is often the thing least well done in many projects. This topic is designed to help you begin to work out where you best fit in the research world – not the academic discipline per se, but strategically placing yourself in the best position to be adequately funded over a long period of time so that you can lead research projects about which you feel passionate.

Learning outcomes

Upon successful completion of this topic you should be able to:

- identify the long-term external influences that can affect your research proposal;
- better link into the critical mass of expertise that will support you in developing a sound body of work.

Topic content

Read the following notes.

1.1 National and institutional research strategies

1.2 Research strengths and critical mass

1.3 Your research strategy

1.4 Research teams

Activities

Complete these activities after you have worked through the subtopics.

Activity 1: Your university's strategic plan

If this is an activity you have not previously done, visit your university's strategic plan on the university website.

Are there ways you could better adapt your own research to fit those priorities?

What implications does the strategic plan have for your current and future research?

Activity 2: Your research strategy

A useful exercise is to review your own personal research strategy. Prepare a one-page summary of your current research context, goals, and priorities. This can be of value when you wish to talk to key people about possible support or common interests.

1. What do you wish to achieve in your research over the next 5 years?
2. How can your current role assist you to get there?
3. What are your main areas of interest?
4. How would you assess your track record? What are your strengths and areas needing building?
5. Describe your research focus and how it links to the university's and national priorities.
6. What are your key priorities for development in the next 2 years?

Module 1: Research Strategy and Planning

1.1 National and institutional research strategies

Is it research?

As a participant in this program, you may be someone who has been conducting research projects for some years now and may feel quite familiar with the basic skills and techniques. You would probably refer to yourself confidently as a 'researcher'. Yet if you ask a group of academics to define 'research', you will undoubtedly get many opinions and a long debate. The Organisation for Economic Co-operation and Development (OECD) defines research as comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture, and society, and the use of this stock of knowledge to devise new applications. This includes pure basic research, strategic basic research, applied research, and experimental development. If what you are doing doesn't fit within this definition, then it isn't research as it is known by the international research community.

Categories of research income

Within the different types of research it is useful to understand that there are four main categories of research income defined by the Commonwealth Government. You will often hear these terms used around your university and they occupy a place of considerable importance in the research budget and planning of your institution, something which will have direct and indirect effects on you as a member of that institution.

- Category 1: National Competitive Grants (Commonwealth Competitive Grants and Non-Commonwealth Competitive Grants)
- Category 2: Other Public Sector Funding (Local Government; State Government and Other Commonwealth Government)
- Category 3: Industry and Other Funding (Australian Contracts; Australian Grants; Donations, Bequests and Foundations; International Funding and Other Funding)
- Category 4: Cooperative Research Centre Funding.

Go8 universities tend to focus on Category 1 income, and this is usually their major source of research income, with the big funding players being the Australian Research Council and the National Health and Medical Research Council. Other universities may have a more diversified strategy.

There are a number of reasons why Category 1 research income is important to universities. The main one is prestige, but there are also practical aspects of which you may not be aware. For example, universities receive Commonwealth funding for research infrastructure under the Research Infrastructure Block Grants Scheme (RIBG). The RIBG allocations reflect the relative success of each institution in attracting Category 1 funds. A university's total research income (for all four categories) is also used as part of a formula that determines the amount of funding received under Joint Research Engagement (JRE) funding. This scheme provides essential funds for research and research training activities within your institution. As you can gather, success begets success, and every researcher wants to belong to a successful university.

Receiving funding from Category 1 research schemes is what you and your research team will usually be expected to focus upon. However, you should not ignore the other categories of research income. The industry sector is the largest source of research and development funding in the country, with its own priorities. However, the vast majority of its resources stay within the industry sector. To access industry funds you need to go out to industry and find out what they want from you, your team and institution, not wait for them to come to you.

Being strategic and opportunistic

All universities and all researchers exist in an increasingly competitive environment for research funding. You and your university need to be adaptive to survive, and a 'balanced portfolio' can help. This is about having a mixture of funded projects that may cover different research income categories. At different times and over a period of years, the balance may shift. One example of this might be seen in defence-related research, which, being a national research priority, can receive public funding as well as funding from the defence industry.

As an individual researcher you need to understand the local and national strategic dimension to research funding. However, you also need to keep an open mind about the exact type of research that you are willing and able to conduct. There is a great demand for high quality research, and a lot of organisations that are willing to pay for results. You sometimes need to seize research funding opportunities that may be outside of your normal experience, but for which you have transferable skills. For example, while microwave radar was developed for defence applications, it can be used in global remote sensing applications to estimate global forest biomass for input into climate change predictions.

Strategic research priorities

The strategic research priorities (SRPs) were developed by the Commonwealth Government and are designed to focus Australian research into areas which will contribute significantly to the economic, social, and environmental needs of Australia.

The five themes of the strategic research priorities are:

- Living in a changing environment
- Promoting population health and wellbeing

- Managing our food and water assets
- Securing Australia's place in a changing world
- Lifting productivity and economic growth.

Please refer to http://www.industry.gov.au/research/Pages/StrategicResearchPriorities.aspx for a detailed description of each strategic research priority and its associated priority goals.

Researchers applying to either the ARC or NHMRC will be required to outline how their proposed research project will address one of the above SRPs. The SRPs may change in future so it is important to check their currency online before embarking on a grant application or any other justification of research in relation to the strategic research priorities. Your research proposal can be at an advantage if you can show strong alignment between your research (including the research infrastructure of your university) and the SRPs.

Institutional strategy

Every university has a strategic plan, usually designed to cover a period of a few years and sometimes having annual updates. The strategic plan aims to lay out the main priorities for the university within an overarching theme. Most will have a dedicated section on research, and some will have separate research plans and annual operational plans. Part of thinking strategically is to be aware of the priorities of your institution, as that tends to be where significant amounts of funding will be directed. Through awareness of these, you are better able to respond to opportunity, or to create opportunity. This can also work in the other direction over time, as strong research leaders and their teams help to shape the strategic direction of the university.

Here are a few examples taken from a couple of university strategic plans:

University of Melbourne

"The University of Melbourne aims to be one of the finest universities in the world. 'Growing Esteem' is the University's strategy for achieving high regard and for making a distinctive contribution to society. The strategy is conceived with the metaphor of a triple helix: three strands of core activities, each sharply focused and well-resourced, and all mutually supportive. The core activities of the University of Melbourne are research, learning and teaching and engagement."
(http://growingesteem.unimelb.edu.au/__data/assets/pdf_file/0003/322437/GrowingEsteem2010.pdf)

University of Adelaide

"The University's mission is to be recognised as a great research university and to use that as the platform for excellence in teaching and learning. This is, of course, an enduring objective. Greatness is not achieved overnight, nor even within the five year timeframe of a single plan. It is vital though to begin to put in place the essential elements of the platform on which greatness might be built. Our goals can only be achieved with the support and involvement of the University community as a whole, as well as through an increasing level of engagement with government, industry and the wider community. Fully understanding the crucial scholarly contribution we can make to contemporary society and fulfilling that contribution are integral to this Plan, as is our commitment to developing mutually beneficial working partnerships with the community. This is the primary role of a great research university, and it is something to which we should all aspire."
(http://www.adelaide.edu.au/VCO/strategicplan/)

University of New South Wales

UNSW's aspiration is to continuously improve our position as a leading research intensive university in the Asia–Pacific region, focusing on contemporary and social issues through defined strengths in professional, scientific and technological fields. We seek to make a significant contribution to the development of knowledge, to learning and teaching, to our students, and to society.
(http://www.unsw.edu.au/about-us/strategic-intent)

At your University

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1.2 Research strengths and critical mass

It is important to have a good sense of your particular research strengths and those that have been identified within your university. You need to build your research strategy around your core research strengths, as an important consideration for any funding body will be your track record and proven credentials. We will come back to this in the next topic.

If you are linked to a research focus that has been identified as a university strength, then you are likely to have greater access to funding and facilities than might otherwise be the case. As the earlier examples of university strategic plans shows, there is an increasing tendency among universities to concentrate or prioritise their funding far more than was once the case.

So what do you do if you find you are not in a designated research priority area? One avenue to consider is joining an existing Research Institute, Centre, Unit, or established Group or Network if you have relevant skills and/or knowledge. For example, a multi-disciplinary area like climate change may draw on environmental science, environmental law, demographics, architecture, public health, etc. Your contribution might also be in the form of particular research techniques that complement the existing mix of capabilities. You will gain from the association (if the group is good), find additional collaborative opportunities, and possibly benefit from specific university funding available to these structures, as well as enhanced opportunities to apply for additional external funding. Each university will have a number of these structures, and there will be others supported by external organisations. You can also look at Cooperative Research Centres (CRC), of which there are many spread across Australia, covering a wide variety of research areas. Details can be accessed at https://www.crc.gov.au/Pages/default.aspx .

Alternatively, you might seek out some international research partners to increase your credibility. Remember that research is a global endeavour, and is influenced by the international environment and the desire of most institutions to develop internationally recognised research capabilities. You may be aware that the 2007 Nobel Peace Prize was awarded jointly to the Intergovernmental Panel on Climate Change (IPCC) and former United States Vice-President Al Gore for "their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change". Did you know that the IPCC involved thousands of leading scientists and officials from more than 100 countries collaborating to assess the scientific evidence for global warming? That is global networking on a massive scale, but it shows that there are opportunities out there.

Certainly multi- or cross-disciplinary research can add an extra dimension to your portfolio, and is often encouraged as a way of exploring big-picture issues, e.g. climate change. However, it can also raise its own challenges for a researcher, such as fitting in with less flexible funding and publishing categories, different expectations of individuals in different disciplines, different ways of working, funding vagaries, etc. Also, in cross-institutional arrangements there can be additional issues with which to deal, such as agreements on funding shares, etc.

Gaining international stature should be the aim of most research leaders, as it is of most research-intensive institutions. However, this will be part of a longer-term strategy and, in the latter case, is often associated with the development of a critical mass. As an individual, you cannot expect this to happen overnight and it will take a lot of extra effort, but the payoff is that it can open up additional funding resources not previously available to you.

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1.3 Your research strategy

If you understand the road ahead, you are less likely to get lost or side-tracked.

Your research strategy is likely to emphasise several key areas of activity: publishing, undertaking research (particularly with the assistance of funded grants), and collaborating with other researchers on new initiatives. The discipline/s in which you operate will have a strong influence on the mix of priorities that you emphasise. In the sciences, grants and refereed papers in highly cited journals are critical outcomes. In some fields patents are highly desired, while others may see creative works and exhibitions as more critical. With the growing cross-pollination of research disciplines, it is important to be open to different ways of viewing your research and thinking about possible research interchanges that will complement the skills other researchers possess. While some disciplines have seen themselves as largely removed from the grant cycle and its associated publishing focus, this is becoming less typical. For example, many medical and science-based projects seek the skills of arts and humanities researchers to achieve the necessary translation of their research into the broader community. Skills in gaining and managing research grants are now seen as fundamental capabilities of any researcher.

Your strategy is likely to include a continuous focus on attracting grants. If you are on a 3-year grant (as an example), it would not be wise to wait until the grant money has been exhausted and you have completely finished your project before applying for your next grant. You need to seek new funding around the second year of your first grant. Of course, this can be more difficult if you are at an early stage of your career and applying to the ARC, as they will be concerned about your track record. If this is the case, you may need to consider a different approach, as we discuss in Topic 2. One good strategy is to document your thinking on a research project or funding opportunity at the time it appears, even if you have to put it aside for the future.

Be wary about any possible limitations which may be contained in research project agreements. For example, if you are a member of a Cooperative Research Centre (CRC), then you will be limited to holding only one other Discovery Project. For a successful researcher able to effectively balance numerous projects, this could seriously restrict your flexibility and income-producing ability, and you would need to have considerable compensation to make this worthwhile. It can be useful to seek a diversified portfolio of grants to ensure you have several strands operating. (Obviously, if you win a $10M NHMRC grant, this may be a different scenario, but the need for long-term planning remains.)

To have a longer-term successful research career, it is essential to integrate short and long-term goals. In the short-term you need to respond to current opportunities and circumstances, developing projects and creating a sound track record of research performance and delivery. Publishing the outcomes from your research is critical. At the same time, keep a longer-term view of 5 or so years, and monitor the success of your strategy in moving toward that goal. Don’t be afraid to ask advice from mentors, role models, and successful researchers.

As an effective researcher, you will need to have a progressive approach to the work that you want to undertake. As you know, all plans have a number of steps and will normally be laid out in a sequential manner. However, as we said above, if you’re on a short-term grant, it’s not wise to wait until you have finished your project before applying for the next grant. You should be doing something about new grants around the second year of a 3-year grant. Of course, this can be more difficult if you are at an early stage of your career and applying to the ARC, as they will be concerned about your track record. If this is the case, you may want to consider a different approach, as we discuss in Topic 2.

The main thing to remember is that if you understand the bigger picture, you have a better chance of 'exploiting' it. A conscious research strategy is an important way of acting on these opportunities.

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1.4 Research teams

When planning a new project, you may need to build a research team that has the necessary skills and expertise. Bringing them into the project at the early conceptual stage will allow you to draw on their creative ideas and expertise, bolster the track record of the research team, and also create the right opportunity to agree on how the collaboration will work if the project is successful.

One of the most important things to do when starting to put together a team is to determine what it is that each person wants to get out of this collaborative arrangement, i.e. what sort of 'payment' do they want for their input, and is this something you can live with? For example, do they want travel money, or funding for a PhD student? It can also be difficult if you want to include senior researchers with many other commitments, or people from other institutions. We will come back to this in the next topic, but in many ways this is yet again about thinking strategically.

Along the same lines, 'thinking outside the square' is a very useful ability for a research leader. Diverse partners with a wide array of complementary objectives can make up a very successful research project. For example, in a recent ARC Linkage funding round, Professor Alan Cooper of the University of Adelaide, a specialist in using ancient DNA to record and study evolutionary processes in real time, won $395,000 to develop new methods to retrieve and analyse preserved DNA. His project was developed in partnership with the National Geographic Society, the Australian Federal Police, and others. Its aim is to develop applications important for biosecurity, customs and quarantine, forensics/counterterrorism, and studies of climate change. Naturally, a lot of negotiation would have occurred between the partners to achieve this result, and that is yet another skill required of a successful research leader.

The technological dimension

In thinking about establishing your research team, and including people from interstate or overseas, the practical obstacles are less than they once were. Email, video-conferencing, etc. have opened up the possibilities for research collaboration. For example, quite a number of universities have 'access grids' to help facilitate research collaboration across the world. This access may be for remote visualisation or interactive applications, or for utilising the high-bandwidth environment for virtual meetings and events. The following website lists 245 Access Grid nodes across 27 different countries: http://www.accessgrid.org/nodes. There will still be occasions when you need and want to talk face-to-face, and this remains important for relationship building, but technology is a viable way of building an international profile.

We will further discuss setting up your research team under the next topic. '*Module 2: Commencement and Collaboration – Putting Ideas Into Practice'* goes into more detail on actually managing your research team and engaging effectively with your stakeholders.

(Note that on the final subtopic page of each topic, the Next > link in the navigation bar below returns you to the first page for this topic, so you can review the topic as a whole and complete any activities listed there before moving on to the next topic via the Organiser page.)

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Topic 2: Research planning – scope and concept

The first topic attempted to give you a sense of the overarching research environment in which you work, and the need to think about that context from a strategic perspective. With that in mind, you now need to start developing your research concept, that is, working out what it is exactly that you want to research and how feasible it will be.

Learning outcomes

Upon successful completion of this topic you should be able to:

- identify the factors that need to be considered in scoping your research idea into a proposal;
- assess whether the project is likely to be feasible given the resources available.

Topic content

Read the following notes.

2.1 The idea

2.2 Building blocks

2.3 People support

2.4 Clarifying the project scope

2.5 Funding considerations

2.6 Timelines

Activity

Complete this activity after you have worked through the subtopics.

Activity 3: Prepare a SWOT analysis

Taking into account all of the information presented in this topic, one of the final things to do to complete the scoping stage of your project is to conduct a SWOT analysis. At this stage think about a project you wish to develop or have been recently involved with. Prepare a SWOT analysis of the project and determine whether or not you should proceed with the proposal before venturing on to the grant-seeking phase. (Guidelines to conducting a SWOT analysis are included in subtopic 2.6.)

Module 1: Research Strategy and Planning

2.1 The idea

Having a strategic sense of the bigger picture for research at the national, state, and institutional level (and, hopefully, where you fit in it), it is now time to develop a project idea or concept. As a researcher, you will have been developing project ideas for some time, but it is worth reiterating some of the basic points.

First, your idea should be new and exciting, as much to stimulate your own curiosity and interest as to engage other members of your prospective team and gain essential funding support. However, the idea also needs to be realistic. As we know with cancer research, there are many teams of researchers working on many projects over a long time-span trying to find a 'cure'. It is not realistic to think you will solve that problem in one 3-year project. It is part of the scoping exercise to find the appropriate balance.

One thing to do is to put down all of your ideas as a starting point and then edit them down to something reasonable, that is within your capabilities and capacity, always bearing in mind that you are aiming for research quality not quantity.

Second, once you have the genesis of your idea sketched out, you need to step back and, being as frank and honest as possible with yourself, determine if it is actually any good. A successful research leader will be confident in their abilities and objective about what they are producing. This is probably one of the more difficult aspects of conceptualising your project, and something you will struggle with throughout your career.

You then need to attain feedback on your proposal. Again, this will not always be an easy process, as you need to expose yourself to possible harsh criticism. However, you need to be brave and take a risk. Better to get useful feedback at this early stage than to waste a lot of valuable time and effort on a proposal that has no real chance of success. Seek out more experienced researchers who may know you or your work and ask for feedback. Some universities may have a formal mentoring system in place to assist you in this endeavour, although an informal approach will probably be the norm. If you are unsure who to approach, check with your Head of School, mentor, a relevant research centre director, or the academic head of a school or faculty research committee for advice. If you wish to learn more about research mentoring you are encouraged to read Topic 4 of the 'Settling In' module.

One of the essential points to consider is that you should not underestimate the time needed to refine an idea. You have to allow yourself time to cogitate on it. This can be difficult, with all the competing pressures on university academics. Unless you are a research-only staff member, you will have teaching responsibilities, and everybody will have some community responsibilities (e.g. meetings, stakeholder events). You also need to have some time for a life outside of research ('work–life balance') or risk early burnout.

Your university may also have other forms of support to ensure your concept is appropriately scoped.

At your University

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2.2 Building blocks

Having a good idea is step one, but you then need to consider attaining the necessary funding. We will cover this in more detail in the next topic, but one of the fundamental points to make here is the importance of an established track record. For example, 40% of the selection criteria weighting for ARC Discovery Projects applications centres on the track record and capacity of the Investigator. While the weighting will vary, the principle remains. As mentioned in Topic 1 in relation to institutional funding, success creates success.

Developing a research career is a long-term venture and will not happen overnight, and the vast majority of researchers will need to build up their profile over time. One way to approach this is through a 'building blocks' strategy – starting with smaller-scale projects in areas about which you may not have originally thought. You could apply for Category 2 or 3 grants, for which there are a myriad of funding sources. These may be small projects that you are able to complete in a relatively short time-span, but can demonstrate your ability to deliver or to perform. You can do this at the same time as you are continuing to deliver conference papers and publishing articles. This will be a part of your planned longer-term strategy of winning larger grants, particularly Category 1 grants such as those from the ARC, NHMRC, etc. Even here, it will normally be a building block approach, starting with smaller projects and grants that offer a strong basis to then move to bigger bids for funding.

The Research Office of your university will have a list of all funding opportunities available, along with the relevant deadlines. You should locate this list and study it routinely, and evaluate your likely success.

At your University

Another possible building block strategy can be to produce international publications with an overseas partner investigator. This is a way of utilising networks that may give you access to a larger block of international funding opportunities.

In scoping your research proposal, you also need to realistically consider whether or not you can seriously compete against other researchers in the field. This is all about viability, not competency (although you must be competent as well). Are you taking on a global player in the field – for example, Bayer AG, a global chemical and pharmaceutical conglomerate with research interests in healthcare, crop science, etc.? Certainly some brilliant ideas have come from a single researcher or a small team working alone, but there are obviously significant benefits to attaining a critical mass which can give a competitive edge, such as access to resources. See the next topic on 'Grant Seeking' for more on this.

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2.3 People support

In the previous topic we talked about getting to know the research strengths within your university and how useful it can be to be associated with one of these strengths. This naturally flows on to associating with and building research networks within your chosen discipline, whether this is in your own university or across institutions.

A useful tactic is the desirability of communicating with 'influence drivers', if this is possible. Within the university these will often be senior researchers, (e.g. Federation or Australia Fellows), or those who have sat on funding review panels at the State or National level and have in-depth knowledge of what is sought, e.g. ARC College of Experts. Primarily, you are looking for someone who knows how these things work. You might also look outside to organisations within the State Government, CSIRO, etc., for a different view.

If you are thinking of looking for research funding outside of the public sphere, especially in some of the more applied research areas, how do you go about initiating contact?

There are a number of ways you can do this. Approach a successful researcher who has connections with a business, industry, or community organisation, and see if they can introduce you, or at least provide useful contacts. If you belong to a research or professional network, you can use its links to external organisations. Some research units (disciplines, centres, etc.) will also have advisory committees which include external people, and may provide another avenue to explore.

You should also bear in mind that it is also common for universities to have overarching agreements (e.g. a memorandum of understanding or a strategic alliance) with certain external organisations. This could be to facilitate research collaboration in broad fields such as water resource, defence, etc. Also, there are usually people within your university who are employed to facilitate links with outside bodies. This will vary across universities and it may take a bit of effort to find these people, as they may be located in academic or administrative units, but you should be able to inquire through your relevant organisational units, escalating upwards until you get the answer. Contact your research office in the first instance, as they are most likely to have comprehensive knowledge of the various opportunities that might be accessed.

The hardest way, but worth considering, can be to 'cold canvas' an organisation. In this situation, you may need to undertake a series of small projects to build trust and your credibility. If you decide to do this, probably the most important thing to remember is to listen to what they want, not try to push your project onto them, and keep initial meetings short and to the point. You will need to be flexible and responsive, ensuring your work meets their research needs. Of course, their project may not be the most exciting, but it will be a start to demonstrate what you can offer and build your track record. Initial meetings need to be short to find out if there is a common interest and to indicate your understanding of the time-pressured culture in which most businesses operate. This approach can be time-consuming, but may be worth the effort in the long run. It can also offer some funds to support your research and to seed the next project.

Once your proposal is starting to take shape, you should start consulting potential team members as soon as possible. This may provide some useful feedback, but it also assists in the planning process, determining what is realistic and achievable. As a team leader, you need to ensure that all aspects of the project are adequately covered and that you have members with appropriate skills. For example, if you are developing a proposal whose success is predicated on input from a specialist in optical phase conjugation and you are not able to find someone, then you obviously need to re-orient your proposal. You may need some technical staff to assist with particular aspects of the project, or may be some PhD students who can be assigned elements of the proposal as part of their dissertation work. One fundamental aspect of this process, an essential part of risk management, is to ensure that you are totally clear about who will do what. This will be linked to your project plan. '*Module 2: Commencement and Collaboration – Putting Ideas Into Practice*' and '*Module 7: Managing and Leading People in a Research Context*' explore the successful management of a project team.

It is worth mentioning here a few specific points about involving 'higher degree by research' students in your project team. There can be significant benefits to all involved in this process, but there are also considerable supervisory responsibilities to remember, depending to some extent on whether you are a principal or co-supervisor. Bearing in mind the importance placed on successful and timely completions, it is essential that both you and the student are clear about your rights and responsibilities right from the beginning. It is also important to train these students in appropriate record and data management to protect their intellectual property and validate their research.

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2.4 Clarifying your project scope

When you develop a research proposal for funding, you need to provide a clear statement relating to the project scope. This statement identifies the anticipated research outcomes, and a list of objectives, deliverables, and requirements which will contribute to a clear understanding of the project. 'Scope' is the aspect around which all of the elements of the research relate (objectives, requirements, deliverables, and description of the framework of the research). It is the framework on which time, costs, risks, and quality also operate. As you move from concept to implementation, this statement of the project scope will need to be regularly reviewed and discussed with the various stakeholders involved.

In this topic, the elements of a good scoping statement are outlined. They will assist you in preparing an effective funding proposal and in managing the project when you receive your funding.

Scoping Statement Components

Scope description: If you have applied for research grants, no doubt you will have been asked to provide a brief description that describes the project in layman's terms. It can sometimes be hard to distil a project down to a few clear sentences that clarify what the project is about. However, this is most important. Your project scope description helps people to understand the project intentions and why it is important. Key elements to include in this scoping statement include: why the project is being done, what it will achieve, and why it is important.

Out-of-scope statement: Equally important when defining the project is to be clear about what is 'out-of-scope'. You won't be able to do everything, and it is most important to be very clear about what needs to be ignored. This is not to say that the research won't pursue those lines of enquiry later, but they will be the subject of another research proposal. It can be useful to keep track of interesting issues that warrant further investigation, as these encourage continuing lines of research. The out-of-scope statement may be something that grows over time as people find new and interesting elements that intrigue them, but it also recognises an inability to pursue those interests within the agreed project framework. It can also provide clarity as to the original intent of the project to avoid misinterpretation by colleagues and stakeholders.

Objectives clarify what is to be achieved through the research project. They can relate to the goal toward which your research will be directed, a purpose to be achieved, a result to be obtained, a product to be produced, or a service to be performed. They provide a series of signposts that clarify the standards and outcomes to be met by the research team.

Objectives are often very specific, providing clear guidance on what is to be measured, to what standard, and by when. Objectives should be 'SMART': specific, measurable, achievable, realistic, and time-bound. The more they reflect these principles, the more they can support the project outcomes. Some examples of SMART objectives are provided here to illustrate.

- A review of the literature relating to smart communities will be completed by June 2015.
- By July 2016, a template for Assum laboratory testing will be developed, trialled, introduced to all laboratory staff, and established as standard practice in all laboratory processes.
- By May 2017, interviews with key stakeholders will be undertaken to clarify their expectations of the project.
- By August 2018, a draft funding proposal relating to the revegetation project will be presented to the key stakeholders for ratification.

Deliverables: At the end of your research project you will hope to have something to deliver to the research sponsors, the research community, and other interested parties. A deliverable is a unique and verifiable product, result, or capability that must be demonstrated at the conclusion of the project or phase of the research. In simple terms it describes what you expect to produce. It might be a paper, a research finding, or completion of a pilot study to verify the next stage of your research.

Milestones are key points at which a major outcome of the research will be evident. Typical milestones may include: data collection phase concluded; an experiment completed; a conference paper presented; a report submitted; or any other number of outcomes. These often reflect considerable interchange across team members and may have required a major push to reach the milestone within the time limits set. By clarifying the milestones, team members are provided with clear goals and priorities to which they can work. This helps promote timely completion of the project.

Requirements: A requirement is a condition or capability that must be met or possessed by a system, product, service, result, or component to satisfy a contract, standard, specification, or other formally imposed documents (PMI, 2004/2008, pp. 365-371).

Requirements include quantified and documented needs that are testable, including the wants and expectations of the granting bodies, community, and other stakeholders. Progress reports are typical

requirements by your university and the granting body. Ethical research and the exercise of social responsibility are also examples of requirements. If you have research students, you will also have a number of requirements to ensure their academic progress is being furthered.

Reference

PMI (2008). A Guide to the Project Management Body of Knowledge, 4th edition, Project Management Institute.
http://www.pmi.org/PMBOK-Guide-and-Standards/Standards-Library-of-PMI-Global-Standards.aspx

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2.5 Funding considerations

If you have an idea and you have a potential team to assist you in your research, the next aspect in scoping out your possible project is the need to think about the detailed planning, and who is going to provide funding. For instance, what sort of equipment or infrastructure will you need? Do you or anyone of your team need travel funds? What about extra staff or student scholarships? A clear understanding of what is needed at this stage will save a lot of frustration and angst down the track, and can make the difference in delivering a successful project on time and on budget. If nothing else, you need to tick all the boxes on a mental list. Estimating up-front the cost of your proposal, even at this early scoping stage, is an essential requirement and a skill. In 'Module 5: Financial, Resource and Risk Management' you will learn how to properly cost, manage, and report on research projects for which you are responsible.

One of the things you will probably need to consider is attaining multiple funding sources for your project. Different sources may be needed for different items, e.g. an infrastructure grant or a top-up scholarship. This will mean finding compatible sources that will allow you to meet the various requirements associated with each funding source. Obviously this will make your task a little more complicated, and requires additional planning (and thinking strategically and opportunistically). In the next topic we will look at seeking grants and the issues associated with gaining support from funding bodies.

You also need to be aware of the research-related policies of your university as they may relate to funding. For example, the majority of, if not all, universities have restrictions on accepting research funding from the tobacco industry. The following example is from the University of Sydney:

"The University notes the established body of scientific evidence that smoking is harmful to human health and also notes the policies of tobacco companies in the marketing of their products. The University shall not accept funding or other forms of support, other than by taxation or government levies, from any tobacco manufacturing company or foundations primarily funded by such companies, or agents known to be acting on their behalf." (University of Sydney, Tobacco Industry Funding Policy)

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2.6 Timelines

The final point to cover in this topic is that of timelines. In scoping your proposal you need to have a good idea of approximately how long it will take you to finalise the project, and the extent to which you have reflected on the project's risks and vulnerabilities.

For example, do you understand what ethics issues may be associated with your project and how long it may take to gain the necessary permits to proceed? In gathering together your proposed team, have you taken into account other activities in which they are involved and which could delay key aspects of your project? If your research project is dependent on a new piece of equipment, will it have to come from overseas? Have you discussed with anyone how long it might take to provide a space for it? Is there accommodation for your project team? The main point is to plan as well as you can with the knowledge that you have. (Topic 4 also introduces you to a useful tool called 'Work Breakdown Structure' (WBS) to better identify the real costs and requirements of your project.)

One of the final things to do to complete the scoping stage of your project is to conduct a SWOT analysis. This will help you to determine whether or not you proceed with the proposal before venturing on to the grant-seeking phase.

SWOT analysis

A SWOT analysis is a tool for examining the internal Strengths and Weaknesses and external Opportunities and Threats (SWOT) to achieving the desired objective – in this case a successful research outcome. The process consists of identifying and categorising factors within the organisation and in the external environment into:

- Strengths – factors within the organisation that will be helpful to achieving the project objective.
- Weaknesses – factors within the organisation that will be harmful to achieving the project objective.
- Opportunities – factors within the environment that will be helpful to achieving the project objective.
- Threats – factors within the environment that will be harmful to achieving the project objective.

Strengths and Opportunities are the features that can drive the project forward to success. The Weaknesses and Threats can block progress and lead to a lesser outcome. An assessment of the competing forces enables you to determine whether you can reduce the blocks and/or increase the drivers to increase the probability of success.

Setting out these features may help you to decide whether it is worth putting time and energy into the project, and the steps you may need to include in planning the project so it can proceed smoothly. A brief outline and template for the process is available at
http://www.businessballs.com/swotanalysisfreetemplate.htm

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Topic 3: Project funding – grant seeking

Having thought about the strategic context of your research, developed an idea that you feel is achievable, and assembled a team to work with you to achieve the desired outcome, you now need to find an organisation that is willing to fund your project.

Learning outcomes

Upon successful completion of this topic you should be able to:

- 3.1 Understanding the grant scheme
- 3.2 Promoting your proposal
- 3.3 The politics of funding
- 3.4 The consequences of success

Activity 4: Prepare a sound bite

One of the most critical challenges you must achieve is describing your project in an engaging, meaningful, and exciting way. This takes practice and will get easier over time. Many proposals require a short summary of 100 words to capture the essence of the project. This is your advertisement, and it needs to grab the attention of people who do not know your field of study.

Prepare a 'soundbite' (approximately 100 words) to explain to a potential funding body what your project is all about, and then have others critique it. Take their feedback on board and revise your summary. Try using this version at a dinner or cocktail party. How did the audience respond? Were they keen to hear more? That is a good indication that you are getting there.

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3.1 Understanding the grant scheme

As mentioned in previous topics, there are many sources of research project funding. You need to find the one or ones that best fit your research, taking into account the strategic and opportunistic considerations that need to be an essential part of your longer-term thinking.

Some of the questions that you need to ask yourself when looking at a particular grant scheme will include the following:

- Are you, and your team members, eligible to apply?
- Does your project fit the aims of the scheme?
- If there are selection criteria, will you be able to address them all adequately?
- Can you provide all the necessary documentation?
- Do you understand what the funding agency will require of you and your project?
- Will the scheme fund the sort of items you require (e.g. salaries, equipment items, infrastructure costs, etc.)?
- Will the funding source be acceptable to your host institution (remember the tobacco policy example in Topic 2)?
- Are there any restrictive requirements, e.g. on publishing your findings?
- Will the funding agreement allow you to comply with all relevant university policies, e.g. intellectual property, code of conduct, etc.?

Just to focus on one of these points as an example, if your research project requires some highly specialised piece of equipment, you might look at the ARC's 'Linkage Infrastructure, Equipment and Facilities' program. This provides funding for large cooperative initiatives so that expensive infrastructure, equipment, and facilities can be shared by researchers in partnered organisations. Some of the equipment for which funding was won in past rounds included a cellular image acquisition and analysis system; a video analysis suite for the integrative analysis of resource acquisition behaviour in animals; a facility for light metal powder processing; and phase two of the AustLit service for Humanities and Education researchers.

It can also be useful to look outside your traditional funding sources if you have already won research grants. For example, if you have only ever applied for an NHMRC grant because you are in a medical research field, look at the ARC for additional opportunities, perhaps teaming up with some 'non-medical' researchers.

Another thing to bear in mind is that you should not waste time applying for the impossible. This does not mean that you should abandon your aspirations, but you need to be realistic. There is no point in applying for grants in areas where you have no track record. (Refer back to Topic 2 and the 'building blocks' strategy.) Peer feedback is particularly useful in checking your likelihood of success.

One of the most simple things to remember, and perhaps so simple that it is often overlooked, is to read carefully the rules associated with any grant scheme to which you are applying. Failure to do so can easily lead to small errors with larger consequences. For example, if you apply for a grant to the National Institutes of Health (a US government agency), the funding rules require the application budget, requests for funds, and financial reports to be in US dollars. If you were to work out your costs in Australian dollars and failed to convert them in your submitted budget, you might (currently) end up with less funding than you anticipated. The rules also state that the NIH will not compensate foreign grantees for currency exchange fluctuations. While not possible to predict accurately, it does require some contingency planning, and you just need to be aware of these issues when you are considering applying to a particular grant scheme.

If it happens that your grant application fails to be approved at all, you should not simply abandon it. It is important to realise that a significant number of very good applications will not be funded, e.g. there was a 23.4% success rate for 2011 NHMRC Project Grants. The best approach is to save the submission, re-work it over time (with peer feedback if possible), and use it in your next application. Many a successful grant application is one that has been revised from a previous submission.

The next thing to look at is the actual funding. One of the painful lessons researchers soon experience when applying for research grants is discovering that grants do not cover 100% of the costs associated with a project. As an example of this, in the 2011 grant announcements for ARC Discovery Projects, the average funding per approved project for 2011 was only 55.3% of the average amount requested.

You will need to think about how you will address a reduction in funding relative to what you have requested. The response is certainly not to do more for less, as this can jeopardise your ability to achieve a high-quality outcome. You need to explore what can be done for what is offered, and rethink the scope of your proposal. This may mean revising your proposal in the light of the funding and informing the granting body.

Another possibility is to seek multiple funding sources to make up the shortfall (maybe consultancies) and building research networks. You should check university resources on the web, talk with business development managers within your organisation, etc. Knowing where to find these resources is an important aspect to being a research leader.

One of the sources that you may attempt to access is of course your own university, as they may well have some strategic research funds. However, it is important to point out that they do not have the fabled 'buckets of money' for you to use to solve the problems of the world. It is to be expected that universities will use their limited funds strategically, possibly focussing on support for emerging research areas, or early career researchers, or national research strengths with the potential to bring in more funds. One of the aspects that many universities may look for is the extent to which any funding provided can be used to leverage additional external funding, so again you may be looking for a package of funding.

Another aspect of the grant-funding process of which you need to take account is the fact that universities typically allocate some of the grant funds to central administration and some to faculties and/or schools. The flow-on to the individual will vary from university to university. This is necessary to cover the indirect costs or overheads of providing the infrastructure needed to support the research activity undertaken. This can include administration, physical plant operation, and maintenance, building use, electricity, and academic services such as the library and IT facilities. Different universities have different models of funding distributions.

You will need to be aware of this when preparing your proposal, so that you are not caught unawares. The infrastructure levy assists with the direct costs of supporting your project. These policies also ensure universities are fair in competing with external agencies, under the National Competition Policy. They place a fair value on the services that universities offer.

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3.2 Promoting your proposal

Once you have decided on the grant scheme to which you intend to apply for funding, you need to think about the most effective way to promote your proposal.

For better or worse, this is primarily a marketing exercise, not the production of a fully-fledged academic paper. As with all marketing, you need to attract attention quickly. The first sentences are critical. It is instructive to note that in the ARC assessment process for Discovery Projects the bottom two-thirds of all applications are usually excluded within about 10 minutes. This is because there are a large number of applications and limited funding. To highlight this point, in the 2011 funding outcomes for its Discovery Grants, the ARC reported that of the 4,230 proposals which were considered for funding commencing in 2008, only 931 were approved for funding. This gave an overall success rate for grant proposals of 22.0%. (Source: http://www.arc.gov.au/ncgp/dp/DP11_selrpt.htm#4)

In preparing your proposal, there are a number of factors to keep in mind. Your application needs to succinctly but fully describe an innovative or novel problem, hypothesis, or challenge. It needs to describe how you and your team, based on your experience and expertise, are best placed to conduct the proposed research. The detail of the actual research needs to balance technicality and accessibility, avoiding too much technical jargon. You need to put forward a plausible approach, and back up your claims with evidence. Basically, the funding body is going to be looking for a high-quality outcome.

In considering the actual resources required, don't over-ask and don't under-ask. Wanting to do something truly amazing is admirable and understandable, but will not look too good if you are then unable to deliver it. A lack of realism may create the impression that you have a poor understanding of the problem or poor research methodology. You also must be able to justify each aspect of your proposed budget, e.g. the level of staff necessary to support your research.

As with the earlier scoping of your research proposal, this is another time when you should seek out feedback from your peers, colleagues, etc.

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3.3 The politics of funding

Probably one of the most fundamental aspects of producing a successful research outcome funded by an external organisation is to listen to your stakeholders, and make sure you understand exactly what it is they expect. You need to have set clear goals upon which all parties can agree.

You also need to be politically astute and aware when undertaking research for which the application may be unclear. There is an example where a team of researchers were funded to conduct research into ice-sheet stress and impact in Antarctica. As it turns out, and unknown to the researchers, the findings were to be used to establish a runway in Antarctica on which to land a jumbo jet (this being many years before a runway was established). Had it gone ahead and had the plane fallen through the ice, the legal consequences could have been very serious. This highlights the need to engage with your stakeholder to develop and maintain the relationship, something which is discussed further in 'Module 2: Commencement and Collaboration – Putting Ideas Into Practice'.

Another matter to consider at this stage is whether or not the commercialisation of your research project outcome is part of your goal. There are a lot of complex issues related to the successful commercialisation of research, including legal agreements, intellectual property, finance, etc. Obviously, becoming involved in the commercial world is not necessarily something in which all academics are experienced or even comfortable.

You will definitely need to seek specialist advice to avoid the pitfalls, and your university should have a specific business unit to assist you, whose services include packaging and marketing university technology for investors, licensees, and potential partners. Such a unit will also be able to advise you about the pros and cons of contract research, consultancies, etc.

To give you an idea of the sort of successful business ventures that have evolved from university research, here are some examples, this time from the University of Adelaide:

- GroPep Limited, a biopharmaceutical company.
- Reproductive Health Services Pty Ltd, a company focused on the development of diagnostics for reproductive and fertility applications.
- Optimatics Pty Ltd, a South Australian engineering firm which provides a global consulting service on water distribution systems.
- New wheat, barley, and faba bean varieties with improved production qualities and ergonomic traits have been licensed for commercial use.
- Mudpack Software, licensed to seven major power companies to assist in managing blackouts.
- Innovative air-conditioning technology licensed to local start-up company Dadanco Pty Ltd.

More about the specifics of commercialisation is covered in 'Module 4: Intellectual Property and Commercialisation'.

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3.4 The consequences of success

Naturally, the prime objective of this exercise is to develop a proposal and win a research grant, and you will be very happy when this occurs. However, before you make the final commitment to submitting your proposal for consideration, it is worth taking time to make sure you fully understand the consequences of success.

As you know, if you receive funding you have a responsibility to deliver the project for which you are being funded. Are you sure that you can commit yourself sufficiently to achieve the desired outcome? For example, you may already be involved in other projects, you may have a heavy teaching commitment, or there may be personal reasons which could restrict you, etc.

Do you clearly understand what the granting body wants delivered and when they want it? As mentioned before, there must be clear communication between yourself and the funding body, communication which will need to continue throughout the life of the project.

Have you thought what might happen if you don't deliver? Depending on the reason, if you mess up a grant it will reflect badly on your track record and can be a backward step in your career.

One final thing to consider relates to the risk versus benefit of a particular funding agreement. Are you sure that the funding body will deliver its contribution to the project? This issue is primarily related to in-kind contributions. For example, there have been instances where one of the key contributions for the successful completion of the research project is access to a database. However, this access was considerably delayed or was never made available for one reason or another, creating difficulties for researchers and students.

The next topic within this module relates to project management – helping you to plan what you are going to do once you have a grant, and managing time and quality.

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Topic 4: Basic research project management principles

The first three topics in this module provided you with some guidance on how to create a research project concept and proposal. This final topic explores the process of planning and managing the research project to ensure its successful achievement. It will examine the different tools and strategies that can help you design and manage your research project, and will outline the key coordination issues you need to address. The topic will primarily focus on the various elements you need to build into your research project plan, but it also provides a broad overview of how these same principles translate into the implementation and evaluation processes throughout your project life-cycle. This topic therefore provides a framework from which the other FRLP modules operate.

Learning outcomes

Upon successful completion of this topic you should be able to:

- Identify simple project management principles applicable to research projects;
- Apply basic project management tools to plan and control your project;
- Manage projects to ensure they remain in-scope, within funding limits, and of high quality;
- Deploy your research team and resources more effectively to achieve the project outcomes;
- Develop an effective project plan to guide all stages of the research project;
- Adapt research projects which do not readily fit into a project management framework into a state in which they can be managed readily; and
- Outline how unstructured research projects can be supported through project management methodologies.

Topic content

Activities

There are three activities in this topic – Activities 5, 6, and 7.

Activity 5 is part of Topic 4.2.

Activity 6 is part of Topic 4.4.

Activity 7 – Creating your own project plan
(Complete Activity 7 after you have worked through all the subtopics.)

If you have a project of your own, review the project plan elements listed in Topic 4.12 and consider what would go into your project plan. You can download a project plan template via one of the links below to assist with this.

Project Management Template (MS Word Format)

Project Management Template (RTF Format)

If you do not yet have a project ready to build as a plan, consider the types of issues or challenges that the 'Hi tech in the outback' project might need to address in order to develop a plan.

We will explore the template in the Workshop from these two different perspectives, so please come prepared with some ideas and thoughts.

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4.1 Research project management

Project management is an important technique for managing the timing, integration of tasks, and overall flows of work. While it was originally introduced to manage technical projects, it is of great benefit when complex intellectual processes and inputs require careful coordination. As the review of research projects in the module 'Settling In' (Topic 5) outlined, there are many complexities which can impede the successful completion of your research project. The use of some simple principles from project management methodology can greatly assist in bringing your project to a quality conclusion with the desired outcomes that you initially identified. It helps to keep you on track and to clarify the critical tasks that should be completed.

Project management adds value by:

- Assisting the researcher to logically manage a project to its successful completion;
- Systematically planning all components of the research;
- Integrating various stages and people to ensure the necessary time and resource issues are addressed;
- Recognising possible barriers and issues, and addressing these to ensure they are accommodated or avoided;
- Integrating planning and control of tasks, people, funds, and facilities;
- Effectively managing stakeholder relationships, particularly through regular communication and interaction; and
- Identifying and managing risks.

Project management employs many useful tools to ensure everyone knows what is required, how it should be done, and who is responsible for the outcomes. It is a process of planning ahead to get the outcomes that are required. This topic will first explore the main principles and methods that can be readily applied to research projects. It will then examine the different phases of research projects and explore how the project management principles can assist in the progressive execution of the project.

Over the course of this topic we will explore how a project plan is developed and what might be included. The plan is a working document – much like your research, in that it clarifies what should be accomplished, by when, by who, and to what quality. However, it is more comprehensive than the research proposal you submitted for approval, as it will also clarify research management activities to be undertaken. It offers a comprehensive overview of the different research, management, and leadership activities that need to be monitored and implemented at various stages of the project. It is readily adaptable to accommodate planned shifts in the project, or changes to resources, outcomes, or context. It is therefore an invaluable tool that can greatly assist in clarifying roles, expectations, intended outcomes, processes, and responsibilities.

Before we delve into project management, it is useful to note that for this topic we will simply use the term "researcher" to describe the role of the research project manager. In larger projects, there may be a dedicated person who is funded to coordinate the many different activities that are to be undertaken. This is highly desirable and increasingly supported by funding bodies. In smaller projects, the role of research project manager is likely to be undertaken by the research leader or a supportive team member. For the purposes of this module we will take this approach, as it is likely that you are the project manager.

First, take a moment to review your personal experience of research projects. Were they well managed?

Activity 5 – Managing research projects: a self-review

Consider your current or a recent research project. Circle any of the following which are research project management challenges for you or your research leader with whom you work. (If you wish, you can print out this subtopic using the print icon on the Organiser page.)

1 = Very high challenge 2 = sometimes a challenge 3 = rarely a challenge

Typical Challenge	Frequency
Poor pre-planning	1 2 3
Lack of priority setting	1 2 3
Crisis management	1 2 3
Shifting priorities	1 2 3

Distracted by other projects and activities	1 2 3
Leader too busy to meet with the team	1 2 3
Team poorly directed/utilised	1 2 3
Attempting too much	1 2 3
Disorganised project area	1 2 3
Failure to monitor outcomes and progress	1 2 3
Limited understanding by team of the goals of the project and where it is heading	1 2 3
Limited conveyance of the project goals and directions to the team	1 2 3
Poor coordination of interdependent activities across team members	1 2 3
Limited engagement with the stakeholders	1 2 3
Ineffective delegation	1 2 3
Poor follow-through or recognition of achievements	1 2 3
Procrastination; indecision	1 2 3
Tendency to add new activities into the project	1 2 3
Lack of self-discipline in completing required contributions	1 2 3
Leaving tasks unfinished	1 2 3
Poor quality outcomes	1 2 3
Ineffective or time-wasting meetings	1 2 3
Administrivia: paperwork; red tape	1 2 3
Records not kept	1 2 3
Inconsistent practices/systems	1 2 3
Other challenges you have identified:	1 2 3

These are quite typical research project challenges. They are symptomatic of projects that have been commenced with a research design that has not been sufficiently developed into an effective plan, or well managed. If you have marked '1' or '2' against different responses, you have no doubt experienced the frustration of working in projects that could have been better managed. This topic will offer you guidance on how to avoid these pitfalls in your own research projects.

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4.2 The project management process

As a researcher your first actions will be focused on the initial design and costing of the research and then, once funds are awarded, progressing the agreed research. Good project management operates across the entire project life cycle to clarify the major tasks to be accomplished and ensure the necessary processes are clearly costed, planned, executed, and monitored. Research project management can also monitor the intellectual outcomes of the project and check that the intent of the research is reflected in the outcomes. The following processes underpin good research project management.

- Develop a detailed plan which clearly documents activities, roles, responsibilities, outcomes, and progress indicators which are reflected in the research project;
- Regularly review the implementation of the research to ensure the evolving research matches what was planned;
- Modify the plan, or modify the implementation of the research, if needed, to refocus the activities;
- Regularly communicate the status of the research during implementation to participants and stakeholders.

Use of some basic project management techniques will ensure your research project achieves its defined objectives and costs and delivery times are controlled. These methods also assist less experienced members of your team, as they clearly define and communicate the expected outcomes and contributions. The process assists in ensuring the project is managed logically to a successful completion. It encourages systematic planning, integration of the critical processes, stronger oversight of the project team, and management of relationships, risks, resources, and time.

Module 1: Research Strategy and Planning

4.3 Project management areas

The PMBOK model (Project Management Body of Knowledge) (PMI, 2008) is one way to articulate project management. It usefully reflects the main issues that are likely to emerge and require management during a research project. The basic framework of the model is to see a project in terms of four distinct development phases – design, planning, implementation, and closeout – and nine knowledge areas that require planning and control across those four phases. The nine PMBOK knowledge areas are briefly described below, along with research and stakeholder management, two important additional elements that must be considered when managing research projects.

4.3.1 Scope management

Scope relates to the intellectual content of your research and the directions it will take during the project. Scope defines what you will and will not do. You will have undertaken some of this conceptual work in preparing your grant proposal. However, there is benefit in defining the scope more closely – particularly at the design phase as it ensures you are fully aware of the likely resource implications of the project. At later stages, it is equally important to ensure scope remains focused. It is very easy to have the project grow or evolve into something different. Thus, the term 'project creep' is very relevant to research projects. We have probably all had experience of looking at new results and wondering "What if we follow that path instead?" Project management helps us maintain a tight control over what is done, so that any changes of direction are intentional and considered, not unplanned. It helps us maintain an awareness of the agreed outcomes.

Since scope describes the outputs or goals to be achieved through the research, it is the primary element which assists in framing the research activities. Managing scope is the first and most important element in managing the whole research project.

4.3.2 Time management

Time management estimates and monitors the times taken for the project activities or stages. Activities need to be defined, the times required to achieve these activities determined, the activities need to be sequenced, and then monitoring of those time-frames becomes part of the regular review process.

In a research project it is hard to estimate the time that a particular activity will take to reach completion. However, the process of thinking about a task and what may be required helps to anticipate any likely blow-outs in scheduling, and can ensure we do not have people twiddling their thumbs waiting for others to finish their agreed work. This process also ensures we monitor the milestones that need to be completed, and check that they are happening in a timely manner. By planning for reporting and considering other elements of the project requirements (such as relationship management), we are also better able to monitor the many different strands of project activity and ensure all necessary tasks are undertaken. This is a particularly valuable contribution that project management can make to your research project.

4.3.3 Cost management

Cost management involves estimating the costs of the research activities and then monitoring those costs to ensure the research project stays within budget, or, alternatively, determining what is required to bring costs under control.

This may sound obvious, but in research projects it can be far from easy. A research project normally operates from an agreed funding allocation which is allocated at the start of the project. The project is then required to operate within those parameters. But unanticipated project costs can emerge: the cost of supplies for experiments may rise; there may be an increase in staffing costs due to a new enterprise bargaining round; an experiment might go horribly wrong and require redoing – or the project may simply escalate above the agreed budget. The value of project management is that regular reviews of the budget are undertaken and action to address likely funding concerns can occur in a timely manner. The project management methodology encourages more careful oversight of costs.

4.3.4 Research management

You will have certain requirements that need to be fulfilled to meet the contractual requirements of your university or the funding agency. They may relate to legal, ethical, or reporting requirements. They will require ongoing oversight and management throughout the project life cycle. Scheduling these expectations into the project plan ensures you do not forget critical obligations.

4.3.5 Quality management

"The project was really racing along and my postdoc was a great support. She said to me 'Leave that part of the experiment with me ... I have done this hundreds of times.' So I did. And six months later we

discovered that the technique she had been using was wrong and we had to write off that entire phase of the research. I realised that I should have put a lot of checks in place to make sure that she knew what she was doing, that it was the right process, and that I was assured that we would reach the outcome we needed." [Real anecdote from a research leader].

Quality management ensures the project activities support the aims of your research and reflect the sponsor's expectations. It also measures the consistency of delivery of outcomes. Quality management is largely achieved by specifying processes required to deliver results, identifying the cause of any problems, dealing with the root causes rather than the symptoms of the inconsistent outcome, and building a common understanding across the research team of the quality expectations.

In a research project context, this can mean making sure all members of the research team clearly understand what standards should be followed, creating templates for record keeping (so that consistent data and history is captured), implementing regular peer review or project review processes (to check that the processes are being followed), and clarifying at the start of the project how you will deal with any quality issues. Early determination as to how quality assurance will operate can avoid many conflicts and anxieties later. Again, if regular reviews of project progress are included in the project oversight, issues relating to poor quality outcomes or delivery can be addressed quickly and rapidly.

4.3.6 Risk management

A risk is a possible future event which may harm your research project. It is important you identify potential threats to the success of the research project and develop a treatment plan to help reduce or eliminate any hazards. This goes well beyond the safety and health issues in laboratories. It can relate to reputational or relational risks, the loss of critical researchers, experimental failure, and many other potential issues. This will be more fully dealt with in 'Module 5: Financial and Risk Management' where the process of risk management is reviewed. However, at this point, it is important to recognise that many of the risks can be anticipated and monitored through your project plan.

A good way to approach risk management is to consider what might go wrong with respect to reputation, deliverables, team composition, budget, quality, project creep, and any other element that makes the project vulnerable. By anticipating any likely problems, you can introduce contingency planning to reduce the likelihood of that issue emerging. As part of your planning, you will benefit from periodic reviews of things that have gone wrong so that there is a record of what should be avoided in subsequent projects. This is best accepted as a whole team responsibility, as many risks can remain invisible to the leader but can still undermine the project's progress.

4.3.7 Human resources management

Managing human resources involves defining the roles and responsibilities of your research team members, managing the university's obligations to the team members, and leading your team to achieve (or exceed) the project goals. This is covered in more detail in 'Module 7: Managing and Leading People in a Research Context'. In this topic, though, we will explore work roles and work loads as they relate to the project activities. Project management assists in checking for underload and overload and clarifies the interdependencies of different members. It also clarifies who is responsible for certain project elements.

The planning relating to human resources management may include elements relating to recruitment and employment of new staff as well as building an effective team. The research team requires careful nurturing, as in this way effective systems are established and a positive and inclusive culture is promoted. Mentorship systems and sponsorship of junior researchers may be factored into your planning. You will also need to consider how much communication, coordination, and monitoring of team members will be required. A highly competent experienced researcher would be greatly offended at being closely monitored as to performance and task completion. A very junior researcher would find it very useful in the commencement stage, but may require less supervision over time – particularly if a good project plan is operating. Good project management can assist with these delicate processes by allowing latitude within a clear framework of performance expectations, role delineation, and clear outcomes.

4.3.8 Stakeholder management

Research is strongly reliant on good relationships with stakeholders. There are many different groups that may have expectations about the research, particularly those groups that have invested their own resources into the venture. Stakeholders can include research agencies, ethics committees, your school or faculty, the university research service agencies, industry partners, overseas collaborators, the wider community which will benefit from your research, and many others. As part of your project management strategies you should consider how you will communicate and regularly interact with these parties. You might also review the ways you involve them in research planning and development, and what types of reporting will be required. Ongoing relationships and new collaborations or partnerships should be a priority during the research process.

4.3.9 Communication management

To ensure the dissemination of relevant project outcomes and updates, you need to develop and oversee delivery of a communication plan for your research project. Communication management includes developing a plan to keep research team members, and other interested parties, informed of the progress of the research and of emerging issues. You are also advised to think of ways in which information about your project can be promoted. A website may be one strategy you might identify. Some media releases at key points in your project might also form part of your planning.

4.3.10 Procurement management

Your project will have various supplies and equipment to be sourced up front, and sometimes on a regular basis for the ongoing research. Planning for procurement ensures there is enough time allowed for the sourcing and supply of materials. It also encourages consideration of the processes which your university

may require for purchasing or leasing. You may also need to have staff trained in using the necessary systems. All of these issues need to be anticipated in your project plan.

Procurement management therefore encompasses the acquisition of any resources you need for the research project, including the organisation of outsourcing where relevant. Procurement may also include negotiating agreements, equipment acquisition (purchased or leased), and consumables sourcing. It also addresses what will happen to fittings and resources after the research project is completed.

4.3.11 Integration management

Integration management monitors the coordination of the other ten knowledge areas to ensure the different elements are sequenced appropriately. This is a very critical part of the project process, particularly in a research team where different people may be working interdependently. Integration management ensures that people have a sense of what each team member is doing, when elements need to be completed, where blowouts are likely to occur, and how the project components mesh. It also guides the scheduling of progress meetings to ensure interdependent processes are effectively coordinated.

Activity 6: What makes projects challenging?

Reflect on the last two or three research projects in which you were involved. Select the project you found most challenging and consider the following questions:

- Who was the project manager? (How did you know and was it evident at the time?)
- To what extent were you aware of the eleven knowledge areas being addressed in the phases you witnessed? Were they well managed? Why? Why not? What was the worst area? How did it impact on the project?
- Were there issues in these research projects which may have been better managed by having a more explicit project management approach?

You have no doubt identified a number of areas where better practice could be achieved. The next subtopics explore some of the more useful project management tools that can assist in managing these various issues.

Reference

PMI (2008). A Guide to the Project Management Body of Knowledge, 4th edition, Project Management Institute. http://www.pmi.org/PMBOK-Guide-and-Standards/Standards-Library-of-PMI-Global-Standards.aspx

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4.4 Developing a Work Breakdown Structure (WBS)

So far we have explored how you provide a clear picture as to the research project intent. However, the scoping statement does not offer sufficient guidance to actually cost and later manage the project. Many research projects are poorly estimated in terms of time, resources, and costs due to poor breakdown of the tasks to be undertaken. This can cause severe problems when the funding fails to cover the true demands of the project, or the project is unable to deliver the promised outcomes.

A particularly valuable tool is a Work Breakdown Structure (WBS). This is a simple representation of a project showing how the parts of the project fit together. It offers guidance on the structure of the research by providing a simple hierarchy of tasks and activities to ensure the project objectives and deliverables are clearly identified and managed.

A WBS helps you to:

- Identify the various tasks that need to be undertaken, including when and by whom;
- Clarify the interdependencies between different parts of the project;
- Assist communication to team members as to their role and duties;
- Provide a basis for scheduling, cost recording, and responsibility assignment; and
- Clarify the various research elements and stages.

The WBS creates a framework to enable you to consider the following critical issues:

- **Define**: What needs to be done?
- **Sequence**: What comes before this activity and what after?
- **Date**: How long will it take?
- **Allocate**: Who is responsible for ensuring it is done?

An effective WBS can be very powerful in communicating many things to the project team. Its contribution includes:

- communicating the structure of the research project;
- ensuring activities support the research goals and are within cost and time requirements;
- highlighting important or risky work;
- mapping requirements, plans, criteria, and deliverables;
- fostering clear ownership by research team members;
- providing data for performance measurement and historical data collection;
- guiding all stakeholders as to the project goals and processes.

4.4.1 How WBS works

The WBS operates as a structured list of tasks that need to be completed during the project. At the top level of the hierarchy, the activities may be more a description than a specific activity to be executed. At subsequent levels, each defined task should be executable, measurable, and assignable. You should be able to say who will do it, how long it will take to do, and how it links to other tasks. The process of developing the WBS is relatively simple, but likely to take several attempts, as the first effort may, after reflection, require further refinement.

There are various ways in which you can develop a WBS. If your project is large and highly complex, it is worthwhile using project management software (e.g. Microsoft Project) to assist with linking the various tasks, contributors, timelines, and processes. It is a useful tool to employ. However, you can still create an effective WBS using some very simple and unsophisticated techniques with post-it stickers. We will use this technique to demonstrate the principles.

There are various steps involved in the WBS exercise. These are described briefly below and then we will see how that translates into a practical example.

1. Identify all the tasks required to accomplish the research activity. Be very specific and write each onto its own post-it sticker. Use active verbs to describe each task. E.g. Identify key stakeholders to be involved in the project.

2. Place these on a large wall or chart that will allow you to shift and re-order the stickers.

3. Look closely at the tasks/activities you have listed. Would a novice know what needs to be done by looking at this list? In all likelihood, you will find that you have assumed a high level of competence and background knowledge that may not exist. Add more post-its with more specific tasks and keep refining the tasks as you delve into each activity. Some good questions to ask include: What are the main tasks we will need to do? How will we do that?

To illustrate, if you were to do a survey of mining workers on their residential needs, you might write: "Survey fly-in/fly-out workers" as a broad description of a project area. But there are many activities associated with this: reviewing past research and the literature, seeking research ethics approval; working with Cozinca HR staff to get approval and access to the staff list; getting a mailing list organised; drafting the survey; creating an online survey and testing it with a pilot group; setting up the analytical database, administering the survey; following up on non-respondents; inputting data; analysing the results; reporting back to stakeholders, etc. Each of these tasks needs to be separately listed as it may be undertaken by different members of the team and it requires consideration of the time and costs involved. When projects only operate at that broader conceptual level of "conduct a survey" there are real risks of having time and cost blow-outs and omitting critical planning/execution elements, particularly when less experienced research members are involved.

4. Think about involving several people in this WBS process. The more critical thinkers there are, the better. Put yourself into the mind of the least experienced team member. What do they need to know to support the project?

5. As you work with the activities, you will see the need to re-order some elements and expand others. Once you feel they are well defined, regroup them into a hierarchical framework where the different objectives are listed together logically and sequentially. Check to see if the sequence is right – have you listed something ahead of a prior task that needs to be done first? Have you missed any crucial steps? Are some of the tasks too big? Do they need more definition?

6. Once you have identified the research project components, come back to the other elements that need to be managed in your project. What reporting requirements must you meet? Make each of those a new task. How will you coordinate your project team (e.g. meetings, quality checks, etc.). List those as additional tasks. What HDR supervision milestones must you manage? How will you liaise with your stakeholders? Every element of the project needs to be included in your WBS. The more fine-grained your early planning, the better.

7. Finally, test the quality of your WBS: does it fully capture your objectives? Are your research deliverables achieved through the tasks you have listed? Have you met all research requirements?

8. While you have the post-its clearly displayed, you may also wish to estimate how long each task might take. List your estimate in days, or parts of days, as this assists in planning your overall timeline. Make sure you allow for waiting time. For example, getting ethics approval for your survey may be quite a lengthy process – while the writing of the application may be efficient, the committee may only meet monthly and it may take several more weeks to advise you of the outcome. It may also want further information or changes to your protocol. In all, you may need to allow 8 weeks at least from seeking approval to receiving it. This will have an impact on your project timelines.

9. At the same time as you are thinking about time requirements, you may also wish to consider people requirements. Who will be responsible for this task? Place their initials on the post-its so that you can start to see who is likely to have large demands at particular times, or who might be available to assist at critical points in the project execution.

10. Once you are happy with the ordering and breakdown of the tasks, capture it in a table so that you can work with the information in different ways. Give each discrete task a hierarchically-based number so that it is clearly nested within a broader structure and related to other activities that need to be undertaken to achieve your objective. List in separate columns the estimated days and the person responsible.

The following example illustrates how a WBS might look for one small element of the Cozinca project relating to one objective. You will see that there are various levels of detail, ranging from broad scoping (e.g. 1.0) to quite detailed activities at 1.2.1. Each of these activities can be further delineated in a similar way.

Figure 2: A Sample WBS: Developing an educational blueprint

Objective:
Investigate and identify design features that might be included in a mining town educational facility suited to school children and adult learners.

- 1. Research state-of-the-art educational facility design.
  - 1.1 Investigate existing literature on educational facility design.
  - 1.2 Visit educational facilities to identify desirable practice.
    - 1.2.1 Contact leading educational architects to identify suitable venues.
    - 1.2.2 Contact identified school facilities to arrange the visit.
    - 1.2.3 Organise visiting panel schedule, accommodation, and flights.
    - 1.2.4 Arrange transportation.
    - 1.2.5 Undertake visits, take photos, and discuss options with school members (including students).
    - 1.2.6 Write report on visit findings.
    - 1.2.7 Present report on visit findings to community advisory group.
    - 1.2.8 Confirm desirable elements to be included in educational blueprint.
  - 1.3 Conduct interviews with local leaders, parents, and students on desirable elements for a new educational facility.
  - 1.4 Conduct focus interviews with mining staff and their families on desirable elements for a new educational facility.
  - 1.5 Develop models of possible designs and consult with stakeholders as to the suitability of the designs.
- 2. Clarify the educational requirements of the new facility.
  - 2.1 Review the literature relating to educational and curriculum design.
  - 2.2 Investigate educational learning models in comparable regional communities.

    - 2.3 Evaluate the educational enhancements possible through a high technology educational infrastructure.
    - 2.4 Identify potential educational options for adult learning.
    - 2.5 Review the requirements for providing vocational educational options.
- 3. Develop a draft educational blueprint for review by community and Cozinca stakeholders.

Hopefully you can already begin to see the benefits of using WBS as a project management tool. It can save you considerable time in communication alone, as every team member can have a copy and the information can be structured in various ways. It also ensures all critical tasks are identified and planned well ahead. It can operate as a quality assurance tool and for discussing project progress with the team. It has sufficient flexibility to be revised as needed while also preventing project creep. Its benefits don't stop there. The next section outlines how the WBS can be represented in many different ways: as a monitoring device, timeline tool, or a workload allocation tool.

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4.5 Employing the WBS in your project planning and management

As noted earlier, there are three major ways in which the WBS can be enhanced. First, you can use the breakdown to clarify how much time needs to be allowed for the project activities. This is particularly valuable in identifying bottlenecks (like the ethics approval delays) that will need to be factored in to your planning. Second, you can clarify the various activities that are interdependent and which need to be carefully planned to allow for the delays that occur while you await the completion of prior tasks. Third, you can estimate how many people (and who) need to be involved in particular activities. This assists with your planning for casual support or research assistance. Each of these options is briefly illustrated in this sub-topic.

4.5.1 Using the WBS to assist with time management

The WBS construction allows for clear depictions of the time required to complete each task. 'Gantt charts' operate from these concepts, showing the duration of the tasks and when they occur, along with the times that need to be allowed for waiting. They can reflect all the activities to be done. Figure 3 illustrates a Gantt chart for a small portion of the WBS outlined in Figure 2.

Figure 3: Gantt Chart sample

Objective	Year 1								Year 2											
Month	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1.0 Research state-of-the-art educational facility design.																				
1.1 Investigate existing literature on school design																				
1.2 Visit school facilities to identify desirable practice																				
1.2.1 Contact leading educational architects to identify suitable venues																				
1.2.2 Contact identified school facilities to arrange the visit																				
1.2.3 Organise visiting panel schedule, accommodation and flights																				
1.2.4 Arrange transportation																				
1.2.5 Undertake visits, take photos, and discuss options with school members																				

(including students)																			
1.2.6 Write report on visit findings																			
1.2.7 Present report on visit findings to community advisory group																			
1.2.8 Confirm desirable elements to be included in educational blueprint																			

4.5.2 Identifying interdependent tasks

The WBS will identify various tasks across a range of different activities. As the various elements are identified and listed, it will become apparent that many are interdependent. They will rely on other tasks or project outcomes to enable their progress or completion. The WBS highlights these interdependencies to the research teams and assists in communicating and coordinating their efforts. The research supervisor will also be more conscious of monitoring progress as these interlinking outcomes are clearly identified. If a critical element is likely to hold other activities up, additional resources might be allocated, or careful oversight might be necessary. This can be simply identified by listing the prerequisite tasks for the different elements. The visible depiction of dependencies also alerts the research team to those elements which can impact on the research group's effectiveness.

The WBS also allows the team to identify milestones and highlight those to the team. Milestones will vary according to the project, but they generally signal the achievement of a deliverable or major outcome. This is a time for celebration, evaluation, and reporting.

4.5.3 Clarifying responsibilities and workloads using the WBS

Once the research tasks are clarified, responsibility needs to be allocated for the task and its management. This is readily done using the WBS, as the table below illustrates. The research team can have a clear understanding of who is responsible and who else will be assisting in that task or process. The sample below offers you an illustration of how that might appear.

Figure 4: WBS activity detail sample

WBS Activities	Prior activity	Estimated duration	Responsibility	Team members
1.0 Research state-of-the-art educational facility design				
1.1 Investigate existing literature on school design		**20 days**	**SD**	
1.2 Visit school facilities to identify desirable practice	**1.1**	**7 days**	**LB**	**SD, AM, JM**
1.2.1 Contact leading educational architects to identify suitable venues	**1.2**	**3 days**	**AM**	
1.2.2 Contact identified school facilities to arrange the visit	**1.2.1**	**3 days**	**AM**	
1.2.3 Organise visiting panel schedule, accommodation, and flights	**1.2.2**	**5 days**	**AM**	
1.2.4 Arrange transportation	**1.2.3**	**2 days**	**AM**	
1.2.5 Undertake visits, take photos, and discuss options with school members (including students)	**1.2.4**	**7 days**	**LB**	**SD, AM, JM**

1.2.6 Write report on visit findings	**1.2.5**	**10 days**	**SD**	**AM**
1.2.7 Present report on visit findings to community advisory group	**1.2.6**	**10 days**	**LB**	**AM**
1.2.8 Confirm desirable elements to be included in educational blueprint	**1.1 1.2.7**	**10 days**	**LB**	**SD, AM**

A particular advantage of WBS is the realistic costing of research personnel. In many research projects there is a tendency to underestimate the time a project or task will take. High peak demands at particular times in the project may also be under-considered. The WBS ensures that the project is considered in sufficient detail to guard against cost blowouts. This will enable careful management of the various resources and ensure that the project progresses in an efficient manner.

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End example.

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4.6 Overview of project management strategies: design phase

Most of the value from project management processes is added during the design and planning phases of the project, when all of the complexities of resources and idea management need to be revealed and layered. The big advantage of project management is that any work undertaken in these two phases guides and operates across the subsequent stages of implementation and closeout.

At the design phase you may or may not be seeking a research grant. Your project planning is readily transferred into a grant proposal, and in fact will ensure your proposal is much stronger, as you will be more realistic in your estimate of resources and timing. It also allows you to see if the project is achievable in that research funding context. All of these considerations make the project more manageable.

The following questions and prompts are designed to help you consider the issues you may need to address in your development of the project. They are briefly highlighted here and will be explored more fully in other modules.

Knowledge areas	Design phase checklist
Scope management	• Has the project scope been defined? Does it match your research capacity? • What is the evidence for the project need and likely value? • What are the project objectives and deliverables? • Are your deliverables realistic? • What are the requirements of your stakeholders? What are your requirements and those of your team? • How does the project fit with the strategic plan of the school, faculty, and/or university? • Can you seek input from other parties as to your project plan? (Seek early feedback if possible) • If you have an established project team, seek their input and ideas
Time management	• Estimate the total time for the research by developing a high-level WBS to identify all likely processes and major demands • Identify any milestones to be achieved • Do you have sufficient time for unexpected contingencies? • Identify the broad estimates of timing to be costed in your project
Cost management	• Estimate the costs of the major research activities, likely staff costs, equipment, travel, rental of offices, etc. Prepare the cost estimate early and revise regularly as new costs emerge • Is there a project costing template you can apply? • Are you applying for research funding? What is your university process? • Are there supplemental funding opportunities you might be able to tap into? • Have you allowed for university overheads in your costings?
Quality management	• Do you need to seek ethics approval? Get started as soon as possible to ensure compliance • Should you establish an advisory group to oversee the research? Who should you invite? • What processes and systems should you establish? Do you need to add time and cost estimates to cover the establishment or maintenance of these processes?

Research management	• Do you have pilot data or previous research that can assist in this new project? • Develop a broad project plan showing the key stages, outcomes, and main relationships between the contributors • Review the project plan to make sure you have covered all elements of your project • Do you need help to plan the research? Seek assistance from your university experts and agencies, including your local school/centre sources
Risk management	• Is there capacity to undertake the project? • Is there sufficient capacity to lead/manage the project? • Is the budget sufficient? • How will you manage non-delivery by research partners? • Are you reliant on others? How will you ensure they remain engaged with your research project?
Human resources management	• Develop profiles of each researcher in your team for use in your proposal and to encourage greater familiarity across the team. Place them on your website if already active • Seek feedback from your team members on the proposed project. Is the idea feasible? The best option? Are the proposed timeframes achievable? • Establish who else might contribute to your project. Is there an opportunity to involve others? Can you involve higher degree students? • Establish your project management team as soon as possible to contribute to the project planning • Set up a regular meeting schedule to progress the project • Develop a policy on publication authoring • Ensure all team members are aware of the project design and outcomes • Encourage contributions from all team members into the project design and proposals • What training will your team require? Is there sufficient capacity to support high demand project periods?
Stakeholder management	• Who are the stakeholders? What do they expect of the project? • If you are seeking an industry partner, how will the project operate? Do you have a good relationship established? How can you strengthen those relationships? • How will a partnering organisation benefit from the research? What are the implications for the research processes? • Do you need support from the faculty or university? Consider preparing a one-page outline of the project to assist with any discussions • Clarify how infrastructure will be shared in cross-institutional projects • Have you engaged early enough with stakeholders? Do you need to undertake a pilot project for proof of concept? • Have you marketed the benefits of the project and the talents of your research team to your collaborators? • Have you defined roles, expectations, and contributions? • Has IP and dissemination of research findings been clearly agreed? • Do research collaborators understand the nature of HDR students and their needs? • Has confidentiality been satisfactorily addressed?
Communications management	• How often do you plan to meet with your research team, partners, and stakeholders? Have you scheduled these in your WBS? • Do you have virtual team members? How will they be kept engaged with your project? • Can reporting be managed through an online website? How will that be organised? • Develop a communication protocol to explain

	who will be responsible for which elements • Consider the media strategy that you will apply over the project
Procurement management	• Do you have somewhere to do the research? Can the research be accommodated in existing facilities? Speak to your head of school about the facility implications of your research proposal • What equipment do you need? What is already available in your faculty/university? If you plan to share available equipment, how will that be managed? • Are you better to buy in bulk for the whole project? • Who will be responsible for managing the resources?
Integration management	• Who is involved in the project? How will you coordinate their efforts? • Where are likely pressure points for the research project? How can you pull in additional resources to assist with those high-demand periods? • Are you reliant on others to perform elements of the research? How will you liaise and ensure they are ready to support your research when you need it?

At your University

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4.7 Overview of project management strategies: planning phase

The design of your research project helps to scope the broad intentions you aim to achieve and provides some specific ideas about the processes to be applied. When you are ready to progress the research (particularly after gaining funding), you will be able to move into detailed planning. At this stage you may need to review the scope and reconsider the costs of the project – particularly if your funding bid was only partially successful. There may also be cost increases, as the project may have experienced delays while the funds for the project were allocated. Some of the major activities during this planning process include developing the detailed WBS and project plan, recruiting your team members, and establishing your research facility. During the planning phase you will want to ensure that:

- Project objectives have been clearly defined;
- Project team members are competent;
- Project is supported by management;
- Resources (time, money, people) are likely to be sufficient; and can be maintained;
- Milestones match the schedule and required deadlines; and
- Quality is controlled by the use of defined processes, checking mechanisms, and review.

This is the critical stage of research project management, as the plan you put together at this point will drive the subsequent research process. The checklist below offers a number of prompts that assist in good project planning. Note that many of these relate to the establishment of good processes and systems so that all the team are kept informed and knowledgeable about your research and its progress.

Knowledge areas	Planning phase checklist
Scope management	• Review the scope and objectives of the research and confirm they are still appropriate. Revise your project plan accordingly • Prepare a detailed WBS outlining the key tasks, contributors, and roles • Review and confirm your milestones and deliverables
Time management	• Estimate the total time for the research • Identify any milestones which should be included in the plan • Review the WBS time elements to identify any activities that require careful management • Check that the research team are able to devote the appropriate amount of time to achieve the deliverables
Cost management	• Examine the WBS and estimate the costs of the major research activities • Estimate the costs of equipment, travel, rental of offices, etc. • Prepare a preliminary budget based on the agreed breakdown of costs • Set up the project fund account and identify the budget to be committed to each element • Establish protocols for expenditure, with 1–2 people maintaining oversight of the budget • Plan for regular reports on expenditure and regular reviews of project costs for particular components
Quality management	• Identify quality assurance requirements and develop strategies to monitor quality and risk • Develop a process for team members to follow • Train research team members to follow the process • Audit the team members to ensure they are following the process • Establish a protocol to deal with incomplete, unsatisfactory, or unsuccessful outcomes
Research management	• Review the conditions of the grant and ensure any reporting or deliverables are included in your project planning • Make contact with your research services to discuss the project and its management. Check what processes need to be completed to acquire the funding into your project grant • Liaise with your legal services to ensure all necessary contracts and grant documents are signed off. Follow up on these if they are not completed in a timely manner • Obtain all ethical clearances for the conduct of your research from the Research Integrity Office • If you plan to include HDR students in your project, liaise with the graduate research and scholarships office to identify requirements or issues to be

	addressed
Risk management	• Is confidentiality an issue? Speak with legal services and your university's commercial arm • Is your research using dangerous processes or chemicals? Is fieldwork involved? Contact your safety and health office if there are issues that need to be managed • Establish a risk log and encourage all members to identify potential risks that require consideration
Human resources management	• Contact Human Resources for advice on recruitment and selection processes • Recruit and appoint staff based on Human Resources policies and protocols. Ensure you are appointing your researchers at the right level and to the correct role • Organise contracts for research team members as soon as possible • Conduct an induction of all team members, including an overview of the Conditions of Award and team/project processes • Conduct an initial performance development meeting with each individual team member. Identify member strengths and development needs • Review relative contributions, expectations, and roles of each member. How will changes be managed and controlled? • Clarify IP understanding with all members. In the case of students, a confidentiality agreement may need to be signed. Contact legal services if advice is required • Establish reporting and timeline expectations • Confirm principles for team culture, interaction, support, and quality control • Clarify project goals and outcomes • Conduct a project orientation/planning session with all team members • Agree on timelines, procedures, and protocols. • Confirm budgeting processes, expectations, and controls • Celebrate the grant success with team members and stakeholders!
Stakeholder management	• Confirm the project scope, milestones, and deliverables • Finalise expectations regarding meetings, reporting, and outcomes. • Confirm dissemination of the findings, IP, and communication strategy • If you need a steering or advisory group, determine terms of reference, role and responsibilities of members. Appoint an executive officer to work with the group • Liaise with your school/faculty contacts to keep them abreast of your program • Finalise issues relating to ownership of IP and outcomes of the project
Communications management	• Document all conversations with the granting body and keep it on file • Maintain a file of email correspondence • Set up your website for the project, including staff profiles, an overview of the project, and contact details • Identify all necessary meetings/milestone reviews and schedule them into the WBS to ensure they are planned well ahead
Procurement management	• Check the university's systems for procurement • If you are setting up a new facility, consider accessing stored furniture and fittings that are being held by the University to reduce fit-out costs • Consider whether computers should be hired or leased • Seek support from your school manager with respect to procurement
Integration management	• Commence a record of the research project development in a log book/file. Consider how you will ensure that all team members can access the research records and document their progress • Is your research experiment-based? Consider establishing some procedures and templates for recording the results and observations so that you have a consistent approach and documentation? • Set up templates for reports, progress logs, and other processes. • Ensure all members of your team have a good understanding of the WBS and its implications for their work outcomes and processes • Set up regular meetings with your junior staff and HDR students to ensure they receive appropriate guidance and supervision • Identify key dates where the team should meet and review progress. Book these meetings into their calendar now to ensure they are able to attend • Finalise your project management systems and processes, e.g. for tracking, timelines, and dependencies

At your University

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4.8 Overview of project management strategies: implementation phase

Although the majority of your project planning will have been undertaken during the earlier phases, the process of project management needs to be carefully reflected in the implementation phase. It is here that your project can go awry, primarily through lack of focus in achieving scope, slippage of time in completing activities, or over-expenditure of funds. Value can also be lost through poor quality (inconsistent) results, risks not being anticipated and treated, or when people in the research team do not work together to achieve the goals. Communication across the team encourages them to work together and to share the same understanding. This is a stage where monitoring and control play a major part in achieving a successful project outcome. The main focus of the implementation phase is to ensure the value-added planning undertaken during the preliminary planning and the detailed planning phases is adhered to. Remember, the main focus of your leadership and management during the implementation phase is on control. This control is required to ensure you stick to your plan as far as possible. This will lead to consistent results from your research project.

Regular reviews of the project plan and quality assurance checks are critical to your project success during this phase. Include the plan in your meetings and consider how well you are tracking with respect to time, quality, milestones, relationships, and outcomes. Communication with your stakeholders and within the team is a fundamental element of your project management during implementation.

An important component of good project management is to address issues as they arise. If a team member is a poor performer, hold a review discussion immediately. If timelines are slipping, gather the group together and discuss what can be done to regain the lost time and keep to schedule. Cost blowouts need to be addressed rapidly or they will compromise the project. Ensure your monitoring and reporting processes are adhered to so that you have early warning of issues.

The following checklist highlights some possible areas to explore during your project implementation.

Knowledge areas	Implementation phase checklist
Scope management	• Maintain control over the project scope • Set up a system for recording interesting/new research possibilities that are beyond the project scope • Address issues as they arise • Regularly affirm the desired outcomes and milestones to the research team • Review the out-of-scope areas that have emerged and consider whether these are areas suitable for new grant submissions • Revise your WBS and project plan if the scope has changed
Time management	• Monitor progress against timelines and milestone completions • Meet with groups and individuals to explore whether the timeline is reasonable • Review the timeline if necessary and outline the changes to the team • Implement corrective actions if slippage is evident • Adjust the project plan to reflect revised timelines
Cost management	• Is the budget on track, particularly with respect to staffing costs (including leave entitlements)? • Ensure all funds are spent according to the agreed budget and conditions of award. Request carry-forward of any residual funds through your research grant office if you have not expended your allocation in a given year • Review the budget monthly and update as needed • Address budget over-runs promptly • Ensure financial statements are prepared and reflect the necessary requirements of the funding body • Monitor that full expenditure of the funding has occurred prior to grant closure
Quality management	• Are quality assurance processes being followed? (e.g. reports, research practice, team communication) • Are project changes being addressed or logged?

Research management	• Plan for publication and presentation as part of the project cycle. Acknowledge industry partners/sponsors in any publications • Ensure HDR students are progressing with their theses and reporting • Is the research on track? Does it still match the grant agreement? • If the study is not prospering how should it be addressed? Should you continue? Talk to your research office
Risk management	• Are safety and health requirements being met? • Is the project conforming to the ethics agreement? • Is the project team working as a cohesive and productive work group? • Monitor emerging risks and address them • If a problem arises, review the issue, why it occurred, and how to avoid it next time. Document this discussion in the risks log to ensure the same mistake is not repeated again. Consider whether additional training may be needed. Do you need to cover this in future induction processes?
Human resources management	• Celebrate milestones • Acknowledge team member contributions/achievements • Ensure all team members are contributing to quality assurance • Mentor young researchers and ensure they receive opportunities to publish, present, shadow, and take responsibility • Discuss postdoctoral fellowships with HDR students and identify the goals they need to achieve to be well-placed for these opportunities • Conduct regular performance review meetings with each individual • Set development goals as well as project goals • Explore how the team can be rewarded for major achievements. (Hint: something as simple as cake has strong impact!) • Are staff taking their annual leave? (You can't afford a leave liability at the end of the project and members need time out to renew their energy)
Stakeholder management	• Be clear about accountabilities and what is expected. Place report requirements etc into timelines • Work on your stakeholder relationships as a high priority • Schedule regular meetings with the stakeholders • Prepare stakeholder progress reports • Meet with stakeholders to review progress. Provide regular updates on process, publications, and outcomes • Monitor stakeholder satisfaction with the progressive outcomes • Explore and identify the potential for further investment into new areas of research with stakeholders • Commence planning for follow-on projects with stakeholders • Monitor stakeholder satisfaction with the outcomes
Communications management	• Contact your public affairs/media arm to promote breakthrough outcomes – involve the stakeholders in this process • Maintain a record of media releases • Prepare reports for use by stakeholders
Procurement management	• Monitor supplies and ensure resources are sufficient to support the research • Check for equipment maintenance/upkeep
Integration management	• Maintain regular meetings with the team • Check work flows for highly integrated activities: is there a bottleneck that is holding up the research or a potential risk evident? Address it urgently! • Review the project plan at meetings to affirm completed activities and highlight coming project requirements

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4.9 Overview of project management strategies: closeout and evaluation phase

As you reach the concluding stages of your project you will need to focus on checking you have completed the necessary checks and reporting. An important element of this phase is to ensure your project team is well set up to move on to new projects or opportunities. This final list highlights some of the necessary closure processes. 'Module 8: Project Closeout' explores these and many other issues in more detail.

Knowledge areas	Evaluation/closeout phase checklist
Scope management	• Evaluate the achievement of the project milestones. What work is still to be completed? • Is there an opportunity to further collaborate with your partners?
Time management	• Review the timeline and plan and ensure all necessary tasks will be completed prior to project closure
Cost management	• Update the budget summary. Aim for full expenditure of the grant by the conclusion of the funding period
Quality management	• Prepare the final report for the granting body. Submit via your research grants office for closeout of your project • Prepare a final summary of the project, lessons learned, expenditure, time management, and other observations to apply to subsequent projects
Research Management	• Copy all data files to CD and other storage devices • Ensure confidential records are secure • Continue writing publications from the project – keep your stakeholders apprised of these • Monitor project impact over the coming years • Clean up records and prepare an archival file to be stored in the university
Risk management	• Summarise lessons learnt from the project. Share with other researchers
Human resources management	• Celebrate the project's successes • Review the project and identify learning that has been drawn from the project experience • Ensure staff have expended their leave allocation prior to project closure • Assist team members in planning for transition to new roles • Plan for redeployment or transfer of team members to other projects or roles • Interview project team members on their project experience and suggestions for future projects • Conduct an exit interview for each team member to review their contributions, affirm their achievements, and assist in exiting the project
Stakeholder management	• Celebrate the project successes. Invite relevant local colleagues

	and stakeholders • Canvass stakeholder feedback on the benefits of the project and its potential impact
Communications management	• Present a seminar on the project outcomes to interested parties and peers • Develop a media release on the project and its value • Update your website to profile the outcomes • Continue to maintain your media archive • Communicate the project closure to all stakeholders and provide a forwarding contact address
Procurement management	• Dispose of equipment and resources • Ensure confidential material is not accessible by subsequent users of equipment
Integration management	• Ensure the final stages of the project are understood by all team members and assist them in completing their agreed commitments

Hopefully you have found these checklists useful as cues to project management processes you might implement in your future projects. They have been drawn together as a set of printable checklists to assist your future planning.

Project Management Checklist (MS Word format)

Project Management Checklist (RTF format)

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4.10 Creating a project plan

All of the various elements so far reviewed in this topic can be integrated into a comprehensive project plan. The plan offers guidance to all stakeholders regarding the project scope and activities, and ensures that there is clarity as to what should be achieved. It provides the basis for grant proposals, accountability, reports, and quality assurance. The following elements might be found in a project plan.

1. Name of research project
2. Lead university (and other institutional partners)
3. Sponsor's name
4. Research leader's name
5. Stakeholders (i.e. those who may need to have their issues addressed or who may affect the research project)
6. Location of research project
7. Project summary (100 words or less)
8. Research scope
9. Research aims
10. Objectives of the research
11. Potential benefits of the research
12. Deliverables
13. Context of the research project and any relevant background (including related research projects)
14. Research constraints
15. Potential research topics which are beyond scope
16. Work Breakdown Structure
17. Projected timeline, milestones, and activity schedule
18. Projected cost and breakdown into key expenditure areas
19. Roles and responsibilities
20. Risks and contingency planning
21. Quality assurance mechanisms
22. Communication strategy
23. Procurement principles.

It can be seen that this plan is much more detailed than typical research proposal outlines. It will ensure that the research operates smoothly and with all relevant parties clearly understanding what should be achieved, when, and to what standard.

Project planning of this nature will vary according to the project complexity. A project with many teams and subprojects, or with junior or inexperienced contributors, benefits from more detailed planning. A smaller project which has experienced researchers can operate a little more broadly. Even in these situations, however, it can be seen that project management and planning offers major advantages in ensuring that everyone knows what needs to be done, by whom, when, and to what level of outcome. It will greatly improve the quality of your research and ensure all necessary commitments are honoured.

Activity 7

Activity 7 uses this list of project plan elements. See the ‘Topic 4’ page.