Guide to NHMRC Dev Grant Commercial Section

1. Changes from 2024

Review

- maximum of 8 reviewers, split between research and commercial assessors. Chair function has ben removed. Note that not all reviewers will respond, and NHMRC has a minimum number of assessors (which is 50% + 1 of the number assigned), hence grants may have fewer reviewers than 8.

- reviewers cannot use AI.

Note – Review criteria appear identical.

2. 2024 Review feedback – common themes

- Where there is an established industry partnership and depth of engagement not well articulated
- Where a project has other funding, how the Development grant differs in aims was not clear (e.g. with CUREator or AEA).
- All risks identified as low – this is not plausible (particularly given known risks around regulatory approval).
- Business case has too much scientific information (but we know business case reviewers don't read the research proposal, so there needs to be enough)
- Industry engagement from overseas companies may raise concerns about economic benefit largely being overseas, so commentary should be provided on economic benefits to Australia.
- Articulate competitive advantage over existing approaches, including current standard of care, competing molecules in development and molecules that have failed.
- Funded applications were for the amount of time, and funding quantum needed to get to a certain development inflection, whereas those that were not funded were more often for the maximum length, and looking for a work program that would occupy a post-doc for 3 years, rather than the workplan that moves the technology to the next value infection point.
- Applications that contract out standard development assays e.g. humanisation, PK, in vivo models having articulated why a CRO can do this better than the university lab are well supported. If the spend is overseas, that needs to be justified.

3. Commercialisation Work Plan

Introductory paragraph

Give a brief executive summary. What are the aims of the grant proposal? Reiterate what your product is and what problem it will solve / unmet market need it will address. Place in the context of commercialisation and Dev Grant scheme objectives.

Do not assume the commercial reviewer will review the 10-page research plan.

Route to market

What do you need to do to bring the product to market?

Idea is to convince the grant examiners that there is a clear and feasible path to market. Explain how the activities that this grant will fund will help the technology be commercialized in a foreseeable timeframe. Can often be very useful to include a customized figure showing the path to market and how this fits in with the commercialization strategy.

Can include the following:

1. Outline the route to market and key development milestones
    a. What is the current stage of the technology? (what has been completed)
    b. What stage will the technology be at the completion of dev grant project? (what is to be funded by grant proposal)
    c. What additional stages/steps are needed to bring the technology to market?
    d. For a-c above, what are the milestones and the approximate timeline for hitting them? Will they be funded?

        For a drug see "standard milestones for drug development" at end of document.

    e. The above will tie into your commercialisation strategy – at what stage will these activities be taken over by a commercial partner? How will that impact funding? (e.g. if you seek to get funding from a VC to fund formal preclinical evaluation and clinical development, then you'd need to show that you have funding (e.g. from the Dev grant and any other funding) to get you to that point). Be clear as to where the Dev grant will get you and what will still be required to (a) get to commercial partnership and (b) get to market. [note: flowcharts that lay this out are useful for charting stage/timeline/content of milestones]

2. Included in the above - what is the regulatory pathway?
    a. Does your project have a specific regulatory route associated with it? How will regulatory and market approval fit into the route to market (at which stage and what is the timeline)? You want to demonstrate that you are familiar with the regulatory pathway and can successfully navigate it / commercial partner can successfully navigate it.

    Eg. For drugs - Regulatory (e.g. IND) application and approval will need to be done prior to clinical trials, but what data is required for that and have you considered how to get it? Regulatory/marketing approval is then needed before you get to the market (e.g. market application submission; FDA filing / approval) - how long do those take and have you considered what data is needed to get them?

Check if there are specific FDA regulatory guidances for your indication.

https://www.fda.gov/regulatory-information/search-fda-guidance-documents. The FDA actively develop new guidelines and put them out for review before finalising. Once a guideline is final, the FDA expects that it will be followed. Both draft and final guidance can

provide useful information on what the regulators will expect in terms of CMC (chemistry, manufacturing and controls) and clinical trials. The guidance's often focus on the phase 3 requirements. Some examples:

- bispecific mAbs https://www.fda.gov/media/123313/download
- Draft guideline on acute pain: https://www.fda.gov/media/156063/download

However, proposals that provide a generic drug development strategy (e.g. the therapeutic will be tested in phase 1, 2 and 3 studies and then an NDA/BLA filed) will not score well. Any figure should be customised to the application – what will the phase 1 look like, the phase 2, the phase 3? Are adaptive designs acceptable. A good starting point is to assess the regulatory strategy of pharma in the indication.

Commercialisation strategy

What is your strategy for navigating the route to market and successfully commercialising your technology? This could be integrated into the route to market or its own section – depending on your type of technology and what stage it is at.

1. What is your partnering strategy? Do you plan to license the product to an existing company or to establish a start-up – why? At what development stage do you plan to partner - why?
    a. If you already have a partner(s) –
        i. What kind of support are they providing and how will it be utilized? If a cash contribution - what will the money be spent on and is it enough? If an 'in kind' contribution (access to equipment / a compound library / cell line / technical expertise) - how will this help you advance your technology?
        ii. What is your partner's appraisal of your existing/potential IP?
        iii. Is this an exclusive partnership or could you form other partnerships? What types?
    b. If you have interest from potential commercial partner(s):
        i. What type of interest and what is their appraisal of the IP?
        ii. Do you need any further data to confirm partnership? What is the data? Do you have funding to obtain this / how will you obtain funding? What is the timeline?
    c. If you don't have a commercial partner yet:
        i. What does your ideal partner look like?
            1. This could be types of companies or names of companies that you could license your IP to.
            2. This could be VCs that may be interested in providing funding if you were to pursue the start-up route.
        ii. How will you find a commercial partner?
            1. Do you need any further data to find a partner? What is the data? Do you have funding to obtain this / how will you obtain funding? What is the timeline for obtaining data?

Link between business plan and outcomes/benefits

1. Could briefly restate the outcomes/significance of the dev grant and give a brief summary of the business plan described about – in doing so clearly demonstrate how they are linked
    a. Eg. The outcomes of the grant might provide key data needed to find a partner or key data that a potential partner has expressed they would need to form a partnership

Risk framework

What are some technical and commercial risks and how to you plan to mitigate them?

When applying for translational funding for early-stage projects in the life sciences, it's crucial to consider various risk categories to ensure a comprehensive and robust application. Here are some typical risk categories to consider:

1. Scientific Risk: This involves the uncertainty around the scientific hypothesis and the feasibility of the proposed research. For example, whether the therapeutic target is valid or if the diagnostic method will yield accurate results.
2. Technical Risk: This pertains to the challenges in developing the technology or methodology. For instance, the complexity of manufacturing a medical device or the reliability of a diagnostic assay.
3. Regulatory Risk: This includes the potential hurdles in obtaining regulatory approvals from bodies like the FDA or EMA. It involves understanding the regulatory pathway and the requirements for clinical trials and market approval.
4. Clinical Risk: This involves the potential issues in clinical trials, such as patient recruitment, trial design, and the possibility of adverse events or lack of efficacy.
5. Market Risk: This pertains to the commercial viability of the product. It includes market size, competition, pricing strategy, and reimbursement issues.
6. Financial Risk: This involves the availability of funding to complete the project and the financial stability of the organization. It also includes the cost of development and potential return on investment.
7. Operational Risk: This includes the risks associated with project management, such as timelines, resource allocation, and team expertise.
8. Ethical and Legal Risk: This involves the ethical considerations of the research, such as patient consent and data privacy, as well as potential legal issues related to intellectual property and compliance with regulations

Addressing these risks in your application can demonstrate to funders that you have a thorough understanding of the challenges and have plans in place to mitigate them

Examples of some risks are below:

1. Technical risk:
    a. Drug is toxic, drug has poor pharmacokinetics
    b. Lack of preclinical efficacy
    c. Manufacturing issues - eg. Synthesis of the drug product cannot be scaled up.

    d. Method is equal to or worse than existing method (tailor to your technology)
2. Commercial / Clinical
    a. The preclinical animal models don't translate to efficacy in humans
    b. The drug does not outperform competitors at a more advanced stage of clinical development
    c. Patient recruitment for clinical trial
3. Commercial risk:
    a. Technology not attractive enough for industry investment
    b. No protectable IP or freedom to operate
    c. Competitor erodes the market
    d. The process does not outperform competitors

Try and articulate at least one risk that is specific to the particular technology.

Team and Strategic alignment

Why is this team ideally placed to commercialise the technology?

1. Do any of the CIs have a previous track record?
2. If you already have a commercial partner
    a. Do they have a track record?
    b. How do their strategic goals align with yours?

Contribution of Technology Transfer Office or similar commercialisation support

Similar to IP management section below – pick one or the other to be more content heavy

1. Give a few sentences about UniQuest track record – you can put most of this in this section or in the IP management section.
    a. Select from the following what is most relevant to your project:
    Established in 1984, UniQuest's commercialisation track record positions UQ as the leader of research commercialisation in Australasia. UniQuest has formed more than 134 start-up companies built on UQ IP. These companies have raised more than A$1.2 billion to advance UQ technologies towards the market and have directly created more than 450 new jobs. UniQuest's track record and notable successes include the blockbuster cervical cancer vaccine Gardasil® and start-up companies Spinifex Pharmaceuticals Inc and Inflazome Ltd, which were acquired in two of the largest university start-up exits in Australian history, and Vicebio which recently raised US$100M to progress a vaccine platform. Marketed products containing UQ IP licensed by UniQuest have generated gross sales of more than A$86.5 billion, significantly contributing to societal and economic impact.

2. Examples that may be relevant depending on the stage of your technology:
    a. Conflict of interest management plans have been lodged with UniQuest….
    b. UniQuest has filed / plans to file provisional patent application PCTXXXX on DATE…
    c. CIX and CIY are collaborating with UniQuest on developing a patent protection strategy…

d. UniQuest may: drive industry engagement, negotiate licensing agreements, seek funding from VCs, form a start-up company, help secure and industry partner, navigate existing relationship with industry partner

2. Market analysis:

Analysis of the addressable market, existing treatments, and competitive advantage.

Addressable market

Who will your technology be sold to? This could be end users (eg. Patients) or hospitals, governments, businesses.

1. This is the place to give stats. How many people with disease? XYZ treatment is used in X# procedures worldwide. The market is growing and a CAGR of XX%, expected to reach $XXB by 202X. ABC disease costs healthcare providers / governments $XX …
2. There may be multiple markets (eg. A drug may have multiple indications), however should try and identify a lead and explain the technical and commercial reasons for this – could be outlined here or in other sections of the grant. If stated in technical section of grant – must be restated in commercialisation section.
    a. Eg. The addressable market is AA…. In addition to this the market could expand to indications BB, CC, and DD. Could include why and the size of these markets

Target product profile

What is the minimum product profile for commercialisation and what is your ideal product profile? What value will your technology bring?

1. What is the primary indication?
2. What is the patient population within the indication?
3. Are there other drugs it may be incompatible with?
4. What would be the formulation, route of administration, how often will it be administered? Will it be administered in or out of hospital?
5. What efficacy endpoint should the product meet?
6. What is the risk/safety profile?

Existing and emerging competitors

1. What is the current standard of care? What are other drugs on the market?
    a. What are current challenges for these existing competitors? Efficacy/safety/efficiency/cost
2. Look at other drugs in preclinical/clinical development or on market that:
    a. Drug: Act on the same target as your drug OR are targeting the same indication you intend to target
    b. Process: Produce the same end product but by a different process OR produce a different product by a similar process
3. For the above competitors: What company, what stage of development (eg. For a drug preclinical, phase I, etc... For another technology what TRL level?), is this expected to directly compete with your target product profile?

Competitive advantage

What is the major unmet need in your target market? How does your technology address that and do so better than competitors?

1. Reiterate the drawbacks of exiting/potential competitor products
    a. Safety issues, compatibility issues, resistance issues
2. Reiterate benefits of your product
    a. Eg. More efficient, safer, more efficacious, faster

Economic benefit to Australia

Could be stand-alone section or integrated into the above sections as long as it is clear.

1. What is the current economic burden in terms of number of deaths or hospital cost associated with ABC disease? Can include stats here. Then explain how your technology will reduce this
2. Commercialisation of your technology may also bring financial benefit to Australia in the form of milestone and royalty income.
3. If technology is being commercialized via a start-up company this will provide jobs and local capacity for drug development to Australia
4. If clinical trials are carried out in Australia this may give business to clinical trial companies
5. Technology may raise Australia's profile in the XYZ therapeutic space

3. IP management

Intellectual Property

IP could be patent IP or know-how (eg. Non-patented assays, expertise in XX field, expertise in manufacturing XX, a compound library / cell line)

1. Do you have existing IP? (Background IP)
    a. If Yes - what is it? If it is a patent what countries have you filed/are filing in? What stage of prosecution - granted/pending? Any expected freedom to operate issues (are there existing patents that your technology may infringe)? Do you expect to generate any additional IP from the activities proposed in this development grant - if so see point b.
    b. If No - what IP do you expect to generate? Will this be generated at the completion of the dev grant - ideally yes.

2. Are there any ownership implication? Mainly needs to be addressed if this is a collaborative project between multiple parties outside UQ. Speak to UniQuest about this.
    a. If there are ownership implication explain in the Management of proposal IP section how uniquest will manage this though… xyz (uniquest to explain)

3. How does your existing/potential IP align with the Dev Grant scheme objectives?
    a. Dev Grant scheme objectives are: Commercial development of a product, process, procedure, or service that, if applied, would result in improved health care, disease prevention or provide health cost savings.

Management of proposal IP

1. Who will manage the IP - UniQuest usually. May have other parties depending on how collaborative project is - may have an inter-institute agreement if multiple parties involved. Can discuss with UniQuest if needed.

2. Can be helpful to reinforce the idea that UniQuest has an established track record of managing IP and commercialising technology. However, if you have included info on UniQuest in the Contribution of the TTO section above, then do not directly repeat the information.

3. Indicate what if any connection the IP owner has or will have to the project CIs or Participating Institutions.
    a. Mainly relevant if the IP will not be owned by UQ or CI on project.
    b. Examples
        1. IP is owned solely by UQ and XYZ ….
        2. CIx and CIy listed as inventors ….
        3. Inventorship for future patents will be assessed….
        4. Appropriate arrangement will be established between Party A and Party B…
        5. XYZ agreement has been established between Party A and Party B …

4. Team sections

20% of the score goes to the commercial potential of the team. There are multiple sections of the grant where the reviewer might form an impression of team quality, and it is clear that reviewer often pick one section and ignore the others.

- Research Team Capability in Research Section
- Team Alignment and Strategy in Commercial Section
- CI Research Achievements
- CI Commercial Achievements
- Sapphire Profile

These should all identify why this team has the capability to deliver this project. The temptation is often to use standard NHMRC grant team bios (particularly for Research Team Capability and CI Research Agreements), but these should always be reviewed to ensure that they all provide some demonstration of translational capacity in case the reviewer only looks at the Research Achievement Section. E.g. if a researcher has previously contributed to a start up or has a research partnership with a pharma company, these should be mentioned in the Research as well as Commercial Achievement sections. However, the Research and Commercial Achievements sections should be clearly different.

Note that reviewers sometimes choose to assess IP quality from the Sapphire Profile section, rather than the carefully crafted IP Section in the Commercial Plan. The Sapphire Profile should make it clear whether patents are current and what the status is (under examination, granted etc).

Reviewers want to see more than a list of patents. They want to know what stage they are at, and if they are still being maintained that is very valuable information.

To score highly, teams will need to demonstrate commercial achievement both nationally and internationally (and should articulate international success).
Consider:

- Patents
- Industry consultation
- Licensing IP
- Direct involvement in industry placements
    - One option to show this is to record where PhD students from the lab have ended up, e.g. Of my 40 graduated PhDs, over 50% are now in industry positions (including companies X, Y and Z), indicating that the lab's training, research and culture are aligned with industry and commercialisation needs.
- Involvement in establishing start up companies
- For clinicians, medical advisory boards for companies should be mentioned, as should # of industry sponsored clinical trials, and also international multicentre clinical trials run by large collaborate groups.

Some reviewers list each CIA, and make a comment on them, and use this for a basis of the score. For these reviewers, ensuring that every CI has clearly articulated commercial achievements is important, as a blank in these lists will likely reduce score.

Reviewers are looking for commercial achievement rather than engagement. Being able to articulate success is important. E.g. for a clinician:

- Involved on 3 clinical advisory boards for companies X, Y, Z which has supported the progression of two therapeutics from phase 2 to phase 3, and supported a 3rd product across the transition from preclinical to phase 1 development.

5. Resubmissions

In the past, the dogma has been that Development Grants often need a couple of submissions to get awarded. Of the 6 grants awarded to UQ Researchers over the last 3 rounds, at least 4 were new submissions, and 1 was a resubmission (final unknown).

The guidelines do not discuss a reviewer rebuttal section, but the 1 resubmission that UniQuest is aware of from the past 2 rounds, which was also successful, had ~ ½ a page at the bottom of page 9 of the research proposal addressing reviewer feedback (with no discussion of previous scores). This may be an approach re-applications could consider, particularly if they have the space available, but UniQuest does not have direct feedback from NHMRC on the benefits or pitfalls of such a strategy, so this strategy should be discussed with experienced NHMRC Development Grant applicants/the Research Office.

2024 successful applications (funding from 2025)

2040344 CIA - Prof John Hooper CIB - Prof Kristofer Thurecht CIC - Prof Trent Munro Optimising an antibody for clinical trials in cancer patients The University of Queensland $827,863.60

2040327 CIA - Assoc Prof Mark Smythe CIB - Prof Kiarash Khosrotehrani Targeting prostaglandin D2 pathway for enhanced therapy in atopic dermatitis The University of Queensland $795,402.00

2039614 CIA - Prof Aleksandar Rakic CIB - Prof H. Peter Soyer CIC - Dr Mitchell Stark CID - Prof Michael Brünig CIE - Harald Kittler* CIF - Edmund Linfield* CIG - Dr Karl Bertling CIH - Dr Xiaoqiong Qi CII - Dr Jari Torniainen CIJ - Mrs Tamara Mills Melanoma detection with terahertz quantum technology: accurate early diagnosis and progression assessment The University of Queensland $1,209,465.20

2023 UQ successful applications (funding from 2024)

2030826 CIA - Prof Mark Walker CIB - Prof Gabrielle Belz CIC - Dr Obadiah Plante Preclinical refinement of a UQModerna vaccine developed to prevent StrepA infection University of Queensland $1,201,617.00

2031553 CIA - Prof David Craik CIB - Dr Conan Wang CIC - Prof Kristofer Thurecht CID - Prof Trent Woodruff CIE - Assoc Prof Barbara Rolfe CIF - Dr Yen-Hua Crystal Huang Developing novel peptide tracers for improving immunotherapy outcomes University of Queensland $ 612,781.1

Supplementary Information

Standard milestones for a drug development

Note: you need to really consider these and make them specific to your project

- While the overall stages are similar for different drug discovery projects, the specifics of what are needed are very project specific and impacted by e.g. type of molecule (peptide or small molecule), indication (e.g is it an orphan indication and subject to any accelerated approvals?)
- It is worthwhile checking out what the path (including regulatory approvals) have been for other drugs comparable to yours (on both indication AND molecule type)
- <u>Milestones for drug development:</u>
    - Discovery
        - Identification of molecule with target mechanism and mode of action
        - Refine indication
        - Determine appropriate in vitro and in vivo assays / disease models
    - Hit optimisation
        - What molecular activity/efficacy is required for a drug that works by this mechanism of action? How have you determined that? That is your target, and you need to outline the route to get to that target.
        - Apply that molecular efficacy to in vivo activity - relate to dosing (including route of administration) and outline route to get to that target.
        - Compound / peptide stability - how stable does it need to be to achieve the required efficacy and proposed dosing targets? Outline a route to get you there.
        - Generally includes some in vivo validation for the mechanism of action (i.e. showing that the in vivo activity is a result of your proposed molecular mechanism).

- Preclinical development of lead molecule
    - Determine dosing and dosing regimen in appropriate models; how many animal models will be needed? What will they be?
    - Toxicology
    - Pharmacokinetics, Pharmacodynamics, biodistribution studies
    - CMC (chemistry, manufacturing, and controls)
    - Any other studies specific to your project?
    -
- Clinical development - Is your drug/indication subject to any schemes for accelerated approval?
    - Phase I
        - How many patients are you expected to require? How will you recruit these patients? Are there normally challenges with recruiting patients for the indication you are pursuing? What are the endpoints used for your indication?
    - Phase II
    - Phase III – check FDA Guidance

Technology readiness levels (TRL)

Mainly used to explain the development stage of technologies other than drugs/therapeutics.

Possible Headings

The NHMRC Development Guidelines template for the business plan is restricted to the 3 headings. There is additional guidance in the text as to what is expected in each section. Based on the 2022 guidelines and reviewing past successful applications, the following headings ensure that all sections are covered off.

Example 1

1. **Commercialisation Work Plan**
    a. Route to market & regulatory pathway
    b. Link between business plan and outcomes/benefits
    c. Commercialisation strategy
    d. Team and Strategic alignment
    e. Project risk framework
2. **Market analysis**
    a. Analysis of the addressable market, existing treatments and competitive advantage
    b. Competitive advantage
    c. Target product profile
    d. Existing and emerging competitors
    e. Economic benefit to Australia
3. **IP management**
    a. Existing IP, stage of prosecution & FTO
    b. New IP generated from the product and ownership implications
    c. Management of proposal IP
    d. IP alignment with scheme objectives

Example 2

1. **Commercialisation Work Plan**
    a. Route to market
    b. Key development milestones
    c. Link between "business plan" and "outcomes and significance
    d. Technical and commercial risks, and plans for mitigation
    e. Strategy for Commercialisation
    f. Strategic alignment
    g. Contribution of technology Transfers Office (TTO)
2. **Market analysis**
    a. Addressable market
    b. Target product profile
    c. Standard of care
    d. Emerging competitors
    e. Competitive advantage
    f. Economic benefit to Australia
3. **IP management**
    a. Background and anticipated IP
    b. IP generated from this proposal
    c. Management of IP

Research study design

The NHMRC assessment guidelines provide a list experimental design parameters to be considered. Feedback from reviewers is often along the lines of experimental design insufficient, so applicants should review their experimental designs against this checklist:

4.3.6.5. Enhancing reproducibility and applicability of research outcomes

Peer reviewers are required to consider the general strengths and weaknesses of the experimental design of the proposal to ensure robust and unbiased results. Assessment of the experimental design should include consideration of the following, as appropriate:

- scientific premise of the proposed research (i.e. how rigorous were previous experimental designs that form the basis for this proposal)
- techniques to be used
- details for appropriate blinding (during allocation, assessment and analysis)
- strategies for randomisation
- details and justification for control groups
- effect size and power calculations to determine the number of samples/subjects in the study (where appropriate)
- consideration of relevant experimental variables
- sex and gender elements of the research to maximise impact and any other considerations relevant to the field of research necessary to assess the rigour of the proposed design.

Example figures/tables

Research proposal timeline

This should summarise the activities, and how the CIs, AIs are integrated, and can also provided a bit more information on the technical requirements.

	Activity	Y1		Y2		CIA	CIB	CIC	AI	1	2	3
1	[describe aim 1]											
2	[describe aim 2]											
3	Describe aim 3											
Footnote: e.g. 1 contractor, 2 Biologist, 3 Chemist												

Risk table for commercialisation section

NB some applicants have also included a scientific risk section in the research section

Risk	**Risk Likelihood (H/M/L)**	**Risk Impact (H/M/L)**	**Risk Management Strategy**
Risk type (operational, funding, IP, regulatory, market, clinical ethical/legal)			
Describe risk			• How mitigated (could be divided into preliminary derisking and future derisking • How mitigated

Describe risk			• How mitigated • How mitigated
Describe risk			• How mitigated • How mitigated
Risk type (operational, funding, IP, regulatory, market, clinical ethical/legal)			
Describe risk			• How mitigated • How mitigated

If insufficient space for the Risk Likelihood and Impact columns, some groups have used bold text under the risk indicating risk level (low, medium and high)

Example Development plan figure Start-up