



FINAL REPORT

The pathway to a fit-for-purpose radiation protection and nuclear safety regulatory framework in Australia

Department of Health and Aged Care

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Glossary

Artificial Intelligence	AI
AUKUS	Indo-Pacific Region security partnership between Australia, the United Kingdom, and the United States
Australian Health Ministers' Conference	AHMC
Australian Nuclear Science and Technology Organisation	ANSTO
Australian Radiation Incident Register	ARIR
Australian Radiation Protection and Nuclear Safety Agency	ARPANSA
<i>Australian Radiation Protection and Nuclear Safety Act 1998 (Cth)</i>	ARPANS Act
<i>Australian Radiation Protection and Nuclear Safety Regulations 2018 (Cth)</i>	ARPANS Regulations
Automatic Mutual Recognition	AMR
Canadian Nuclear Safety Commission	CNSC
Chief Executive Officer	CEO
Code of Practice	Code
Council of Australian Governments	COAG
Department of Health and Aged Care	DoHAC
Environmental Health Standing Committee	enHealth
Environmental Protection Agency	EPA
Intergovernmental agreement	IGA
Integrated Regulatory Review Service	IRRS
International Atomic Energy Agency	IAEA
International Organisation for Standardisation	ISO
Low level waste	LLW

Medical Radiation Practice Board of Australia	MPBA
Millisievert	mSv
National Directory for Radiation Protection (2nd edition)	NDRP2
National Health Terminology System	NHTS
Nuclear Safety Committee	NSC
Probabilistic Risk Assessment	PRA
Radiation Health and Safety Advisory Council	RHSAC
Radiation Health Committee	RHC
Radiation Health Expert Reference Panel	RHERP
US Nuclear Regulatory Commission	NRC

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Executive summary



1. Executive summary

Context

In Australia, civilian radiation protection and nuclear safety is regulated on a jurisdictional basis with each State and Territory, and the Commonwealth, administering its own radiation protection and nuclear safety legislation. Consequently, there can be overlap, gaps, and inconsistencies across radiation protection and nuclear safety legislative frameworks.

National consistency and uniformity in the civilian radiation protection and nuclear safety framework has been a long-term focus for the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Department of Health and Aged Care (DoHAC or the Department).

The Department engaged KPMG to seek further clarity on:

- Consistencies and inconsistencies across Australia's radiation protection and nuclear safety regulatory framework;
- Challenges arising from the identified inconsistencies; and
- Options and recommendations that will provide for a best practice, fit-for-purpose and consistent policy, legislative and regulatory framework moving forward.

Purpose of Report

This Final Report (Report) presents an overview of the current state of the national civilian radiation protection and nuclear safety regulatory framework and **highlights key opportunities for reform** that can better align the framework with **international best practice** and improve its **fitness-for-purpose** in Australia. This Report seeks to provide context and an evidence-base for the options explored and also makes recommendations to improve the present radiation protection and nuclear safety arrangements.

This Report reflects and draws upon the Interim Report delivered to the Department in October 2023 annexed to this Report at **Appendix A**.

Summary of Findings and Recommendations

Strengths of Current Framework

Consultation and analysis undertaken during the legislative and regulatory mapping identified a number of strengths for the present framework:

- The present framework has been effective in minimising radiation and nuclear incidents and protecting overall public safety;
- Consistent application of the Transport Code was reported to have successfully improved the efficiency of the regulatory environment;
- The States and Territories have demonstrated a willingness to work together in areas of identified need for uniformity; and
- Overall, stakeholder views regarding the Automatic Mutual Recognition (AMR) scheme were positive as evidenced by the implementation of the scheme by State and Territory agencies.

These achievements demonstrate effectiveness of various aspects of the current system and the commitment of stakeholders and regulatory bodies to maintain a high level of safety in these industries. In addition to these strengths, a number of opportunities were identified throughout various phases of the review to strengthen and improve the uniformity of the radiation protection and nuclear safety framework.

In pursuit of a more fit-for-purpose framework, the following process was followed to identify recommendations for reform:

1. Conducting a comprehensive legislative review and analysis to identify any consistencies and inconsistencies across Australia's radiation protection and nuclear safety regulatory framework (Refer to page 21 to 41 of **Appendix A** for more detail);
2. Undertaking a detailed international benchmarking exercise to identify areas of uplift available to align Australia's framework to international best practice (Refer to page 50 to 59 of **Appendix A** for more detail);
3. Creating a targeted and structured approach to consultation with stakeholders in regulators, industry, and professional bodies (Refer to **Appendix C** for more detail);
4. Synthesising insights derived from the above steps to develop preliminary opportunities for reform designed to address the identified inconsistencies and resulting challenges (Refer to **Appendix D** for more detail);
5. Sharing preliminary options with the Department (Refer to page 60 to 72 of this **Report** for more detail); and
6. Evaluating the recommendations developed and mapping them against a criterion of scale of impact and implementational feasibility (Refer to **Appendix D** for more detail).

Tables 1 and 2 below outline the key findings and recommendations from this process and identify opportunities for consideration to address greater uniformity in areas identified as important for safety, efficiency and transparency.

Table 1: Summary of Key Findings from Legislative Mapping Exercise and Stakeholder Consultations

Key Findings

Legislative Mapping Exercise

The present radiation protection and nuclear safety framework is characterised by significant areas of inconsistency, that, if harmonised, can lead to a range of benefits for the community, regulators, and regulated entities.

Finding 1: Minimum Legislative Requirements Not Met

As a means of achieving uniformity, Part A of the Second Edition of the National Directory for Radiation Protection (NDRP2) sets out 16 minimum legislative requirements (elements (A) to (P)) which Commonwealth, State and Territory radiation protection legislation must contain.

Present State Finding	Commonwealth, State and Territory legislation have failed to incorporate substantial elements of these minimum legislative requirements.
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Evidence	Page 19 of this Report contains a heat map of the present inconsistencies.
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Finding 2: Inconsistent Regulated Activities

To achieve consistency across regulated activities, the NDRP2 sets out a list of activities relating to radiation usage which legislation across the jurisdictions should regulate. Our analysis focused on identifying whether the Commonwealth, State and Territory jurisdictions have provisions within their respective legislation covering the ambit of activities prescribed by the NDRP2 as requiring regulation.

Present State Finding	The Commonwealth, States and Territories are largely inconsistent in the types of activities which they regulate.
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Evidence	Page 20 of this Report contains a heat map of the present inconsistencies.
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Finding 3: Inconsistent Criteria for License Applications

Part A of the NDRP2 sets out the minimum factors which regulators should consider prior to granting a licence.

Present State Finding	The Commonwealth, States and Territories have each introduced their own respective factors to be considered, outside of those contained in the NDRP2. This has created notable inconsistency in the licencing process.
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Evidence	Page 20 of this Report contains a heat map of the present inconsistencies.
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Finding 4: Inconsistent Codes of Practice

Part B of the NDRP2 highlights the adoption and implementation of Codes of Practices as one mechanism to improve uniformity in radiation protection and nuclear safety. Our analysis focused on the extent to which Commonwealth, State and Territory legislative frameworks prescribed Codes of Practices within each jurisdiction's respective legislative framework.

Present State Finding The Commonwealth, States and Territories **are largely inconsistent in the Codes of Practice which they each prescribe.**

Evidence **Page 21** of this Report contains a heat map of the present inconsistencies.

Stakeholder Consultation

Stakeholders presented a diverse range of insights, informed by their unique interactions with the radiation protection and nuclear safety framework. The broad range of insights collated can be found on page 22 of this Report.

Finding 5: Single, National Regulatory Framework

Feedback from stakeholders indicated the desire to establish a single national regulatory framework for radiation protection and nuclear safety through either:

- The referral of legislative power from each State and Territory to the Commonwealth; or
- The Commonwealth enacting legislation to establish a national regulator for only some aspects of radiation protection and nuclear safety which is supported by a constitutional head of power, or
- Introduction of a benchmarked standard through reliance on the NDRP2 or creation of a model legislation, which is promulgated by each State and Territory through an intergovernmental agreement (IGA).

Table 2: Summary of Key Recommendations

Key Recommendations

Preliminary insights and gaps in the present radiation protection and nuclear safety framework identified from the initial desktop research and legislative review process were validated and tested with stakeholders. Two recommendations emerged from stakeholder consultations as potential responses to the identified inconsistencies and gaps in the Interim Report and provide evidence to help inform future policy decisions.

Recommendation 1: Targeted Legislative or Regulatory Arrangements

Recommendation 1 proposes to target efforts into priority areas of reform to deliver more significant, and long-term improvements to the existing framework. This recommendation involves State and Territory Governments concentrating reform efforts on areas of inconsistency to deliver uniform safety standards to the regulated community.

Priority Areas for Reform

- Dosimetry regulation: amendments to respective State and Territory legislation so that there is 'like-for-like' recognition in dosimetry which reflects the Code of Radiation Protection in Planned Exposure Situations, RPS C-1
- Accreditation and licensing: amendments to respective State and Territory legislation so that there is a nationally agreed standard of accreditation and extent of training and knowledge which regulated professionals are required possess.

Please see **page 60** of this Report for further detail on the suggested priority areas for reform.

Implementation Considerations

Implementation considerations for this recommendation are extensive and include:

- Noting the inherent complexities of legislative reform, a regulatory impact analysis and cost to benefit analysis should be undertaken to validate whether efforts exerted are proportionate to the desired positive impact; and
- This recommendation requires significant flexibility to accommodate the different needs and circumstances of each jurisdiction.

Recommendation 2: Inconsistent Regulated Activities

Recommendation 2 considers the implementation of additional governance mechanisms to strengthen the existing legislative and regulatory framework, without legislative amendments to the present regime

Opportunities for Reform	<ul style="list-style-type: none"> ▪ Increased stakeholder engagement with regulatory tools; ▪ Establishing a working group for Code development; ▪ Formulating a definitions handbook to provide clarity on nuclear and radiation definitions; and ▪ Implementing a formal feedback mechanism to facilitate information exchange between the States and Territories.
Implementation Considerations	<ul style="list-style-type: none"> ▪ Consideration for data governance and data management of agreements register results to cross-correspond with implementation gate reviews.

Long Term Reform Options

Stakeholders presented potential options for reform including moving towards an Intergovernmental Agreement (IGA) or adopting a single national framework. While there are precedent examples of both approaches (e.g. Maritime Safety Regulation, Model Work, Health and Safety Legislation), they were not assessed as a viable short-medium term option due to:

- Requirements for extensive funding from the Government;
- Requirement to undergo significant negotiation and with Governments of Australia and the need for Ministerial support;
- Substantial investment of time and elapsed time to final implementation; and
- Uncertainty regarding ultimate implementation of the intended outcome given the IGA or national regime arrangements require extensive implementation activities by State and Territory agencies.

Conclusion

Based on the project scope and areas of focus, the current regulatory framework presents several opportunities for potential reform to ensure it remains fit-for-purpose in the current environment and adaptable to the evolving regulatory and technology landscape. The current regulatory framework has various areas that should be sustained to support its future goals, including transport, AMR and the sustainment of overall public safety.

Importantly, change will support national reform through evidence-based and user informed approaches that promote the health and well-being of the broader Australian community.

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Introduction



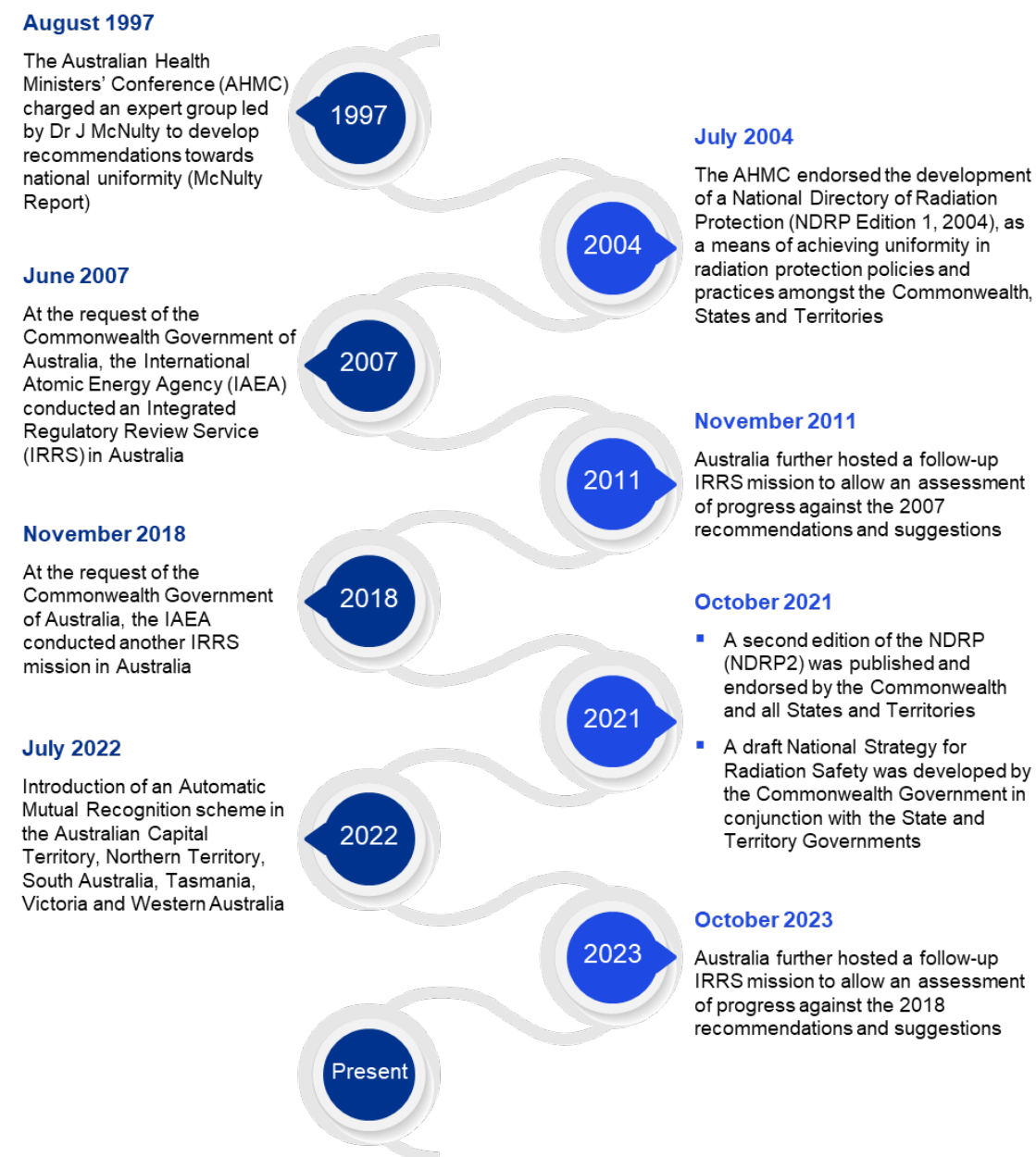
2. Introduction

Background

In the civilian context, radiation has a range of beneficial uses across industries such as mining, manufacturing, healthcare, telecommunications, and power generation. However, prolonged exposure to high doses of radiation can cause damage to the tissues of the human body as well as to the environment. It is therefore essential that radiation usage be subject to stringent standards of safety regulation to protect the health of radiation users.

Australian governments have long recognised the importance of radiation protection and nuclear safety. A summary of key recent efforts towards radiation protection and nuclear safety regulation in Australia is set out in the figure below:

Figure 1: Recent regulatory radiation protection and nuclear safety landscape



International Atomic Energy Agency

In 2018, at the request of the Commonwealth Government, the International Atomic Energy Agency (IAEA) dispatched an international team of senior radiation and nuclear safety experts to conduct an Integrated Regulatory Review Service (IRRS) mission in Australia (IRRS Mission Report, 2019). The purpose of the IRRS mission was to provide peer reviewed feedback on the operation of Australia's radiation and nuclear safety regulatory framework, benchmarked against the IAEA's best practice safety standards.



2023 IRRS Follow-up Mission Report

In October 2023, Australia hosted an IRRS follow-up mission, to assess Australia's progress against the previous recommendations and suggestions made by the IRRS mission report in 2018. Despite significant improvement, the Mission Report noted that further consistency efforts would nonetheless remain valuable. Key recommendations from the Mission Report included:

Figure 2: Key recommendations from Mission Report

<p>R1: The Commonwealth Government, in conjunction with State and Territory Governments, should ensure a consistent level of protection of people and the environment through effective coordination and harmonised implementation of codes and guides by the Commonwealth States, Territories and regulatory bodies.</p>	<p>R5: The Governments should ensure that all parties having responsibilities for safety of facilities and regulatory activities have the necessary competence and resources to carry out their responsibilities.</p>	<p>R7: Regulatory bodies should assess the need for updating regulatory requirements or guidance, review and assessment, inspection and licensing processes after considering the events reported in ARIR, especially the noteworthy events highlighted in the annual ARIR report.</p>
<p>SF1: All regulatory bodies should consider further developing and using a formalised process for identifying lessons to be learned from regulatory experience from other jurisdictions and for sharing lessons learned from their regulatory experience, with the goal of making better use of existing regulator resources and improving consistency across Australia.</p>	<p>SF2: The Commonwealth Government, in conjunction with State and Territory Governments should consider establishing additional binding mechanism to ensure consistent and timely implementation of NDRP2 across Australia</p>	<p>S10: ARPANSA, in conjunction with the State and Territory regulatory bodies, should consider completing a review of the regulatory framework and prioritising identified gaps to ensure that it is comprehensive and provides adequate coverage commensurate with the radiation risks associated with the facilities and activities in accordance with a graded approach</p>

Current Legislative Framework

In Australia, the responsibility of regulating radiation protection and nuclear safety falls on each respective State and Territory jurisdiction. Across the Commonwealth, States and Territories, there can be duplication and inconsistencies across the regulatory framework, creating confusion and increasing regulatory burdens for the regulated community

Commonwealth Framework

The operation and administration of the civilian radiation protection and nuclear safety framework is dictated by the *Australian Radiation Protection and Nuclear Safety Act 1998* (Cth) (ARPANS Act) and its subordinate to the *Australian Radiation Protection and Nuclear Safety Regulations 2018* (Cth) (ARPANS Regulations). However, as Australia is a federal constitutional monarchy, the Commonwealth Government is only entitled to exercise the powers explicitly provided to the Commonwealth by the Constitution or through intergovernmental agreements (IGAs). Despite the promulgation of a legal framework for safety through the ARPANS Act, the Act only applies to Commonwealth Government entities, the Commonwealth estate and Commonwealth contractors. With the States and Territories each enforcing their own radiation protection frameworks, the current patchwork of regulations creates inconsistencies and potential gaps in public safety.

The ARPANS Act establishes ARPANSA. The CEO of ARPANSA has several functions under the ARPANS Act, including the promotion of national uniformity of radiation protection and nuclear safety policy and practices across all Australian jurisdictions. The CEO of ARPANSA is assisted in meeting this function through its advisory bodies: the Radiation Health and Safety Advisory Council (RHSAC), the Nuclear Safety Committee (NSC) and the Radiation Health Committee (RHC). ARPANSA is assisted by the RHC, who produce, and the RHSAC, who endorse, the Radiation Protection Series, which consist of:



Fundamentals:

Documents that set the fundamental principles for radiation protection and describe the fundamental safety and security objectives. Documents belonging to this category are written in an explanatory and non-regulatory style and describe basic concepts and objectives of international best practice.



Codes and Standards:

Documents that are regulatory in style and may be referenced by regulations or conditions of licence. These documents contain overarching requirements and are expressed as 'must' statements which are to be satisfied to ensure an acceptable level of safety and security.



Guides and Recommendations:

Documents that provide recommendations and guidance on how to comply with the Codes or apply the principles of the Fundamentals. These documents are written in an explanatory and non-regulatory style and indicate measures recommended for good practice.

Though the Radiation Protection Series is a useful resource which can help achieve consistent implementation, each element contained within the resource are not binding on the States and Territories to mandate its implementation.



State and Territory Framework

Each State and Territory government has enacted its own legislative framework to regulate the use of radiation and promote nuclear safety. Each State and Territory framework prescribes a regulator to administer and oversee radiation activities. A high-level summary of the current frameworks is provided in the table below:

Table 3: Current State and Territory radiation protection and nuclear safety frameworks and State regulators

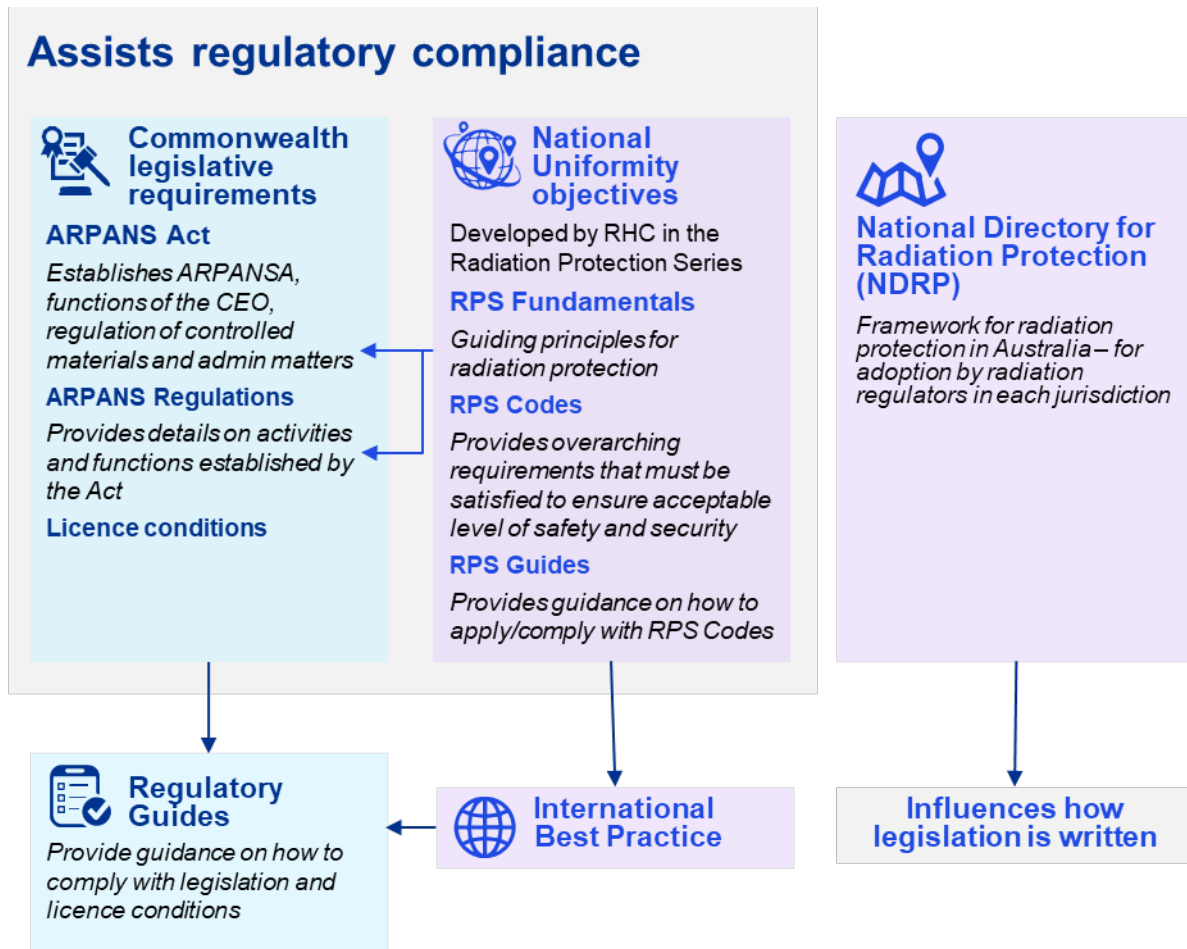
Jurisdiction	Legislation	Regulation	Regulator
Commonwealth	<i>Australian Radiation Protection and Nuclear Safety Act 1988 (Cth)</i>	<i>Australian Radiation Protection and Nuclear Safety Regulations 2018 (Cth)</i>	Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
Queensland	<i>Radiation Safety Act 1999 (QLD)</i>	<i>Radiation Safety Regulation 2021 (QLD)</i>	Department of Health (QLD)
New South Wales	<i>Protection from Harmful Radiation Act 1990 No 13 (NSW)</i>	<i>Protection from Harmful Radiation Regulation 2013 (NSW)</i>	Environment Protection Authority (NSW)
Victoria	<i>Radiation Act 2005 (VIC)</i>	<i>Radiation Regulations 2017 (VIC)</i>	Department of Health (VIC)
South Australia	<i>Radiation Protection and Control Act 2021 (SA)</i>	<i>Radiation Protection and Control Regulations 2022 (SA)</i>	Environment Protection Authority (SA)
Western Australia	<i>Radiation Safety Act 1975 (WA)</i>	<i>Radiation Safety (General) Regulations 1983 (WA)</i> <i>Radiation Safety (Qualifications) Regulations 1980 (WA)</i> <i>Radioactive Safety (Transport of Radioactive Substances) Regulations 2002 (WA)</i>	Radiological Council & Department of Health (WA)
Tasmania	<i>Radiation Protection Act 2005 (TAS)</i>	<i>Radiation Protection Regulations 2016 (TAS)</i>	Department of Health and Human Services (TAS)
Northern Territory	<i>Radiation Protection Act 2004 (NT)</i>	<i>Radiation Protection Regulations 2007 (NT)</i>	Department of Health (NT)
Australian Capital Territory	<i>Radiation Protection Act 2006 (ACT)</i>	<i>Radiation Protection Regulation 2007 (ACT)</i>	ACT Health

Notably, within the regulatory landscape, the legislative instruments listed in the table above form just one aspect of a broader legislative framework. Rather, radiation usage may also attract ancillary regulatory burdens from other legislation. Using Queensland as an illustrative example, the broader framework for radiation also warrants consideration of the following acts:

 <i>Coal Mining Safety and Health Act 1999 (Qld)</i>	 <i>Disaster Management Act 2003 (Qld)</i>	 <i>Environmental Protection Act 1994 (Qld)</i>
 <i>Mineral Resources Act 1989 (Qld)</i>	 <i>Mining and Quarrying Safety and Health Act 1999 (Qld)</i>	 <i>Nuclear Facilities Prohibition Act 2007 (Qld)</i>
 <i>Petroleum Act 1923 (Qld)</i>	 <i>Petroleum and Gas (Production and Safety) Act 2004 (Qld)</i>	 <i>Planning Act 2016 (Qld)</i>
 <i>Public Health Act 2005 (Qld)</i>	 <i>Public Safety Preservation Act 1986 (Qld)</i>	 <i>Work Health and Safety Act 2011 (Qld)</i>

ARPANSA provides clarity to the framework to aid State and Territory regulators as well as the regulated community through the publication of various sources in the Radiation Protection Series. There are however other instruments in place to guide regulation, as follows:

Figure 3: National Regulatory Framework adapted from ARPANSA (2022)



The Case for Uniform Regulation

The focus on a uniform regulatory approach is linked to the following factors:

Inconsistent implementation of the NDRP2

Following an overall lack of consensus by the States and Territories to establish model legislation, the AHMC agreed on the establishment of the NDRP2, as a means of achieving uniformity. The role of the NDRP2 was clear: to provide an agreed framework for radiation safety, together with clear regulatory statements which were to be adopted by the Commonwealth, States and Territories. The NDRP2 has since come into its second edition (i.e., NDRP2), which has received endorsement by Health Ministers in all jurisdictions.

Noting the significant unifying role which the NDRP2 plays, a current state analysis of the extent to which legislation across the jurisdictions implemented the NDRP2 was conducted in our Interim Report (see **Appendix A**). This allowed the identification of four key themes, as follows:

Theme 1: Incorporation of agreed requirements under the NDRP2

As a means of achieving uniformity in radiation protection and nuclear safety, Part A of the NDRP2 sets out 16 minimum legislative requirements (elements (A) to (P)) which Commonwealth, State and Territory radiation protection legislation must contain. Accordingly, our analysis for this theme focused on identifying whether the Commonwealth, States and Territories have, in fact, incorporated the 16 minimum requirements as agreed. As an example, four requirements are as follows:

Table 4: Comparative analysis between Commonwealth, State and Territory legislation and minimum legislative requirements from the NDRP2

Minimum Legislative Requirements as identified in the NDRP2	Comparative Analysis	Consistency with NDRP2
(K) Provide requirements for engineered barriers and controls to restrict: i) radiation levels ii) release of radioactive materials, and iii) external and internal exposures, including exposures of relevance to environmental protection	South Australia and Tasmania contain explicit provisions requiring shielding and barriers be in place to protect persons from exposure. Western Australia also requires shielding during repair or installations. All other jurisdictions do not include explicit legislative requirements for shielding or similar barriers to be present within a radioactive facility, however this is likely required in accordance with Codes of Practice.	Inconsistent
(L) Provide for accrediting persons or classes of persons to assess compliance with the requirements of the legislation, including conditions of accreditation	All jurisdictions provide for accrediting persons to assess compliance with the regulatory framework. The regulator and its inspectors assume a compliance and enforcement function.	Consistent or Mostly Consistent
(M) Provide for the establishment and maintenance of a register of radiation sources.	ARPANSA's role in administering a national register is acknowledged, despite no explicit reference in legislation for the requirement to maintain a register for radiation sources. The requirement for a registration register is explicitly provided for across most State and Territory legislation, except the Commonwealth, Victoria (which does mandate a register under its legislation, but does not explicitly list radiation sources as a required inclusion), and limited registration for Tasmania (only for disposal).	Partially Consistent
(N) Require authorised parties to establish records of radiation doses incurred by staff and, where relevant, assess and maintain records of doses to the general public	Most States or Territories require responsible persons (the primary duty holder) to maintain records of radiation exposure incurred by staff. However, Commonwealth, Victoria, Tasmania and Australian Capital Territory legislation does not contain explicit provisions for the establishment of recordkeeping for this purpose.	Partially Consistent

Please see pages 23 to 28 of **Appendix A** for additional detail.

Theme 2: Consistency of regulated activities

To achieve consistency across the radiation protection and nuclear safety framework, the NDRP2 sets out a list of activities relating to radiation usage which legislation across the jurisdictions should regulate. Our analysis focused on identifying whether the Commonwealth, State and Territory jurisdictions have provisions within their respective legislation covering the ambit of activities spotlighted by the NDRP2 as requiring regulation. For example, some of the activities include:

Table 5: Insights from mapping exercise comparing scope of regulated activities across the Commonwealth, State and Territory jurisdictions

	Cth	NSW	QLD	VIC	SA	WA	TAS	NT	ACT
Activities requiring approval									
Approval to relocate									
Approval to dispose									
Approval to supply									
Approval to acquire									

Licensed	
Not licensed	
Unique application (See Appendix A for further detail)	

Please see pages 29 to 31 of **Appendix A** for additional detail.

Theme 3: Granting an Application

Part A of the NDRP2 sets out minimum factors which regulators should consider prior to the grant of a licence. The Commonwealth, States and Territories have each introduced their own respective principles to be considered as part of an application outside those factors contained in the NDRP2, such as:

Table 6: Insights from mapping exercise comparing the additional considerations introduced across the Commonwealth, States and Territory jurisdictions

Additional Considerations	Cth	NSW	QLD	VIC	SA	WA	TAS	NT	ACT
Applicant shows that magnitude of exposure is as low as reasonably achievable									
Applicant has expertise necessary to carry out activities									
Applicant shows a net benefit in carrying out conduct									

Legislation includes this consideration	
Legislation does not include this consideration	
Legislation includes a similar consideration	

Please see pages 32 to 40 of **Appendix A** for additional detail.

Theme 4: Codes of Practice

Part B of the NDRP2 highlights the adoption and implementation of Codes of Practices as one mechanism towards uniformity in radiation protection and nuclear safety. Our analysis focused on the extent to which Commonwealth, State and Territory legislative frameworks prescribed Codes of Practices within each jurisdiction's respective legislative framework, as set out below. This analysis considered only prescription within legislation (primary and subordinate), notwithstanding that jurisdictions may impose compliance with Codes of Practice through other means, for example individual licence conditions.

Table 7: Insights from mapping exercise comparing the incorporation of prescribed Codes of Practice across the Commonwealth, State and Territory jurisdictions

	Cth	NSW	QLD	VIC	SA	WA	TAS	NT	ACT
Code for the Disposal of Radioactive Waste by the User (Radiation Protection Series C-6)							1985 NHMRC		
Code for Radiation Protection in Planned Exposure Situations									
Security of Radioactive Sources									
Code for the Safe Transport of Radioactive Material									
Code for Disposal Facilities for Solid Radioactive Waste (Radiation Protection Series C-3)									

Prescribed	
Not prescribed	
Prescribed a different version	

Please see pages 42 to 43 of **Appendix A** for additional detail.

From the current state analysis conducted, it became apparent that the purpose of the NDRP2 has yet to be achieved, as the Commonwealth, States and Territories did not fully incorporate all elements of the NDRP2.

Current State

At present, the publication of the second edition of the NDRP2 and formulation of the Draft National Strategy for Radiation Safety (Draft Strategy) in response to the IRRS mission recommendations are expected to significantly progress Australia towards a more uniform approach to radiation protection and nuclear safety. Since public consultation of the Draft Strategy in 2021, the Draft Strategy has not been formally adopted or published. This can largely be attributed to the anticipated changes to the Australian radiation protection and nuclear safety regulatory landscape following the Australian, United Kingdom and United States (AUKUS) partnership. In light of this, substantial revision of the original Draft Strategy was undertaken, with the latest draft no longer containing an IGA to formalise the States and Territories' commitment to uniformity.

From here, Australia is expected to further progress the radiation protection and nuclear safety framework by addressing the recommendations and suggestions made by the IRRS during the follow-up mission this year.

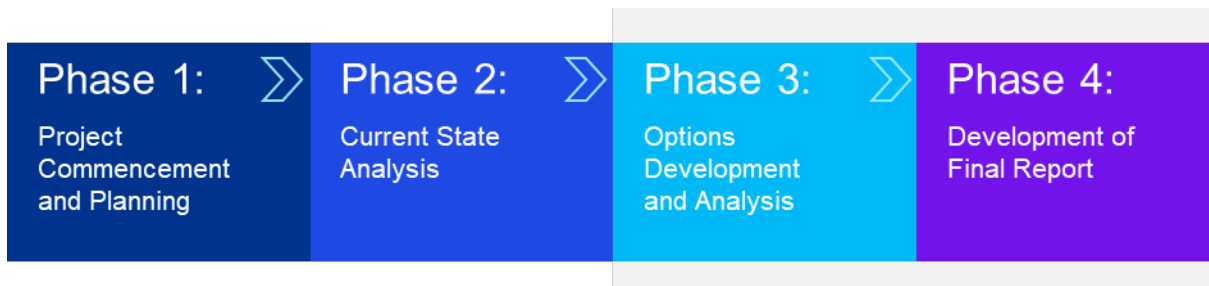
Purpose of this Report

From this background, KPMG's review provides a timely opportunity to consider the progress made by Australia towards the aim of national consistency in the radiation protection and nuclear safety regulatory framework. The DoHAC's engagement of KPMG seeks to serve the following purposes:

- Identification of the consistencies and inconsistencies across Australia's radiation protection and nuclear safety regulatory framework,
- Identification of the challenges arising from the identified inconsistencies, and
- Formulation of options and recommendations that will provide for a best practice, fit-for-purpose and consistent legislative and regulatory framework moving forward.

KPMG's review of Australia's civilian radiation protection and nuclear safety legislative framework is conducted in phases, as follows:

Figure 4: Project Phases



This Report forms the final deliverable for the engagement (Phase 4) and draws upon insights from Phases 2 (Current State Analysis) and 3 (Options Development and Analysis). KPMG's project plan for this engagement can be found in full detail in **Appendix B**.

Leveraging our Interim Report as well as subsequent stakeholder consultations, this Report provides:

- A current state analysis of Australia's civilian radiation protection and nuclear safety regulatory framework, including areas of consistencies and inconsistencies,
- A synthesis of insights derived from extensive stakeholder consultations,
- Options and recommendations that will provide for a future-focused, fit-for-purpose and consistent radiation protection and nuclear safety regulatory framework,
- Insights derived from a benchmark of international regulatory best practice standards which will align Australia's approach to radiation protection and nuclear safety regulation in line with leading international jurisdictions, and
- Pragmatic and operationally feasible next steps for the Department.

The desired overall outcome from this Report is to highlight key uplift opportunities for Departmental consideration, with the aim of progressing Australia's radiation protection and nuclear safety framework towards greater consistency. This more mature framework will alleviate confusion arising from inconsistency and improve overall safety outcomes for the regulated community.

Methodology

The project team leveraged findings from the Interim Report and further designed a methodology to synthesis stakeholder consultation insights and international best practice findings.

	Radiation protection and nuclear safety legislative mapping	International best practice analysis
01	A desktop review of Australia's existing legislative and regulatory framework around civilian radiation protection and nuclear safety was conducted. All legislation, regulations and Codes of Practice were identified and grouped into major themes.	The project team conducted preliminary desktop research across federated and non-federated government frameworks to establish an international 'best practice' regulatory standard for civilian radiation protection and nuclear safety. From this exercise, the jurisdictions of Canada, the United Kingdom and the United States were selected for further analysis.
02	Using the NDRP2 as guidance, four themes were distilled on the basis that they formed part of the nationally agreed minimum standards.	For the jurisdictions identified in step 1, further desktop research was conducted by the project team.
03	Using the themes identified in step 2 as a baseline, the project team reviewed the regulatory framework of the Commonwealth, States and Territories and made an assessment as to the extent of regulatory alignment across each jurisdiction.	Common themes and trends were then identified for the jurisdictions identified in step 2.
04	The extent of alignment attributed to each jurisdiction's legislative framework formed a map, which was used to identify preliminary inconsistencies, gaps and areas of uniformity across the four themes.	Through gaining a deeper understanding of international comparators, valuable insights into Australia's position in a global context were then captured. This allowed for identification of key opportunities for improvement in the development of a nationally consistent radiation protection framework in Australia.
05	With the insights gained from the legislative mapping exercise and international best practice analysis, the project team identified key stakeholders to validate these preliminary insights with. Extensive yet targeted stakeholder consultations were then undertaken to collate wide ranging insights into the present radiation protection and nuclear safety framework. The methodology followed by the project team to conduct these stakeholder consultations is contained in Appendix C .	
06	These stakeholder insights were synthesised to derive seven broad categories which largely summarise the current perception of the radiation protection and nuclear safety regulatory framework.	
07	Leveraging stakeholder views to validate the preliminary legislative analysis conducted and international best practice insights, our project team then developed seven future-focused options of regulatory improvement.	
08	Each of the options developed were then mapped against its respective scale of impact and operational feasibility, to ensure that the Department can easily prioritise and select their preferred option. The options developed represent a culmination of insights, based on initial desktop research, stakeholder consultation and international benchmarking.	

03

Stakeholder Insights



3. Stakeholder Insights

Insights from Stakeholder Consultations

Following a detailed legislative analysis and international benchmarking exercise, various observations were made and presented in the Interim Report. In order to validate these observations and understand their practical impacts on the regulated community, KPMG sought to test the findings with various stakeholder groups through stakeholder consultation sessions conducted between September to November 2023. A full list of stakeholders is at **Appendix C**. As part of conversations with stakeholder groups, KPMG also sought to understand the types of reform which stakeholders desired in the radiation protection and nuclear safety framework.

Purpose of Stakeholder Consultation

The purpose of stakeholder consultation was to inform the analysis of the proposed options against insights and perspectives from key stakeholders across the nuclear and radiation industry. This allowed for holistic evaluation of the regulatory landscape, considering the perspectives and expertise of various stakeholders including government agencies, industry professionals, experts and regulated entities and service providers. As different states and jurisdictions administer their own frameworks, stakeholder views on national consistency within the regulatory landscape are vital to helping contextualise and address broader issues related to radiation protection and nuclear safety. Throughout the consultation process, stakeholders provided key insights on emerging challenges, new technologies and potential gaps in the current regulatory landscape.

Stakeholder Consultation Methodology

Following the project plan annexed at **Appendix B**, preliminary insights and gaps in the present radiation protection and nuclear safety framework identified from the initial desktop research and legislative review process were then validated and tested with stakeholders. Extensive stakeholder consultations were conducted across regulatory bodies, industry, and professional bodies to collate insights on two primary questions:


1. Is the current radiation protection and nuclear safety framework fit-for-purpose?
2. Are there any opportunities for reform which the radiation protection and nuclear safety framework can benefit from to improve outcomes for the regulated community?

A comprehensive list of the stakeholders consulted for this project is annexed at **Appendix C**.

Following the stakeholder consultation methodology in **Appendix C**, KPMG collated extensive stakeholder views and created an insights synthesis document, which:

- Documents and summarises all views expressed (regardless of whether the view was widely or independently held); and
- Categorises the insights communicated into broad emerging themes.

The most common perspectives through stakeholder consultations were then categorised into the following seven overarching themes:

 <h3>What is working well</h3> <ul style="list-style-type: none"> States and Territories considered themselves to be working well together Consensus that overall public safety in radiation protection and nuclear safety is maintained 	 <h3>Impact of greater uniformity</h3> <ul style="list-style-type: none"> Stakeholders reiterated the importance of having uniform safety outcomes rather than uniform processes Complete uniformity may not recognise jurisdictional specific nuances
 <h3>Priority Areas for Reform</h3> <ul style="list-style-type: none"> General consensus that areas such as emergency management, licensing and definitions could benefit from reform Priority areas differed depending on the stakeholder group 	 <h3>Perspectives on the NDRP2</h3> <ul style="list-style-type: none"> Many stakeholders queried the effectiveness of the NDRP2 due to the lack of a binding mechanism to hold jurisdictions accountable to its implementation
 <h3>Governance and Risk</h3> <ul style="list-style-type: none"> General consensus that governance should be a key consideration in radiation protection Many stakeholders suggested risk-based approaches to help manage risk 	 <h3>Opportunities for Reform</h3> <ul style="list-style-type: none"> Stakeholders consistently noted the necessity of a mechanism to introduce greater State and Territory accountability Most stakeholders noted the importance of a cost to benefit consideration
 <h3>Barriers to Reform</h3> <ul style="list-style-type: none"> Inconsistent implementation of standards, political appetite and a lack of in-depth collaboration between States, Territories and industry stakeholders were all identified barriers to reform 	

This section of the report will provide a brief description of each theme captured from stakeholder insights. It will contextualise the themes with evidence in the form of case studies or references to broader industry research. The qualitative data from the thematic analysis forms the foundation of information used to directly inform and shape the options and recommendations in Part 5 of the Report.

Insight 1: What is Working Well?



Engagement with key stakeholders highlighted several areas where regulation of nuclear safety and radiation protection in Australia are successful. These include transportation, Automatic Mutual Recognition and the sustainment of overall public safety.



States and Territories considered themselves working well together despite inconsistencies in their respective approaches to radiation protection and nuclear safety.



Although there are regulatory inconsistencies between jurisdictions, overall public safety in radiation protection and nuclear safety has been maintained as evidenced by the lack of major public health incidents in the sector.



Several areas such as transport and the AMR were working well and contributing to the low rate of nuclear and radiation related public health incidents.

Transportation

When asked what was working well in the current regulatory landscape, stakeholders consistently listed ‘transport’ as a successful element in nuclear safety and radiation protection. This can largely be attributed to all the States and Territories (except for the Australian Capital Territory) legislating for licences to transport, with explicit application of the *Code for the Safe Transport of Radioactive Material (RPS C-2)* (Transport Code). Consistent application and alignment to the Transport Code has enabled greater predictability and therefore decreased inconsistency.

State and Territory representatives noted that elements of the transportation lifecycle could be improved upon, highlighting several inconsistencies in licensing, training and transportation-related definitions that made the transport process overly complicated and confusing. There was overall agreement that despite geographical differences between States and Territories, transportation was an area in the current regulatory framework that would benefit from uniformity. The rationale underpinning this perception being that transportation is one area of the framework which necessarily involves multiple jurisdictions and accordingly, should be afforded consistency.

Automatic Mutual Recognition

The current state of AMR in Australia is gradually evolving and showing promising signs. The *Commonwealth Mutual Recognition Act 1992* was amended in 2021 to allow for Automatic Deemed Registration for licensed individuals to work across States and Territories with the goal of making it easier for workers who need to be licensed or registered for their jobs to work in other States and Territories. The *Commonwealth Mutual Recognition Act 1992* has been adopted and implemented by all States and Territories, except for Queensland, which continues to implement the remaining provisions of the Act. While the specifics of how AMR is being implemented across all occupations and industries requires further analysis in the future, progress has been made in establishing a resilient and adaptable system in Australia.

Implementation of AMR in the nuclear and radiation industry is currently underway in various jurisdictions, with the aim of streamlining the regulatory process and ensuring consistency in standards across different regions. Overall user sentiment through stakeholder consultations regarding AMR was positive, but not without criticism. Although stakeholders had “little complaints” regarding the scheme, some State representatives noted they were only compliant with AMR due to a lack of data, resources, or research to understand better alternatives. They also noted AMR was complex and difficult to achieve in the context of radiation protection as there are “many factors that can influence uniformity and consistency” across different jurisdictions. State representatives noted the previous scheme of mutual recognition worked well but the current AMR was unnecessarily complex due to the many categories of licences. Additionally, there were issues regarding the enforceability and application of AMR. For example, State representatives noted that the current scheme creates confusion regarding licensing conditions between States noting the AMR does not reference the second ‘visiting’ jurisdiction’s licensing conditions and only refers to the first ‘home’ jurisdiction. Representatives added that under the AMR scheme, people were working under the ‘home’ jurisdiction’s license conditions while subject to the law of the second jurisdiction, creating complexity with AMR enforceability.

Overall, stakeholder views regarding AMR were positive and are reflected in State and Territory implementation of the scheme. However, the extent to which AMR promotes uniformity across different jurisdictions in Australia’s nuclear and radiation industry regulation, particularly across occupations, requires further research and analysis.

Sustainment of overall public safety

Australia’s progress in promoting and achieving safety in radiation protection and nuclear safety can be assessed through various initiatives and agencies, including ARPANSA. According to ARPANSA’s *Annual Report 2022-23*, Australia has made significant progress in achieving safety in the use of radiation and nuclear materials. The *Annual Report* highlights several key achievements including:



A reduction in the number of radiation accidents and incidents – ARPANSA's data indicates a decreasing trend in the number of reported radiation accidents and incidents in Australia. This decline is attributed to various factors, including enhanced safety measures, improved training and education programs, and effective enforcement of regulatory requirements.



An increase in the number of radiation safety inspections – ARPANSA has increased the frequency and scope of radiation safety inspections across various industries and sectors. These inspections aim to identify and address potential safety hazards, ensuring compliance with regulatory standards and promoting best practices in radiation protection.



The development of new radiation safety standards and guidelines – ARPANSA actively reviews and updates radiation safety standards and guidelines to reflect the latest scientific knowledge and technological advancements. These standards provide clear and practical guidance for radiation protection practices, ensuring the safety of workers, the public, and the environment.



The implementation of new radiation safety programs – ARPANSA has implemented various radiation safety programs to address specific areas of concern or emerging issues. These programs focus on improving radiation protection practices in areas such as medical imaging, industrial applications, and radioactive waste management.

A key theme emerging from stakeholder consultations was the effectiveness of the current system in helping protect the Australian public as evidenced by the lack of any large-scale, high risk radiation incidents. Regarding safety, several stakeholders noted the importance of maintaining a high level of safety in radiation protection through consistent application of safety standards between jurisdictions. For example, concerns were expressed regarding proposed changes to the legislative framework that could be perceived as lessening safety in certain States, making it difficult to reach agreement for decision-makers. Additionally, there was discussion about the need for clearer separation between powers of different regulatory bodies to ensure that safety standards are maintained. However, there was a view that despite some differences across jurisdictions, “90-95%” of what is done across the country is uniform and there had not been any large-scale, high risk radiation incidents which highlights the effectiveness of the current system.

At the State and Territory level, stakeholders were in agreement that the current system is generally effective in delivering the desired safety outcomes. Stakeholders noted however that the present system was not free from flaws as elucidated through the occurrence of various incidents e.g., the Western Australian ‘lost source incidence’ or instances of accidental radiation exposure.

Insight 2: Impact of Greater Uniformity on Safety Outcomes



Stakeholder views were varied regarding the necessity of uniformity reflecting a desire to either maintain the current state, partially proceed with uniformity or initiate significant effort towards achieving uniformity.



There were divergent views regarding the necessity of uniformity with some stakeholders expressing their concern over a lack of uniformity in high-risk areas like emergency preparedness and waste management.

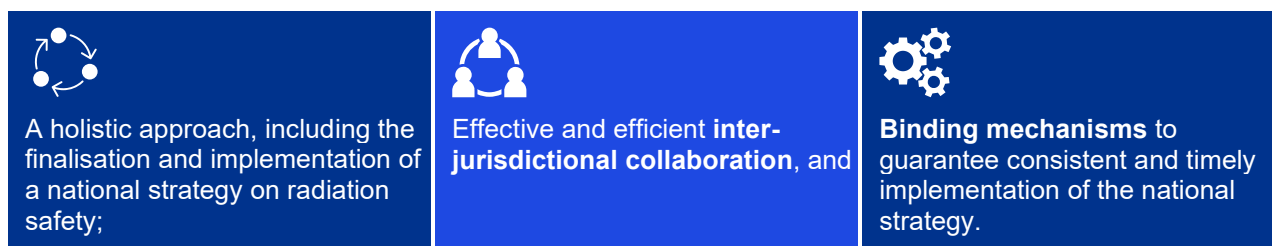


Some representatives however noted that uniformity across all issues would be impossible and does not recognise the nuances between States and jurisdictions, their resourcing constraints, budget and workforce.



Stakeholders reiterated that the focus should be on uniform safety outcomes rather than processes.

The Mission Report discusses the importance of achieving national uniformity in radiation safety in Australia and notes this as a primary objective that requires:



The Mission Report also notes that discussions on achieving national uniformity across the jurisdictions would significantly contribute to collective continuous improvement.

View 1: Present state is adequate

Throughout consultations, there were some minor views that there is too much focus on uniformity. There was overall sentiment that even though uniformity was being communicated as an essential component to the regulatory framework, stakeholder views suggested there should be less of a focus on making things 'look pretty' e.g., aligning definitions which have no impact. States and Territories defended the view that their approaches were already largely consistent and there was collaboration between jurisdictions to contribute to national uniformity and consistency. State representatives added that it would be a mistake to assume that consistent adoption of codes and the NDRP2 equates to uniformity as there are jurisdictional differences in priorities. They also noted that different geographical demographics require different approaches and achieving uniformity through systems at a high-level can be difficult due to political motivators and funding constraints.

View 2: Some effort towards uniformity is required but not much

Stakeholders noted the importance of uniformity in helping to achieve consistency and reduce confusion but noted jurisdictional specific differences should be accounted for to reflect the distinct considerations for State and Territory requirements. Stakeholders noted that inconsistencies exist at granular levels referencing differences in who can perform certain procedures and who can have a radiation safety plan as an example. They suggested that achieving uniformity should not be the lowest common denominator as this would require some jurisdictions to reduce their standards in favour of creating consistency. Central to this view was the perception that a reduction of safety standards should not be accepted as a trade-off to achieve consistency, as the overall purpose of the framework is to protect people and the environment from radiation risks.

Stakeholders suggested that the focus should be on achieving consistent outcomes rather than achieving uniformity in approach and process. A majority of stakeholders offered the view that consistency in outcomes, rather than consistency in approach was more important than achieving comprehensive uniformity. They encouraged reviewers to acknowledge the difference in strengths and demographics of States and Territories and that these differences should not be lost in a pursuit of uniformity.

View 3: Significant effort towards uniformity is required

There was a consistent theme among professional bodies to see greater uniformity to reduce confusion for the regulated community and increase compliance. As the regulatory regimes around radiation are deeply technical in nature, a lack of consistency further exacerbates difficulties in developing and implementing support tools to help the regulated community understand the regime. There was also recognition that the regulatory environment is further complicated by radiation legislation sitting within the context of other ancillary legislation e.g., WHS Act, Planning Act, Electricity Act etc. Several stakeholders noted that although the NDRP2 was a good tool, it could be improved by providing stricter requirements which would promote greater compliance. Stakeholders viewed the NDRP2 as a 'steppingstone' to an intergovernmental agreement (IGA) and were in favour of binding mechanisms as a way to promote uniformity and create a mechanism of accountability that also promoted compliance with standards. These views are consistent with the Mission Report which suggests 'binding mechanisms' to contribute towards achieving national uniformity.

Insight 3: Priority Areas for Reform



Stakeholders identified several priority areas for reform



Stakeholder views on the priority areas for uniformity were varied but highlighted several areas that would benefit from greater harmonisation including **emergency management, radioactive waste management, licences, definitions and radiation safety**. Stakeholders noted that achieving uniformity on all aspects of regulation would not only be difficult to achieve, but also could potentially misrepresent the priorities or relevant issues of each jurisdiction.

Table 8: Priority areas for uniformity identified according to stakeholder group

Group	Emergency Management	Radioactive Waste Management	Licences	Definitions	Radiation Safety
States and Territories	✓	✓	✓	✓	✓
ARPANSA	✓	✓			
Industry and Professional Bodies	✓	✓	✓	✓	✓

Throughout the stakeholder consultation period, several areas for prioritisation of uniformity efforts were identified and included:



Emergency management – Emergency management was consistently regarded as a key priority area for uniformity. Stakeholders referenced the disparity in how ARPANSA considers emergency response (i.e., Lucas Heights) compared to that of States and Territories'. States and Territories argued they are exposed to a broader range of emergency response events given their regulation of more entities compared to ARPANSA's regulation of Commonwealth-only entities. Stakeholders further acknowledged the role of the COMDISPLAN in the event of an emergency radiation event and spoke to the significant role of the COMDISPLAN during the lost source incident in Western Australian earlier this year. A priority area for uniformity however was the coordination of State and Territory resources in the event of another such incident, with stakeholders acknowledging that other States and Territories can play larger roles in emergency responses. Stakeholders further acknowledged the lack of an emergency response feedback mechanism, to allow other States and Territories not involved in an emergency response to also share in learnings.



Radioactive Waste Management – stakeholders mentioned the differences in language and terminology used in radiation emergency plans across States and Territories. Stakeholders queried whether these inconsistencies mattered and if there should be a consistent set of legislation and terminology regarding radioactive waste management. They added there were different perspectives on the importance of consistency but agreed that having a consistent framework would be beneficial. They encouraged reviewers to consider the challenges in achieving uniformity in this area given the different requirements and approaches in each jurisdiction.



Licences – stakeholders noted inconsistencies in how the States and Territories treat the licencing process. For example, in the Northern Territory, hospitals apply and hold licences rather than users. Stakeholders expressed a desire for greater consistency in terminology across the States and Territories as different naming conventions on licences and old licences with old terminology are still being used. They also noted that each jurisdiction needs to consider the changing workforce in more detail as requests for licences are increasing and outpacing the ability for licencing bodies to process and grant licences.



Definitions – stakeholders discussed the importance of consistent definitions in radiation protection. They noted there can be differences in how ‘waste’ for example is defined and this can lead to ambiguity and challenges for regulated entities. They also discuss the importance of separating nuclear and radioactive materials and the need to think about what is grouped under national standards. In contrast, some stakeholders noted there was little need to focus on definitions and terminology if the outcome is the same. Majority of stakeholders noted the inconsistency of language used between jurisdictions contributed to confusion and suggested the usefulness of a **thesaurus or dictionary of definitions** to increase understanding and promote consistency on common terminology.



Radiation safety – there was significant discussion amongst stakeholders about the need for uniformity in radiation safety and protection. Stakeholders noted that safety is a key concern and that there are different dimensions to risk including mathematical consequences and perceived risk. They also discussed the importance of taking into account technical perceptions of risk. Overall, most stakeholders noted that safety is a key consideration in radiation protection and there is a need for a consistent approach to radiation safety that balances the different dimensions of risk to ensure safety is maintained and upheld.

Overall, stakeholders discussed the need for a consistent standard using a professional standards model. They noted the various challenges of achieving uniformity and the need for greater consistency in areas such as transport, emergency response and the use of radioactive materials. The discussions from stakeholder consultations suggest the **priority areas outlined above could benefit from greater uniformity and consistency** to ensure public and occupational safety. This view was further strengthened due to stakeholder insight that there are commercial entities heavily involved in industries using or assisted by radiation, whereby the lack of regulation to ensure consistent standards will necessarily expose the public to harm and impact safety.

Insight 4: Perspectives on the NDRP2



Stakeholder attitudes towards the NDRP2 have been dominated by the widespread recognition of the limited practical role which the NDRP2 presently plays.



Despite the Commonwealth, States and Territories having varied alignment to the NDRP2, most stakeholders recognise the importance of the NDRP2 as a unifying tool towards achieving a goal of consistent regulation.



Many stakeholders queried the effectiveness of the NDRP2 noting that there is no binding mechanism to hold State and Territory jurisdictions accountable to fully implanting the NDRP2. Due to this deficiency, many stakeholders labelled the NDRP2 as “too soft”, or a mere “steppingstone” to an IGA.



Due to the lack of any accountability to fully implement the NDRP2, various stakeholders highlighted the limited role of the NDRP2 in addressing areas of inconsistency such as delayed adoption of Codes of Practices, inconsistent definitions, and varied standards.

Role of the NDRP

The first edition of the NDRP was published in 2004 in response to the lack of a tool which could unify radiation protection policies and practices amongst the Commonwealth, State and Territory jurisdictions. Receiving the endorsement of health ministers through the AHMC, it was widely agreed that the regulatory elements of the NDRP must be adopted as soon as possible within each jurisdiction's regulatory framework. Following its publication in 2004, the first edition of the NDRP was amended seven times through the structured Radiation Protection Series process, to incorporate approved regulatory revisions. However despite this iteration, and the issuance of a second version (NDRP2) in 2021, this fundamental unifying role which the NDRP framework was purposed to fulfil largely remains unchanged, acting as a regulatory tool to progress national uniformity.

Benefits of the NDRP2

Across extensive stakeholder consultations, most radiation protection and nuclear safety stakeholders recognised the importance of a regulatory tool such as the NDRP2. Noting the intentions behind the creation of the NDRP2, stakeholders recognised:

- The importance of the NDRP2 in providing a central benchmark to unify State and Territory legislative requirements; and
- The platform which the NDRP2 provides to allow endorsement by the State and Territory jurisdictions.

Fallibilities of the NDRP2

Whilst recognising the intention and role which the NDRP2 was created to play, most stakeholders highlighted the extensive practical limitations on the NDRP2 in practically progressing national uniformity in radiation usage regulation.

This was largely based on two dominant criticisms:

1. There is no present mechanism to ensure consistent implementation of the NDRP2

Whilst the NDRP2 has been endorsed by the Commonwealth, States and Territories, this in itself is not a binding mechanism through which implementation of the minimum legislative standards contained in the NDRP2 can be enforced.

The **lack of accountability** associated with the NDRP2 has further been recognised by the Mission Report. In the Mission Report, the IRRS team noted that despite the NDRP2 having a fundamental role in laying down a foundation for nationally agreed radiation safety codes and standards, the actual implementation of the NDRP2 has not proceeded uniformly nor promptly across all the jurisdictions.

Whilst the NDRP2 has been collectively drafted and agreed to by the Commonwealth, State and Territory regulators, there is presently no systematic audit of feedback mechanism from jurisdictions to enHealth regarding progress on implementation of the NDRP2.

Accordingly, stakeholders have highlighted that the present NDRP2:

- Is “too soft” overall;
- Cannot resolve the issue of delayed adoption of Codes of Practices across the Commonwealth, States and Territories;
- Is unable to harmonise the inconsistent definitions and varied standards which are presently in place; and
- Seems to play the role of being a “steppingstone” to an IGA, which may better bring about desired outcomes.

2. The NDRP2 fundamentally assumes that all States and Territories are capable of adhering to minimum legislative standards completely

Central to the NDRP2 is the assumption that perfect alignment will ensure consistent regulation of radiation. This assumption however has been subject to extensive criticism by stakeholders as there is an alternate view that alignment to a single benchmark, like what the NDRP2 is attempting to do, does not necessarily equate to uniformity.

Rather, stakeholders have expressed strong views that the variable levels of actual implementation of codes and principles set within the NDRP2 is warranted, noting that States and Territories have distinct geographical and therefore, jurisdictional priorities. Given the diverse priorities and sizes of each State and Territory, stakeholders noted that variability in resourcing and workforce capabilities means having a strict

benchmark for radiation protection and nuclear safety is not fit-for-purpose, as it deprives jurisdictions from tailoring their frameworks to address specific challenges and opportunities which exist at the jurisdictional level.

Insight 5: Perspectives on Governance / Risk-based Approaches



Stakeholders noted confusion regarding the governance structures in the regulation of radiation and nuclear materials. Risk-based approaches may be a useful framework from which to promote regulation and compliance with standards.



A minor view shared by stakeholders was that governance was a key consideration in radiation protection. Stakeholders noted the lack of consistency in this area and the need for greater clarity regarding the governance mechanisms in place.



Risk-based approaches to achieving greater uniformity were also offered as a suggestion to help stratify risk according to mathematical, perceived risks and technical dimensions of risk.

According to the Mission Report, governance arrangements for radiation safety is complex, with multiple regulatory bodies operating across different jurisdictions. Effective governance arrangements are necessary to ensure that regulatory bodies have the necessary resources and competencies to carry out their functions effectively. The Mission Report highlights the importance of recognising the substantial advantages of consistent regulation for public health, the regulated industry, and the efficient use of resource across the country. **Discussions on achieving national uniformity across the various jurisdictions** would significantly contribute to collective, continuous improvement. Effective governance arrangements are essential to ensure that regulatory bodies can effectively carry out their functions and achieve national uniformity in radiation safety regulation in Australia.

Perspectives on Governance

Stakeholders expressed confusion over why radiation protection was a responsibility of Environmental Protection Authorities in NSW and SA compared to Health Departments in other States and Territories. They noted that the responsibility for implementing policies and standards is placed on various jurisdictions and State regulatory bodies, which have led to inconsistencies in how policy standards are adopted and enforced. Currently, there is no obligation for States to implement codes and standards related to radiation protection. Stakeholders added that the International Atomic Energy Agency (IAEA) could provide that obligation, but codes needed to first be developed in line with international standards and in regulatory language to be enforceable, with previous cases demonstrating that codes were not always enforceable in court. Stakeholders offered the view that if **a dedicated workforce were to be established for the development of codes**, they could develop codes more efficiently thus enabling uniformity to occur more easily and regularly.

In Australia, the governance structures that govern the nuclear and radiation industry involve various government bodies and agencies at the national and state levels. Below is a general overview of these structures:

Governance bodies	State and Territory Regulators
<p>Australian Radiation Protection and Nuclear Safety Agency (ARPANSA): ARPANSA is the Australian Government's primary authority for radiation protection and nuclear safety. It operates under the ARPANSA Act and is responsible for regulating and promoting the safe use or production of radiation by Commonwealth entities.</p>	ACT: Health Protection Service
<p>Australian Nuclear Science and Technology Organisation (ANSTO): ANSTO is a government-owned organization that operates Australia's nuclear research reactor and other nuclear facilities. It conducts research and development, produces radiopharmaceuticals, and provides nuclear expertise and services.</p>	NT: Department of Health (NT)

Governance bodies	State and Territory Regulators
<p>State and Territory Regulators: Each Australian state and territory has its own regulatory body responsible for radiation safety and nuclear activities within their jurisdiction. These regulators work in coordination with ARPANSA to ensure compliance with national standards and regulations.</p>	NSW: Environmental Protection Agency
<p>Radiation Health Committee (RHC): an advisory committee comprised of state and territory representatives who provide expert advice to the ARPANSA CEO on radiation protection and safety. They assist in the development of regulations, guidelines, and policies related to radiation and nuclear activities.</p>	QLD: Department of Health (QLD)
<p>Radiation Health and Safety Council (RHSAC) ‘Council’: advises the ARPANSA CEO on emerging issues and matters of major public concern relating to radiation protection and nuclear safety.</p>	SA: Environmental Protection Agency
<p>Nuclear Safety Committee (NSC): advises the ARPANSA CEO and the Council on matters relating to nuclear safety and the safety of controlled facilities, including developing and assessing the effectiveness of standards, codes, practices and procedures.</p>	TAS: Department of Health and Human Services
<p>Nuclear Regulatory Framework*: The regulatory framework for nuclear activities in Australia includes legislation such as the Australian Radiation Protection and Nuclear Safety Act 1998, which establishes the legal framework for radiation protection and nuclear safety. Other legislation and regulations may also apply at the state and territory levels.</p>	WA: Radiological Council

*As shown in Figure 3 of this Report

It's important to note that the governance structures in Australia are designed to ensure the safe and responsible use of nuclear and radiation technologies while protecting human health and the environment. The specific roles and responsibilities of each governing body may vary depending on the jurisdiction and the nature of the activities involved.

Perspectives on risk-based approaches

There was discussion about risk-based approaches in radiation protection with stakeholders noting that risk takes on two dimensions: mathematical consequence and perceived risk, and that there needs to be a balance of these dimensions to ensure safety. They also discussed the need to consider technical perceptions of risk. Stakeholders suggested that **risk-based approaches are a key consideration in radiation protection** and that there is a need to balance different risk dimensions to ensure that safety is maintained.

The International Atomic Energy Agency (IAEA) provides guidance to states for adopting a risk-informed approach and conducting threat and risk assessments in the design of nuclear security measures. The US Nuclear Regulatory Commission (NRC) utilises Probabilistic Risk Assessment (PRA) to estimate risk by calculating real numbers and determining the likelihood of accidents or incidents. These approaches enhance the security regime for radioactive sources throughout their lifecycle.

In Australia, ARPANSA has developed regulatory guidelines to assist applicants and licence holders in achieving and maintaining compliance with radiation protection. They also offer safety guides for medical practitioners in diagnostic and therapeutic procedures involving ionising radiation.

The Mission Report recommends that regulatory bodies should assess the need for updating regulatory requirements or guidance, review and assessment, inspection, and licensing processes after considering the events reports in the Australian Radiation Incident Register (ARIR). The Mission Report also notes that the integrated safety assessment shall be repeated periodically, with account taken of the radiation risks associated with the facility or activity, in accordance with a graded approach.

Risk based approaches to radiation protection and nuclear safety are essential to ensuring safety. Balancing mathematical consequence, perceived risk, considering technical perceptions of risk, and updating

requirements based on events or incidents reports are key considerations. Guidance from organisations like the IAEA, NRC and ARPANSA can provide valuable resources and support in implementing risk-based approaches. These approaches are summarised below:

Table 9: Overview of risk-based approaches to radiation protection

Approach	Description	Source
Risk-informed Approach ¹	Using risk insights, engineering analysis, and judgment to assess and manage potential risks.	IAEA
Performance-Based Regulation ²	Developing regulations based on risk insights.	US NRC
Probabilistic Risk Assessment ³	Estimating risk by calculating real numbers, determining likelihood and consequences of potential hazards.	US NRC
Radiation Licencing and Compliance	Updating regulatory requirements and guidance based on event reports to ensure safety and compliance.	ARPANSA

Insight 6: Opportunities for Reform



Throughout the consultation process, many options were raised as potential avenues for reform, however the most popular was the introduction of a regime for greater accountability.



Generally, stakeholders provided a diverse range of potential opportunities for reform depending on what their priority area of focus was.



Using these preliminary insights from stakeholders, the project team then further considered and validated these opportunities for reform and have translated the most viable options into options for this Report.



Central to these identified opportunities for reform is a cost to benefit ratio consideration, as for many opportunities highlighted, there is disproportionate effort required for the expected amount of positive change.

Stakeholder identified opportunities for reform

During the stakeholder consultation process, the project team were able to collate a diverse range of insights on perceived opportunities for reform. The entire array of suggestions provided are summarised into broad themes as follows:

¹ International Atomic Energy Agency (2015), *Risk Informed Approach for Nuclear Security Measures for Nuclear and Other Radioactive Material out of Regulatory Control*, IAEA Nuclear Security Series No. 24-G, IAEA, Vienna

² *Risk and performance concepts in the NRC's approach to regulation*. (n.d.). NRC Web. <https://www.nrc.gov/about-nrc/regulatory/risk-informed/concept.html>

³ *Risk assessment in regulation*. (n.d.). NRC Web. <https://www.nrc.gov/about-nrc/regulatory/risk-informed.html>

Figure 5: Views expressed during stakeholder consultations regarding opportunities for reform

Creation of model legislation through for example, the ARPANS Act	Development of a national thesaurus to achieve consistent terminology usage	Education of licence holders on the distinct requirements across the State and Territory jurisdictions	Potential avenues to implement prescriptive licences i.e. if a user is a member of a profession they are automatically licensed
Investment in processes to encourage greater communication between regulators and stakeholders	Having more frequent communications with industry	Encouraging a more collaborative method of developing Codes of Practices	Implementation of a national approach through having a national regulator
Introduction of binding mechanisms on States and Territories through for example, an IGA	Introduction of a single accreditation method or establishment of a national standard of competency	Legislative amendment regarding the function of the CEO of ARPANSA	Have greater collaboration across emergency responses to better share learning opportunities

The diverse array of opportunities for reform were typically based on what the stakeholder's priority area of focus was, meaning that for:

- Regulators, suggestions were largely regarding regulatory tools and ways in which greater clarity could be provided to the regulated community, to ensure consistency and reduce confusion; and
- Professional bodies, suggestions were largely focused on ways in which regulatory burdens could be eased for their members.

Uplift of these identified opportunities

From the array of options identified, the project team has further synthesised the recommendations in key options for the DoHAC. The selection process was largely based on:

- Feasibility of option;
- Expected practical outcome and scale of change of the option;
- Anticipated cost and effort required to be invested into the option; and
- Level of cooperation required across the States and Territories to achieve the outcome.

For greater detail on our options validation process, please refer to **Appendix D**.

Insight 7: Barriers to Reform



Engagement with stakeholders led to the identification of key barriers which may hinder greater consistency in the current radiation protection and nuclear safety landscape.



Despite the promulgation of consistent standards, a key barrier to national consistency in the regulatory environment is the inconsistent implementation of standards.



Through extensive stakeholder consultations, the political sensitivities which must be accounted for during the reform process arose as a significant barrier to achieving consistent outcomes.



A commonly identified barrier to reform is the lack of communication and in-depth collaboration between the States and Territories as well as industry stakeholders.

Throughout stakeholder consultations, three key categories of barriers to reform were identified, as follows:

Consistent standards but inconsistent implementation

Despite widespread acknowledgement that there are resources in place to progress uniformity e.g., through Codes of Practice, the NDRP2, or the Radiation Protection Series, a significant barrier to reform has been repeatedly identified as the **lack of consistent implementation** of these resources across the States and Territories.

For example, the Mission Report notes:

- That individual jurisdictions have had variable levels of actual implementation of the codes and principles set out in NDRP2;
- The objectives for enHealth and RHERP to ensure a nationally consistent approach to the implementation and compliance of radiation safety codes and standards has not been fully achieved;
- The Commonwealth Government, in conjunction with State and Territory Governments should consider establishing additional binding mechanism to ensure consistent and timely implementation of NDRP2 across Australia.

Stakeholders have generally spoken to inconsistent implementation of standards and have attributed the reasons why this barrier has arisen to various factors such as:

- Distinct resourcing capabilities of each State and Territory jurisdiction, with stakeholders noting that smaller jurisdictions may not have sufficient workforce or resources to necessarily ensure complete alignment to a set of benchmarked standards;
- Lower standards than the current state being prescribed in the codes, where stakeholders have noted that they are unwilling to modify their respective radiation procedures in the interest of national uniformity if it were to lower their safety outcomes for the regulated community;
- States being asked to implement Codes of Practice despite not being fully agreeable to the Code, where stakeholders have noted that an expectation of consistent implementation of Codes can only occur where there is explicit, unanimous consent to the Codes first;
- Distinct priority areas for each State and Territory, where stakeholders noted that the jurisdictional focus for each State and Territory differ fundamentally depending on the type of radiation usage in the jurisdiction, which necessarily translates to the focus given for implementing relevant standards. For example, the focus on uranium mining in South Australia and healthcare in New South Wales.

Political considerations

Despite the many catalysts for change such as the acquisition of nuclear-powered submarines from the AUKUS partnership and the development and update of new and emerging uses of precision cancer treatment radiotherapy modalities, a key barrier to reform has been identified by stakeholders as the insufficient levels of political incentive. Stakeholders expressed views that government investment and attention to reform may be difficult to achieve noting that the present radiation protection and nuclear safety regime largely achieves overall safety outcomes. There have largely been two dominant perspectives on safety regulation, as follows:



Working Well

Some stakeholders cited the lack of major radiation incidents as evidence of the present regime working relatively well in achieving the purpose of protecting people and the environment from the harmful effects of radiation.



Improvement Required

Other stakeholders have noted that the lack of a major radiation incident should not be overall indication of the effectiveness of the present regime. In this view, the extent of inconsistent regulation not only impacts the implementation of standards by the regulated community but has direct safety outcomes as users of radiation may go unregulated in areas where regulation may be warranted.

However, consistent to both viewpoints were an underlying recognition that significant reformative action may be barred by the lack of political support in the civilian radiation protection and nuclear safety framework. This is further exacerbated with radiation safety being one consideration amongst others as the radiation framework is governed by not just the relevant State and Territory's radiation laws. For example, radiation relevant considerations might sit within other regulatory portfolios and require collaboration with other bodies such as mining bodies for radiation uses in mining and work, health and safety groups for non-ionising radiation.

Further, areas of inconsistency in the radiation framework may be attributable to the flow-on effect of broader and non-radiation specific state decisions. For example, the Queensland Premier's decision to not participate in mutual recognition for all licensing frameworks, resulting in Queensland not participating in the AMR regime for radiation licences. These political decisions which sit external to but have flow-on effects on the radiation regime have been noted to present significant barriers to achieving consistency across the radiation protection and nuclear safety regulatory regimes across the States and Territories.

Lack of communication and in-depth collaboration between States, Territories and industry stakeholders

A commonly identified barrier to reform is the lack of extensive communication and in-depth collaboration between the States and Territories as well as industry stakeholders. Whilst platforms of communication between regulators and the public already exist, namely through the formation of the:



Radiation Health Council (RHC)

The RHC consists of a representative of each State and Territory, the CEO of ARPANSA, a representative of the Nuclear Safety Committee, a person to represent the interests of the general public and up to 2 other members; and



Radiation Health Expert Reference Panel (RHERP)

RHERP is an expert panel established under the Environmental Health Standing Committee (enHealth), tasked with providing expert advice on specific issues as directed by enHealth,

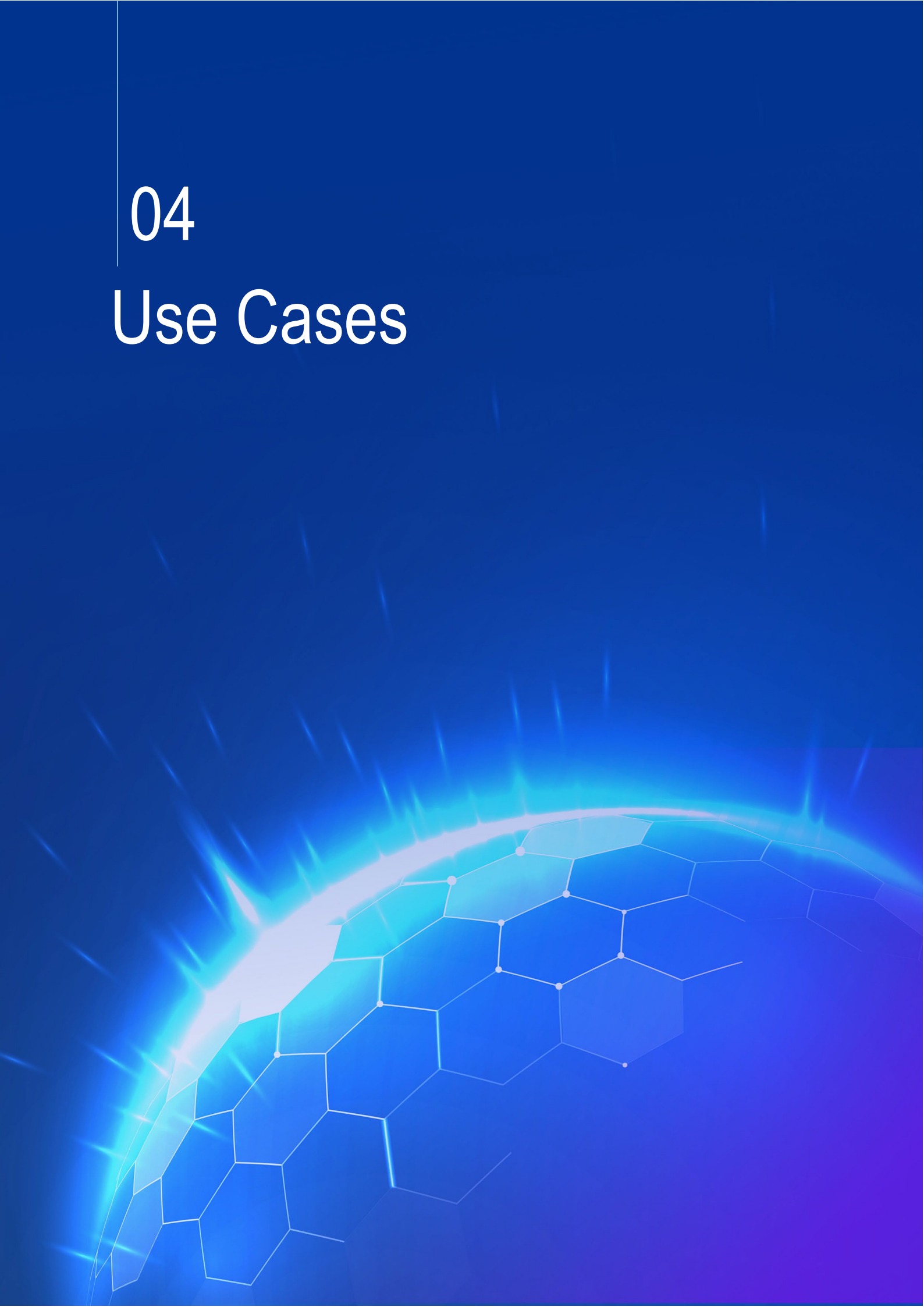
stakeholders have nonetheless provided significant feedback that better communication mechanisms are required to facilitate:

- Discussion regarding feedback and learnings from emergency management incidents;
- Ad-hoc state specific responses to licensing decisions; and
- Other discussions required to facilitate consistent and timely implementation of codes and standards.

The Mission Report further validates the existence of this barrier to reform by noting the present need for an additional forum to facilitate the systematic exchange of information with a goal of progressing national uniformity. The current mechanisms for discussion as they exist also seem to lack a systematic element of industry participation, despite the statutory mandate of public participation.

04

Use Cases



4. Application of Use Cases

Stakeholders highlighted several use cases indicating the challenges with the multi-jurisdictional nature of the Australian nuclear and radiation regulatory framework. Ahead of stakeholder consultations, the project team prepared several, hypothetical use cases to inform conversations with stakeholders and representatives to understand the unique challenges faced by professionals in the industry. The hypothetical use cases were prepared using industry data and legislative analysis and were further validated through discussions with stakeholders.

Throughout the engagement period, stakeholders shared their insights on whether the use cases were reflective of real-world challenges faced by nuclear and radiation professionals. They offered new and emerging insights on issues to better illustrate the challenges faced by professionals across various aspects of the regulatory framework including licensing, transport, accreditation and the introduction of new technologies and applications such as artificial intelligence.

The purpose of this section is to use real-world examples to further contextualise stakeholder views and demonstrate the necessity of greater consistency for a fit-for-purpose radiation protection and nuclear safety regulatory framework. Each use case builds on stakeholder feedback and illustrates a specific challenge that industry professionals face with the application of current legislative and regulatory frameworks that govern the nuclear and radiation industry.

 Use case 01	 Use case 02	 Use case 03	 Use case 04
Transportation of Radioactive Waste Materials via Ground	Artificial Intelligence in Radiation Industry	Shielding	Waste Management

For each identified use case, the applicable legislative instruments which apply at each stage have been identified and extracted. As the use cases typically span multiple jurisdictions, this provides an opportunity to highlight the level of uniformity and consistency of State and Territory legislative instruments, as it applies to the same scenario. The extent of alignment will be colour-coded per the following key:

Figure 6: Key used to demonstrate the extent of consistency of legislative instruments in the use cases

Assessing the level of uniformity and consistency			Definition: Involved Entities For the purposes of this use case, an 'Involved Entity' means any entity whose actions or decisions impact the outcome of the use case. For clarity, this does not include advisory
Interaction supported by alignment between Commonwealth and State or Territory legislation	Interaction not supported by alignment between Commonwealth and State or territory legislation	Interaction requires further analysis on its implications for alignment	
Potential Alignment	Potential Gap	Further Analysis Required	

Use Case 1 – Transportation of Radioactive Material on Ground

Use case 1 illustrates the transport journey of radioactive material from a Western Australia to a Commonwealth facility in New South Wales. The use case identifies application processes, variations in applied Codes of Practice, and decision-making criteria used by regulators. Additionally, the use case showcases potential inefficiencies associated with multiple licence applications and the requirement for primary duty holders to comply with several different safety standards.

01 Radioactive material is scheduled to be transported from Western Australia to a Commonwealth Facility in New South Wales.

Issue Identification

- It is assumed a licence to possess and use the radioactive material has been obtained prior to transport.
- In order to transport the material in WA, requirements include:
 - Obtain a licence to transport the material ([section 25\(1\) of the Radiation Safety Act 1975 \(WA\)](#)); and
 - Have an approved 'Radiation protection programme' in accordance with section 5 of the [Radiation Safety \(Transport of Radioactive Substances\) Regulations 2002 \(WA\)](#). A 'Radiation protection programme' is defined in accordance with Section II of the [International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Material 2018 Edition, SSR-6 \(Rev. 1\)](#) set out in the [Code for the Safe Transport of Radioactive Material \(2019\)](#), RPS C-2 (Rev. 1) published by the CEO of ARPANSA under the Commonwealth Act, and as modified by clauses 2.2 to 2.10 this

Legislation

3. Radiation Safety Act 1975 (WA)
4. Radiation Safety (General) Regulations 1983 (WA)
5. Radiation Safety (Transport of Radioactive Substances) Regulations 2002 (WA)

Involved Entities

- Licence holder for possession and transport
- Driver of the vehicle
- Radiological Council (WA)

Please note: The following use cases have been prepared to illustrate a sample of key challenges that arise from the multi-jurisdictional nature of the Australian radiation protection and nuclear safety regulatory framework. The use cases are illustrative in nature to demonstrate the inconsistencies which exist within the current regulatory framework based on a review of the legislation and present standards. We note that the use cases may slightly differ based on actual practice.

Please note: Referenced legislation and regulation have been colour coded in accordance with the legend provided on page 40.



02 The radioactive material is packed into a suitable transportation vehicle and departs the commercial facility. The vehicle must travel through South Australia on its journey to the Commonwealth facility in New South Wales.

Issue Identification

- The person responsible for the transport of the radioactive material (the commercial facility) is defined as a “carrier” when entering South Australian jurisdiction ([section 3\(1\) of the *Radiation Protection and Control Act 2021 \(SA\)*](#)).
- The carrier does not have physical possession of the radioactive material ([section 3\(5\)\(b\)\(ii\) of the *Radiation Protection and Control Act 2021 \(SA\)*](#)). However, they must obtain authorisation to transport the radioactive material in accordance with a radiation management licence granted by the Minister ([section 21\(1\) of the *Radiation Protection and Control Act 2021 \(SA\)*](#)) in order for the driver to operate the vehicle ([section 21\(3\) of the *Radiation Protection and Control Act 2021 \(SA\)*](#)).
- To obtain a South Australia transport licence, the commercial facility must submit a radiation management plan in accordance with the [Code of Compliance for Radiation Management Plans 2022](#) published by the South Australian Department of Health ([section 34\(4\) of the *Radiation Protection and Control Act 2021 \(SA\)*](#) & [regulation 23 of the *Radiation Protection and Control Regulations 2022 \(SA\)*](#)).

Legislation

1. Radiation Protection and Control Act 2021 (SA)
2. Radiation Protection and Control Regulations 2022 (SA)

Involved Entities

- Licence holder for possession and transport
- Driver of the vehicle
- Minister of Health (SA)

Please note: Referenced legislation and regulation have been colour coded in accordance with the legend provided on page 40.



03 The transportation vehicle crosses the jurisdictional border from Western Australia to South Australia.

Issue Identification

- South Australia prescribes the same Transport Code as Western Australia ([regulation 3\(1\) of the *Radiation Protection and Control Regulations 2022 \(SA\)*](#)). However, South Australian regulations impose additional specific duties on carriers and drivers where radioactive materials are being transported ([sections 111 & 112 of the *Radiation Protection and Control Act 2021 \(SA\)*](#)).
- The South Australia regulations also modify the Transport Code to include reference to the *Dangerous Substances (Dangerous Goods Transport) Regulation 2008 (SA)* ([Schedule 6\(1\)](#)).

Legislation

1. Radiation Protection and Control Act 2021 (SA)
2. Radiation Protection and Control Regulations 2022 (SA)
3. Dangerous Substances (Dangerous Goods Transport) Regulation 2008 (SA)

Involved Entities

- Licence holder for possession and transport
- Driver the vehicle
- Environment Protection Authority (EPA)



04 The transportation vehicle crosses the jurisdictional border from South Australia to New South Wales

Issue Identification

- After obtaining the Minister of Health's (SA) approval to transport the radioactive materials into South Australia from Western Australia, the transportation vehicle must then enter New South Wales jurisdiction.
- New South Wales prescribes the same Transport Code as Western Australia & South Australia ([regulation 36 of the Protection from Harmful Radiation Regulation 2013 \(NSW\)](#)).
- The person driving the transportation vehicle must transport the radioactive material in accordance with the Transport Code ([regulation 36 of the Protection from Harmful Radiation Regulation 2013 \(NSW\)](#)).
- According to New South Wales legislation, the driver is not a person responsible for the radioactive material ([section 6\(1\)\(ii\) of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)). However, they must have a Radiation User Licence ([section 7 of the Protection from Harmful Radiation Regulation 2013 \(NSW\)](#)) and be technically competent ([section 5\(1\)\(b\) of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)).
- If satisfied with the Application, the Authority approves the application for the licence ([section 9 of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)).

Legislation

1. Protection from Harmful Radiation Act 1990 No 13 (NSW)
2. Protection from Harmful Radiation Regulation 2013 (NSW)

Involved Entities

- Person responsible for the vehicle (Radiation Management Licence holder)
- Driver of the vehicle
- Environmental Protection Authority (NSW)



05 The transportation vehicle enters the Commonwealth facility and subsequently crosses jurisdictions from New South Wales to the Commonwealth.

Issue Identification

- The Commonwealth Act prescribes the same Transport Code as WA, SA and NSW ([regulation 4 of the Australian Radiation Protection and Nuclear Safety Regulations 2018 \(Cth\) \(ARPANS Regulations\)](#)).
- Due to the contractual arrangement, the Commercial facility is considered a Commonwealth Contractor under the Commonwealth Act ([section 11 of the Australian Radiation Protection and Nuclear Safety Act 1998 \(Cth\) \(ARPANS Act\)](#)) and therefore, a controlled person ([section 12 of the ARPANS Act](#)).
- The driver is considered a permitted person ([section 11A of the ARPANS Act](#)).
- The Commercial facility must apply to obtain a Source Licence to 'deal' (transport) with the radioactive material ([regulation 47 & 54 of the ARPANS Regulations](#)) and comply with licence conditions ([regulations 55-67 of the ARPANS Regulations](#)).

Legislation

1. Australian Radiation Protection and Nuclear Safety Act 1998 (Cth)
2. Australian Radiation Protection and Nuclear Safety Regulations 2018 (Cth)

Involved Entities

- Person responsible for the vehicle (Radiation Management Licence holder)
- Driver of the vehicle
- ARPANSA
- Commonwealth facility

Identified Issues:

1. Requirement for multiple licence applications across jurisdictions
2. Potential variation in safety management plan requirements per jurisdiction (for instance, see South Australian *Code of Compliance for Radiation Management Plans 2022*)
3. Variation in decision making criteria across jurisdictions

Practical Insights

From this use case, although there are potential gaps identified in the present regulatory regime, stakeholder insights indicated that transport in general was well regulated. Stakeholders provided feedback that regulation of the transport of radioactive goods was presently well aligned across the States and Territories due to the introduction of the AMR regime.

Use Case 2 – Artificial Intelligence in Radiation Industry

Use case 2 illustrates the inconsistencies created with the introduction of artificial intelligence (AI) systems in the radiation industry. A minor view shared by stakeholders was the concern over the maintenance of professional standards and safety outcomes for patients with the introduction of generative AI technologies such as machine learning (ML) and deep learning (DL) systems. Discussions on emerging technologies highlighted stakeholder concern over the rate of technological advancement outpacing the creation of new, fit-for-purpose legislation to adequately address the changing face of the regulatory landscape.

The use of AI technology in the radiation industry has gained significant attention due to its potential to revolutionise the field. Recent research has reviewed the application of AI in radiation oncology and nuclear medicine and despite the significant advances it may present, AI most notably introduces a new layer of complexity to the current multi-jurisdictional regulatory landscape. Challenges exist in the clinical implementation of AI-based tools and in technical, ethical and legal domains (including patient data privacy)⁴.

Studies⁵ suggest the implementation of AI in diagnostic and interventional radiology may improve image analysis, aid in diagnosis, streamline the development of appropriate interventions and improve clinical predictive modelling. However, AI also presents challenges related to trustworthiness⁶ and ethical concerns⁷ related to lack of transparency in the statistical rationale generated by ML and DL when expounding on the task purpose, making them difficult to apply in medical imaging.

It is important to note that AI is not currently regulated in the radiation and nuclear industry in Australia. Professional bodies have acknowledged the various legislative, ethical and workforce implications of AI integration in the radiation industry⁸, yet further regulation and robust governance mechanisms for AI on a national scale⁹ must occur prior to considering how these technologies may be used for health disciplines such as radiotherapy or nuclear medicine.

Table 10: Application considerations for Radiation Professionals and AI enabled systems in clinical practice

Application Considerations	Radiation Professional	AI System
Clinical data sets from patient data; efficacy in clinical application of data	Relies on available data sets for decision-making	Relies on data sets for learning and decision making; requires skilled workforce to provide data to AI system, train data model and verify data outputs
Ethical concerns and conflicts of interest	Subject to ethical guidelines and professional codes of conduct	Not subject to ethical guidelines or conflicts of interest; data sharing guidelines between hospital and tech supplier is unclear
Platform integration in nuclear medicine workflow	Training and proficiency with existing platforms and workflows	Integration may require technical adaptations; dependent on human technician and proficiency of operator
Personalisation, efficiency, and accuracy improvement	Experience and expertise in tailoring treatments for individual patients	Potential for personalised treatment plans with accurate data inputs and enhanced efficiency and accuracy; dependent on human technician and proficiency of operator
Social biases and security risks	Subject to biases, but can be addressed through training and professional development	Requires robust algorithms, accurate data sources and inputs, effective safeguards to reduce security risks.

⁴ International Atomic Energy Agency. (2022). Artificial intelligence for accelerating nuclear applications, science and technology. IAEA.

⁵ Waller, J., O'Connor, A., Rafaat, E., Amireh, A., Dempsey, J., Martin, C., & Umair, M. (2022). Applications and challenges of artificial intelligence in diagnostic and interventional radiology. *Polish journal of radiology*, 87, e113–e117. <https://doi.org/10.5114/pjr.2022.113531>

⁶ Saboury, B., Bradshaw, T., Boellaard, R., Buvat, I., Dutta, J., Hatt, M., Jha, A. K., Li, Q., Liu, C., McMeekin, H., Morris, M., Scott, P. J. H., Siegel, E. L., Sunderland, J., Pandit-Taskar, N., Wahl, R. L., Zuehlsdorff, S., & Rahmim, A. (2022). Artificial intelligence in nuclear medicine: Opportunities, challenges, and responsibilities toward a trustworthy ecosystem. *The Journal of Nuclear Medicine*, 64(2), 188–196. <https://doi.org/10.2967/jnumed.121.263703>

⁷ Korreman, S., Eriksen, J. G., & Grau, C. (2021). The changing role of radiation oncology professionals in a world of AI – Just jobs lost – Or a solution to the under-provision of radiotherapy? *Clinical and Translational Radiation Oncology*, 26, 104–107. <https://doi.org/10.1016/j.ctro.2020.04.012>

⁸ Artificial Intelligence: The State of Play 2019 | RANZCR. (n.d.). <https://www.ranzcr.com/search/artificial-intelligence-the-state-of-play-2019>

⁹ Safe and Responsible AI in Australia – Discussion Paper. Department of Industry, Science and Resources (2022).

<https://consult.industry.gov.au/supporting-responsible-ai>

Please note: These examples have been developed using peer-reviewed journal articles referenced throughout this section. The above may vary depending on specific contexts and technological advancements and is used for illustrative purposes only.

01 A radiologist has moved to a new hospital which has recently introduced an AI-enabled system to assist with image interpretation and treatment planning.

Issue Identification

- The radiologist uses AI to help interpret various imaging modalities including X-Rays, computed tomography (CT) scans and Magnetic Resonance Imaging (MRI) scans to identify a tumour including its size, location and characteristics.
- The radiologist works with the radiation oncologist to develop a treatment plan. This includes determining the optimal radiation dosage, treatment volume and treatment technique.
- Because the radiologist was not trained on the new AI system, the radiation oncologist seeks further clarification of several aspects of the radiologist's imaging assessment noting discrepancies with the outputs produced when correlated with a gold-standard test.
- As the machine can not disclose the statistical rationale behind the elaboration of their tasks, the radiologist is forced to repeat the process and provide an updated imaging assessment before the team can proceed with a treatment plan.

What if the radiation oncologist did not review the radiologists AI-generated imaging assessment?

A lack of human verification or "human in the loop" in the treatment planning process may have resulted in an incorrect diagnosis which could have led to over- or under- treatment of the patient's condition.

This may have resulted in negative health consequences for the patient and resulted in reputational damage for the radiologist, the Oncology Ward and the hospital more broadly. This may have led to negative health consequences for the patient and resulted in reputational damage for the radiologist, the Oncology Ward and the hospital more broadly.

Identified Issues:

- Requirement for training on new system; currently no AI-specific certification or accreditation standards in Australia for the use of AI-enabled systems assisting with medical imaging and treatment planning.
- Regulatory safety assessment principles and guidance may need to be developed to ensure that the full benefits of AI can be accrued, particularly when there may be significant consequences of failure or maloperation.
- Emphasises the importance of industry standards for the adoption of new technologies; needs national uniformity on technological applications of AI that have direct impacts on patients and individuals. Emphasises the importance of industry standards for the adoption of new technologies; needs nationally agreed-upon processes for the technological applications of AI that have direct impacts on patients and individuals.

Identified issues

In the absence of new legislation to address emerging technologies in radiation and nuclear medicine, individuals must interpret existing laws and regulations to understand how AI may be used responsibly in clinical practice. For example, the ARPANS Act regulates the use of radiation and nuclear materials in Australia, but it does not specifically mention AI. It does however include provisions that may be applied to the use of AI in this industry, such as the requirements to obtain a licence for certain activities involving radiation or nuclear materials. Furthermore, future considerations for the use of AI in the radiological industry may consider the utility of issuing licences for practitioners who are trained to use AI-enabled systems. Currently however, these processes and standards do not exist. Stakeholder discussions revealed that AI technologies and applications are being used in the clinical setting with little regulatory oversight or training. Without explicit standards and professional guidelines on the use of AI in radiation protection and nuclear safety, this inevitably creates risks in misinterpretation and subjectivity in the translation of existing, non-AI

specific legislation to AI applications in the clinical setting potentially creating further inconsistencies in the current regulatory landscape.

Use Case 3 – Shielding

Use case 3 illustrates the shielding design process for the establishment of new diagnostic imaging facilities in Australia. RadioTech, a US company which specialises in manufacturing radiation-based medical devices, wants to establish a new diagnostic imaging facility in Australia. The company plans to operate in multiple States and Territories and needs to ensure compliance with radiation shielding requirements all jurisdictions. RadioTech identified two States to commence its expansion: New South Wales and Victoria.

01 RadioTech seeks to establish its headquarters in Sydney, New South Wales. They research the regulations and guidelines specific to NSW to inform the shielding design process for their new facility.

Issue Identification

- RadioTech applies for a licence to the NSW Environment Protection Authority (EPA), providing detailed information about the facility, equipment, procedures and radiation safety requirements.
- They refer to the *Protection from Harmful Radiation Act 1990 No 13 (NSW)* and *Protection from Harmful Radiation Regulation 2013 (NSW)* to understand their legislative requirements.
- Once their licence is obtained, they commence designing shielding for the facility and consult with a qualified Radiation Safety Officer (RSO) and Consultant Radiation Expert (CRE) who are familiar with the NSW requirements for shielding.
 - The RSO and CRE assist with the design process and recommend RadioTech design their facility in accordance with *Radiation Guideline 7* developed by NSW EPA which provides assessment and verification requirements for licensing (2, 2.7,3.2.2 a-k; 6.1)
- RadioTech develops and implements written procedures for the maintenance, inspection, and testing shielding to ensure its continued effectiveness. The shielding designs must comply with *Section 13* of the *Radiation Safety Act 1998 (Cth)*:
 - A person who has possession or control of a radiation source must take all reasonable steps to ensure that people and the environment are not exposed to radiation at a level that is likely to cause harm.
 - A person who has possession or control of a radiation source must develop and implement a shielding plan. The shielding plan must identify the radiation sources that are present, the people who may be exposed to radiation, and the measures that will be taken to protect people and the environment from harmful exposure.
- Other regulations and codes of practice RadioTech include in their regulatory considerations include:
 - ARPANSA Regulatory Guide RG-161: Radiation Protection for the Public -Code of Practice
 - ARPANSA Regulatory Guide RG-163: Radiation Protection for Workers and Members of the Public – Code of Practice.

Legislation

1. *Protection from Harmful Radiation Act 1990 No 13 (NSW)*
2. *Protection from Harmful Radiation Regulation 2013 (NSW)*
3. *Radiation Safety Act 1998*

Involved Entities

- NSW EPA
- Radiation Safety Act 1998
- Radiation Safety Officer
- Consultant Radiation Expert

Please note: Referenced legislation and regulation have been colour coded in accordance with the legend provided on page 40.



02 Less than six weeks later, RadioTech commences plans to establish their Victoria facility. They research the regulations and requirements to inform the shielding design process for their new facility.

Issue Identification

- RadioTech applies for a licence to the Victorian Department of Health and Human Services (DHHS), providing detailed information about the facility, equipment, procedures and radiation safety requirements.
- They refer to the *Radiation Protection Act 2005 (Vic)* and the *Radiation Protection Standard 2022 (Vic)* to understand their legislative requirements:
 - The *Radiation Protection Act 2005 (Vic)* requires that any person who possession or control of a radiation source must develop and implement a shielding plan. The plan must identify the radiation sources that are present, the people who may exposed to radiation, and the measures that will be taken to protect people and the environment from harmful exposure.
- Once their licence is obtained, they commence designing shielding for the facility and consult with a qualified Radiation Safety Adviser (RSA) who is familiar with the Victorian requirements for shielding.
- Other regulations and codes of practice RadioTech include in their regulatory considerations include:
 - Radiation Safety Guideline No. 10: Shielding Design and Verification
 - Radiation Safety Guideline No. 11: Radiation Safety in Medical Imaging
 - Radiation Safety Guideline No. 12: Radiation Safety in Industrial Radiography.

Legislation

1. *Radiation Protection Act 2005 (Vic)*

Engaged Entities:

- Department of Health and Human Services (Vic)
- Radiation Safety Adviser

Identified Issues:

1. Qualifications for shielding design and verification are not defined
2. Common shielding design methodologies are used but largely not mandated; Note NSW has developed Radiation Guide 7: Radiation shielding design assessment and verification requirements as a way to provide advice on shielding for different practices. This guidance document is not mandatory, and an equivalent guide does not exist in other States or Territories

Use Case 4 – Waste Management

Use case 4 illustrates the waste disposal process for low-level waste (LLW), which is to be transported from a facility in New South Wales to a nuclear waste disposal facility in South Australia.

Note: The Australian Radioactive Waste Agency (ARWA) was established in 2020 as a stand-alone agency which sits within the Department of Industry, Science and Resources, with the principle aims of:

Note: At the time of this report,

- Developing strategies to manage radioactive waste;
- Implementing agreed plans for managing and disposing of radioactive waste; and
- Enabling Australia to meet international obligations under the *Joint Convention on the Safety of Spent Fuel Management and Safety of Radioactive Waste Management*.

ARWA is responsible for the establishment of the National Radioactive Waste Management Facility (NRWMF), a facility designed to permanently dispose of low-level waste and store intermediate-level waste (ILW) on a temporary basis until a suitable ILW disposal system is developed. At the time of this report, a NRWMF facility was proposed to be established at a site near Kimba, South Australia, however this location is no longer being pursued following a Federal Court challenge.

To illustrate the practical difficulties with waste management, this use case assumes the existence of a NRWMF in South Australia.

01 Low level waste in New South Wales is scheduled to be transported to a NRWMF in South Australia

Issue Identification

- In order to transport the LLW from New South Wales to South Australia:
 - The person driving the transportation vehicle must transport the radioactive material in accordance with the Transport Code ([regulation 36 of the Protection from Harmful Radiation Regulation 2013 \(NSW\)](#)).
- According to New South Wales legislation, the driver is not a person responsible for the radioactive material ([section 6\(1\)\(ii\) of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)). However, they must have a Radiation User Licence ([section 7 of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)) and be technically competent ([section 5\(1\)\(b\) of the Protection from Harmful Radiation Act 1990 No 13 \(NSW\)](#)).

Legislation

1. [Protection from Harmful Radiation Regulation 2013 \(NSW\)](#)
2. [Protection from Harmful Radiation Act 1990 \(NSW\)](#)

Involved Entities

- Use license applicant
- NSW Environment Protection Authority

Please note: Referenced legislation and regulation have been colour coded in accordance with the legend provided on page 40.



02 The Low-level waste is packaged into a suitable transportation vehicle and crosses the jurisdictional border from New South Wales to South Australia. The LLW is packaged into a suitable transportation vehicle and crosses the jurisdictional border from New South Wales to South Australia.

Issue Identification

- South Australia prescribes the same Transport Code as New South Wales ([regulation 3\(1\) of the Radiation Protection and Control Regulations 2022 \(SA\)](#)). However, South Australian regulations impose additional specific duties on carriers and drivers where radioactive materials are being transported ([sections 111 & 112 of the Radiation Protection and Control Act 2021 \(SA\)](#)).
- The South Australia regulations also modify the Transport Code to include reference to the *Dangerous Substances (Dangerous Goods Transport) Regulation 2008 (SA)* ([Schedule 6\(1\)](#)).

Legislation

1. *Radiation Protection and Control Act 2021 (SA)*
2. *Radiation Protection and Control Regulations 2022 (SA)*
3. *Dangerous Substances (Dangerous Goods Transport) Regulation 2008 (SA)*

Involved Entities

- Licence holder for possession and transport
- Driver of the vehicle
- Environment Protection Authority (EPA)



03 The LLW arrives at the NRWFM in South Australia and is ready to be deposited for disposal.

Issue Identification

- Disposal of waste at the NRWFM requires:
 - An approved application from the SA EPA pursuant to [sections 66-67 of the Radiation Protection and Control Regulations 2022 \(SA\)](#), which largely incorporates the [Code for Disposal Facilities for Solid Radioactive Waste \(RPS C-3\)](#).
- **Note:** [Sections 8 and 9 of the Nuclear Waste Storage Facility \(Prohibition\) Act 2000 \(SA\)](#) prohibits the establishment of a nuclear waste facility in South Australia as well as any transport of nuclear waste to a nuclear waste disposal facility. Despite this, [section 12 of the National Radioactive Waste Management Act 2012 \(Cth\)](#) indicates that the authority of the Commonwealth to conduct activities in relation to the operation of a facility is not prohibited on the grounds of State or Territory law. Under [section 109 of the Constitution of Australia](#), state legislation is invalid to the extent that there is any inconsistency with Commonwealth legislation. In this respect, the LLW would still be entitled to be transported and safely disposed at the NRWFM in South Australia.

Legislation

1. *Radiation Protection and Control Regulations 2022 (SA)*
2. *Nuclear Waste Storage Facility (Prohibition) Act 2000 (SA)*
3. *National Radioactive Waste Management Act 2012 (Cth)*

Involved Entities

- Licence holder for possession and transport
- Driver of the vehicle
- National Radioactive Waste Management Facility
- SA Environment Protection Authority

Identified Issues:

1. Requirement for multiple licence applications across jurisdictions
2. Variation in decision making criteria across jurisdictions
3. Transport and construction of a nuclear waste disposal facility is in contravention of the *Nuclear Waste Storage Facility (Prohibition) Act 2000 (SA)*

05

Recommendations



5. Recommendations

The recommendations represented in this Report have been developed in response to the gaps identified in the current radiation protection and nuclear safety framework (as detailed in the Interim Report), which have been further synthesised and validated through a comprehensive stakeholder analysis exercise. The process undertaken to formulate the recommendations was as follows:

1. Conduct a detailed desktop review of the present state of radiation protection and nuclear safety regulation to identify the present gaps in the framework and the uplifts required towards a better fit-for-purpose framework.
2. Undertake international best practice research to understand how the Australian radiation protection and nuclear safety framework can be modified to meet international standards.
3. Conduct a comprehensive stakeholder analysis to validate the identified gaps and begin formulating opportunities for reform. The project team acknowledged all suggestions raised by stakeholders and further developed each suggestion into potential opportunities for reform based on considerations such as:
 - The scale of the likely impact of each proposed option;
 - Operational feasibility (i.e., relative ease or difficulty if implementation with consideration for cost, legislative tabling timeframes, and security ‘buy-in’ or support);
 - Scale of change impact; and
 - Wider strategic policy and regulatory implications.

Each opportunity was analysed against a prioritisation matrix using a scale of low, medium or high based on its scale of impact (i.e., benefit to the regulated community) and implementation feasibility which ranged from low, medium to high effort. The opportunities presented throughout this section have been graded according to both scale of impact and implementation feasibility with a grading for each measure used to produce a prioritisation category. This is depicted in the below, with further detail of the options analysis methodology available in **Appendix D**.

Figure 7: Prioritisation matrix - scale of impact and implementation feasibility scale definitions and prioritisation categories

Scale of Impact		
Low	Medium	High
Only one or two members of regulated community are advantaged; benefit is low or negligible; minimally addresses the gaps identified in the Interim Report	All members of regulated community are advantaged; moderate benefit; partially addresses the gaps identified in the Interim Report	All members of regulated community are advantaged; significant benefit; comprehensively addresses the gaps identified in the Interim Report

+

Operational feasibility		
Low	Medium	High
Simple to implement; no cross functional dependencies; already has a known solution; can be implemented within a few weeks	Requires some budget or human capital investment; multiple members working together to implement; can be implemented within 1-2 months	Higher level leadership support required; Governance and legislative changes; Significant budget and human capital investment; 6+ months for implementation



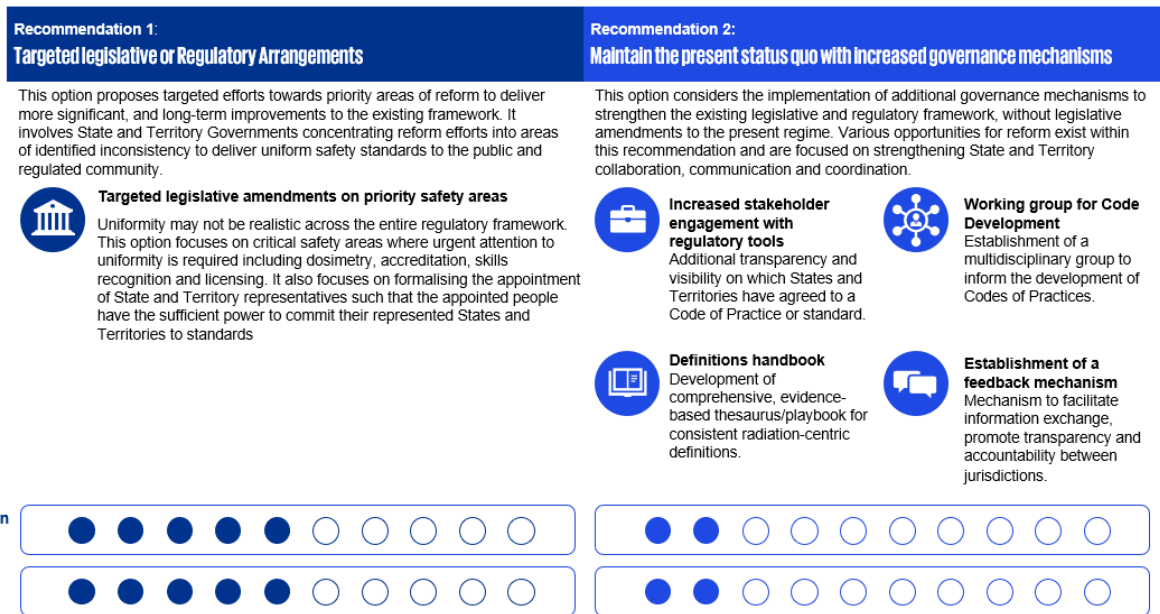
Prioritisation Category			
Minor 'quick wins'	Immediate Priorities	Major Reform Options – potential long-term priorities	Lower Priority

In response to our findings, two recommendations emerged as potential responses to inconsistencies and gaps identified in the present radiation protection and nuclear safety framework. They are as follows:

- **Recommendation 1** – Targeted Legislative or Regulatory Arrangements;
- **Recommendation 2** – Enhancing the Current Governance Mechanisms

Details of each recommendation are summarised below:

Figure 8: Summary of Recommendations



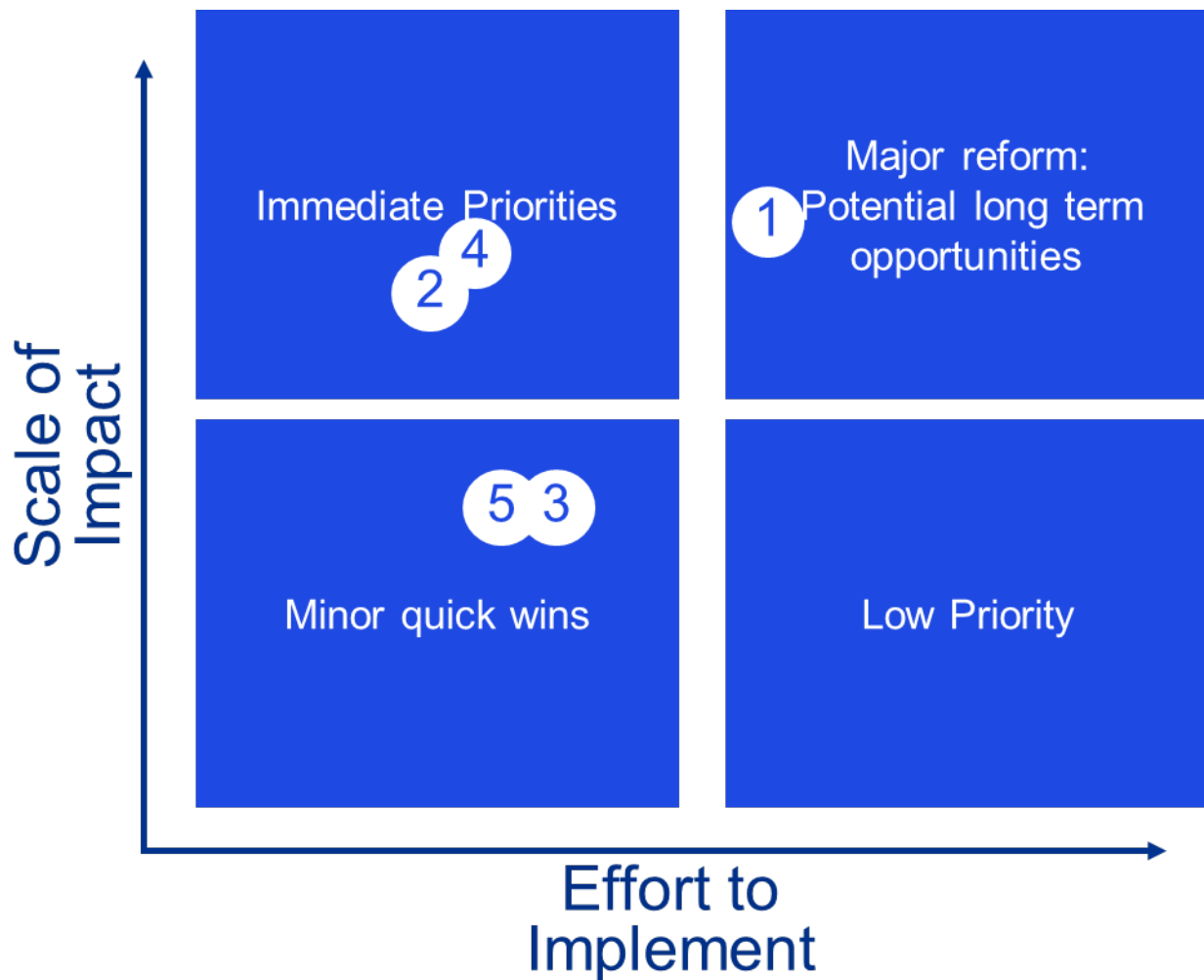
Matrix of opportunities

To provide a clear and concise overview of the array of options, the project team have created an opportunities matrix, which assesses each opportunity in terms of their perceived viability for reform. The project team were able to group options into four major groups for DoHAC’s consideration:

<p>Immediate Priorities</p> <ul style="list-style-type: none"> ▪ This entailed options that required minimal effort to implement yet produced significant impacts. ▪ These options are 'immediate priorities' due to its relative importance amongst the other options 	<p>Major Reform</p> <ul style="list-style-type: none"> ▪ This entailed options which required extensive effort to implement but had a high trade-off due to these option's wide ranging positive impact. ▪ These are potential longer-term opportunities
<p>Minor Quick Wins</p> <ul style="list-style-type: none"> ▪ This consisted of options which required relatively low effort to implement but in turn, also meant that there was relatively low reward. ▪ DoHAC can consider these options quick wins and 'low hanging fruit'. 	<p>Low Priority</p> <ul style="list-style-type: none"> ▪ This entailed options which required extensive effort yet did not produce any impact proportionate to the effort invested. ▪ The project team filtered out these options due to their low efficacy.

Opportunities		Recommendation
1	Targeted legislative and regulatory amendments	1
2	Increase stakeholder engagement with regulatory tools	2
3	Working group for code development	
4	Establishment of a feedback mechanism	
5	Definitions handbook	

Figure 9: Matrix of opportunities





Opportunity 1: Targeted Legislative and Regulatory Amendments

Scale of Impact	High	Operational Feasibility	High	Prioritisation Category	Major reform option - potential long term priority
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Recommendation

This opportunity for reform acknowledges that a central system of uniformity may not be achievable in a timely manner across the entire regulatory framework and instead recommends concentrated efforts in various priority areas which may either:

- Enhance safety outcomes; or
- Significantly reduce regulatory burdens.

In this opportunity, targeted legislative reform in areas such as dosimetry regulation or accreditation recognition (as explored in the two case studies below) uplift the present radiation protection and nuclear safety framework into a more fit-for-purpose framework by addressing immediate 'pain points' raised by stakeholders.

The intended outcomes for the moderate targeted legislative or regulatory framework for each example case study are as follows:

- Dosimetry regulation: amendments to respective State and Territory legislation so that there is 'like-for-like' recognition in dosimetry which reflects the Code of Radiation Protection in Planned Exposure Situations, RPS C-1 e.g., in exceptions to effective dose limitations, interpretations of "occupational exposure" (see case study 1 below for more detail); and
- Accreditation: amendments to respective State and Territory legislation so that there is a nationally agreed standard of accreditation and extent of training and knowledge which regulated professionals possess. These amendments would mitigate the present AMR scheme from being inhibited through each State and Territory recognising different scopes of practice for each regulated profession.

Other recommendations ancillary to this opportunity largely focus on formalising the appointment of State and Territory representatives on key committees such that the appointed people have the sufficient power to commit their represented States and Territories to uniform standards. By introducing greater responsibility in these State and Territory roles, the commitments made by State and Territory representatives are intended to hold more weight and therefore, better bind States and Territories to their commitments.

Please note: The recommendations and case studies provided in this example are based on stakeholder insights and legislative mapping only. KPMG can work with the Department to determine and validate the best targeted areas for reform, such as through a regulatory impact analysis or a cost benefit analysis. The considerations described here provide a high-level overview only and may be subject to change depending on immediate priority areas facing the Department.

Evidence

Stakeholder consultation:

This recommendation arose as multiple stakeholders noted the importance of recognising the multifaceted nature of a fit-for-purpose radiation framework, with the key debate surrounding whether there should be a radiation protection and nuclear safety framework which is completely consistent in process or whether the crux of a radiation framework should be focused on achieving consistent safety outcomes. Noting the geographical and political differences which naturally exist between the States and Territories, this opportunity focuses on acknowledging and preserving the varied focuses between the States and Territories e.g., health in New South Wales and uranium mining in South Australia. The opportunity instead pivots the focus on critical safety areas where consistency is required.

Many stakeholders further noted that a significant detraction from a fit-for-purpose framework resulted from States and Territories committing to a set standard or Code during negotiations yet never having any actual

intent to implement the agreed upon standards, resulting in varied standards being promulgated in the present radiation protection framework.

International best practice

The European Union (EU) has several directives and regulations that set out common standards for nuclear safety across all member states. These include the Nuclear Safety Directive (2014/87/Euratom), the Basic Safety Standards Directive (2013/59/Euratom), and the Waste Directive (2011/70/Euratom). For example, the EU'S Nuclear Safety Directive (2014/87/Euratom) requires all member states to conduct safety assessments before the construction of new nuclear power plants. These assessments have specific requirements that all member states must follow, with a requirement that the results of the assessment be made available to the public to promote transparency.

Leveraging this international example, the Australian Government could develop a set of national standards for priority safety areas like emergency management, accreditation and education based on the EU's nuclear safety directives and regulations. These standards could be developed in consultation with State and Territory governments, industry, professional bodies, and the public.

Advantages

- **Improved safety outcomes:** This option would ensure that all Australians are protected by the same high standards of radiation and nuclear safety, regardless of jurisdictional focus. This would reduce the risk of incidents and accidents and improve the health and well-being of the population at large.
- **Reduced costs and inefficiencies:** This option would streamline and simplify radiation and nuclear safety regulation in targeted areas, reducing costs and inefficiencies for regulated entities and individuals in discrete areas.
- **Facilitation of interjurisdictional cooperation:** This option would facilitate cooperation between State and Territory governments on radiation and nuclear safety in select areas, improving interjurisdictional cooperation in select areas.
- **Accountability:** This opportunity provides for a more palatable reform option for States and Territories and has the potential to increase accountability and the tendencies of the jurisdictions to abide by their commitments.

Disadvantages

- **Complexity:** Developing and implementing moderate reform options is a complex task, requiring significant coordination and cooperation between State and Territory governments. Even though concentrated efforts can be focused onto key priority areas, the debate then becomes whether the effort in coordinating consistency in select areas translates to tangible positive impact.
- **Cost:** Implementing this option would be resource intensive due to the legislative change required and can be a large commitment of resources for positive outcomes in select areas only.
- **Time:** It could take several years to develop and implement this option, depending on the level of complexity and the level of cooperation between State and Territory governments.

Implementation considerations

- **Funding:** Adequate funding must be provided to support the implementation and maintenance of this option
- **Flexibility:** This option must be flexible enough to accommodate the different needs and circumstances of each State and Territory
- **Coordination:** It is important to have a strong coordination mechanism in place to ensure that this option is implemented consistently across all jurisdictions
- A regulatory impact analysis and cost vs benefit analysis would be highly encouraged for this opportunity
- The success of this opportunity is also contingent upon States and Territories abiding by and willing to align their frameworks with that of the views represented by their respective representatives.



Case Study 1:

Dosimetry Regulation

Many stakeholders noted dosimetry regulation as a priority area where greater efforts can be focused to achieve uniform regulation.

In an attempt to achieve consistent dosimetry regulation, ARPANSA published the Code of Radiation Protection in Planned Exposure Situations, RPS C-1, which sets the effective dose limit for occupational exposure as 20 mSv annually (averaged over 5 consecutive years). Whilst the Commonwealth, States and Territory legislation are consistent in defining effective dose limits as 20 millisievert (**mSv**) annually, State and Territory specific variations, exceptions and implementation differences detract from the consistent level of safety intended behind consistent dosimetry regulation.

A source of significant deviation from agreed standards arises where each State and Territory regulator has distinct interpretations of the legislation. In legislation, States and Territories are clear that the effective dose limit for occupational exposure is 20 mSv. However, despite agreeing on the quantum of dose exposure, some stakeholders noted practical difficulties with jurisdiction specific interpretations of what constitutes “occupational exposure” as some States and Territories have exceptionally narrow interpretations. In some interpretations, a person who does not have a radiation licence can technically not be occupationally exposed despite being in the same room and exposed to the same radiation dose as someone who possesses a licence and therefore, is recognised as occupationally exposed under legislation. Accordingly, concentrated efforts on uniform dosimetry regulation could strive to achieve consistent safety outcomes for people exposed to the same doses of radiation (regardless of their licensing status). This could potentially minimise variation in treatment under radiation protection and nuclear safety legislation.

Other more minor instances of variation arise where some States and Territories vary the effective dose limit for occupational exposure for exceptional cases such as pregnant workers, where exposure is lowered to 1 - 5 mSv in the first trimester of pregnancy depending on the jurisdiction. Although the safety intentions behind this variation are apparent, this has resulted in inconsistent dosimetry regulation for the regulated community across different jurisdictions, as the same regulated individual i.e., a pregnant worker may be subject to an effective dose limit in one jurisdiction but not in another.



Case Study 2:

Accreditation and licensing

Many stakeholders noted the areas of accreditation and licensing as requiring greater consistency across the States and Territories.

Stakeholders raised concerns about the extent of variation across the States and Territories in how they recognise training and skills in the licensing process. They noted competencies were reviewed differently depending on the jurisdiction and expressed the need for greater consistency in how regulated entities are recognised as at present, some States and Territories may place conditions on their recognition of accreditation such as the completion of additional training or audits.

Despite the introduction of the AMR scheme, stakeholders noted that there is no nationally recognised training for radiation professionals. By way of illustrative example, in the case of a radiologist wishing to move interstate to New South Wales, the NSW EPA only requires that the radiologist provide evidence of current registration from the Australian Health Practitioner Regulation Agency (AHRPA). Even so, despite this like-for-like accreditation recognition, under the AMR regime, the radiologist is only permitted to undertake activities that they are allowed to perform under their 'home' state licence, even if their scope of practice is broader in New South Wales than that recognised under the 'home' state licence.

The Medical Radiation Practice Board of Australia (MPBA) is responsible for the registration and accreditation of radiation professionals. The Board has three divisions of practice, and registered practitioners must be qualified in at least one of these divisions, such as diagnostic radiography.

Currently, radiation professionals in Australia are regulated by ARPANSA and the State and Territory radiation safety regulators. The accreditation process for radiation professionals typically involves a combination of education, training, and experience requirements. Professionals must complete an accredited course in medical radiation science, medical physics, or radiography, depending on their specific field of practice. After completing their education and training, radiation professionals are required to register with their relevant State or Territory regulator in order to practice. This registration process ensures that professionals meet the necessary competency standards and have the appropriate qualifications to practice in their jurisdiction safely. However, issues arise when accredited and qualified professionals choose to work in a different State than the 'home' State where their licenses were obtained.

While the current accreditation process is generally effective, stakeholder feedback highlights opportunities for greater reform that could enhance the overall quality and safety of the radiation profession in Australia. A noteworthy opportunity raised by industry representatives relates to the establishment of national standards for skills recognition and licensing requirements. While there are already guidelines and standards in place, having a standardised set of licensing requirements across all jurisdictions could help to ensure consistency and eliminate potential variations in the licensing process. To further build on this work, stakeholders offered the view that nationally recognised and accredited training courses should be developed based on the national standards.



Opportunity 2: Increase Stakeholder Engagement with Regulatory Tools

Scale of Impact	Medium	Operational Feasibility	Medium	Prioritisation Category	Immediate Priority
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Recommendation

This opportunity for reform considers strengthening accountability mechanisms to increase compliance with agreed-upon Codes of Practice. This option involves developing more robust monitoring and reporting systems, increasing the transparency of decision-making and hosting States and Territories accountable for their performance. Specifically, this may include:

1. The development of an agreements register to promote visibility of how many and which States and jurisdictions have agreed to a Code of Practice.

The agreements register would be a publicly available document capturing the State and Territory representatives and the agreed upon Code of Practice.

2. In addition to the implementation of an agreements register would be the establishment of quarterly check-ins throughout the year to act as 'implementation gates' to capture compliance with Codes.

This would also help capture any barriers to implementation, timeframes for implementation and other details related to a State or Territories' commitment to adopting the agreed upon Code.

Collectively, these mechanisms may help to promote compliance with Codes and increase accountability to promote a culture of compliance and engagement with regulatory tools.

Evidence

Stakeholder consultation:

Discussions with stakeholders highlighted the lack of accountability measures to assess compliance with Codes of Practice. Stakeholders noted that throughout the development of a Code or standard, agreement was arrived at by consensus vote, meaning that unanimous agreement was not necessary for Code development. Several stakeholders noted that despite agreement from some States and Territories, there were codes that were never adopted by States. They added there was a clear disconnect between the States and Territories that initially showed agreement compared to their implementation of the agreed upon Code or standard.

International best practice

These accounts validate our findings from our desktop analysis which indicated that Codes of Practice and the NDRP2 are infrequently prescribed across jurisdictional legislation and regulations. The lack of prescription does not mean that jurisdictions do not implement Codes of Practice and the agreed requirements of the NDRP2. However, it does mean that regulators across Australia are not obliged to implement the Codes of Practices or the NDRP2 in a manner that is consistent across legislative frameworks. This may result in a delay of Codes of Practices being implemented across Australia in a uniform manner, particularly when ARPANSA updates or amends a Code. Our mapping exercise compared the incorporation of prescribed Codes of Practices across the Commonwealth, State and Territory jurisdictions and highlighted major inconsistencies between the implementation approach taken towards several Codes ranging from radiation protection, transportation of radioactive materials and security of radioactive sources.

Advantages

- Increase accountability and transparency between States and Territories: States and Territories will have the opportunity to view the decisions of various jurisdictions. This will promote transparency and create an accountability mechanism that allows for comparison of agreements to implementation action or inaction.
- Improve communication and coordination: Implementation check-ins create a mechanism to capture potential barriers to implementation, understand timeframes for individual States and Territories and create a clearer picture of the potential resource, budgetary or workforce considerations for effective Code implementation.
- Promote compliance: Creates an incentive to comply with agreed upon Codes of Practice and standards that have been publicly registered.

Disadvantages

- No binding mechanism: This option is not a binding mechanism and does not guarantee continuity between registering and implementing agreements. For example, a State may register their agreement for a Code of Practice in one instance but choose not disclose information at quarterly check-ins of their implementation progress.
- Requires human capital: an independent-reviewer or existing entity must perform this function periodically and monitor adherence to agreements.
- Requires significant time and financial investment: Will require proficient data analysis and tracking to monitor implementation and keep record of agreements - will require a database of information

Implementation considerations

- Must consider which entity will adopt this function and whether it will be absorbed into an existing entity's current role or be the responsibility of an independent reviewer.
- Requires consideration for data governance and data management of agreements register results to cross-correspond with implementation gate reviews.



Opportunity 3: Working Group for Code Development

Scale of Impact	Low	Operational Feasibility	Medium	Prioritisation Category	Minor quick win
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Recommendation

This opportunity for reform considers the establishment of a multidisciplinary group to inform the development of Codes of Practice. This opportunity supports the development of user-informed codes which are generated from multiple user perspectives including representatives from regulatory bodies, lawyers and other relevant experts. The working group could play a number of important roles including:

- Identifying the need for new or revised Codes of Practice
- Providing input into the development of Codes of Practice
- Reviewing draft Codes of Practice
- Promoting Codes of Practice to stakeholders
- Supporting the implementation of Codes of Practice

The establishment of a working group for the development of Codes of Practice may help create stronger linkages between stakeholders on shared problems, increase stakeholder buy-in which may subsequently promote user uptake.

Evidence

Stakeholder consultation:

Discussions with stakeholders noted ambiguity with how Codes of Practice are currently written and interpreted. They highlighted that there were different interpretations for commonly used terms like 'incidents' and 'timely implementation' which created confusion around the correct application of Codes of Practice and likely impacted interpretation across the States and Territories. They further noted that although the RHC holds consultative workshops, involves industry experts and establishes drafting committees in the code drafting process, there have been instances where Codes of Practices are drafted in such a way which cannot be enforced. Stakeholders offered insights suggesting that a working group should be established involving a stronger legal presence so States and Territories can collaboratively work on developing Codes of Practice and ensure they are user-informed and enforceable.

International best practice

The International Organisation for Standardisation (ISO) is a non-government organisation that develops and publishes international standards. The ISO standards are widely recognised and used in industries around the world. The ISO has established several technical committees to develop standards for shielding, radiological protection, and nuclear technologies. These committees include:

- ISO/TC 85 Nuclear energy, nuclear technologies, and radiological protection – this committee is responsible for developing standards for all aspects of nuclear energy, including radiological protection and waste management.
- ISO/TC 147 Measurement of radiation – this committee is responsible for developing standards for the measurement of radiation, including those used to verify the effectiveness of shielding systems.

ISO's approach to the utilisation of technical committees is an example of a best practice model to the establishment of a working group for the current regulatory landscape in radiation protection and nuclear safety. ISO technical committees are composed of experts from a variety of backgrounds, including industry, academia, and government. ISO's technical committees also follow a rigorous process for the development of standards. This process includes public consultation to ensure that the standards meet the needs of all stakeholders.

ISO's technical committee model could be used as a benchmark or gold-standard approach to the establishment of a working group for the development of Codes of Practice and standards.

2023 IRRS Follow-up Mission Report

The Mission Report notes that the implementation of Codes of Practice, exemptions and clearance levels remains inconsistent across States and Territories. They add that although one of enHealth's goals is to ensure a nationally consistent approach to the implementation and compliance of radiation safety codes and standards, there is no systematic feedback from jurisdictions to enHealth on progress in actual implementation of codes adopted at the national level. In addition, whilst ARPANSA has a statutory mandate to promote national uniformity, it is not represented on enHealth, even with an observer status, when radiation safety matters are discussed. The IRRS team observed that the objectives for enHealth and RHERP to ensure a nationally consistent approach to the implementation and compliance of radiation safety codes and standards has not been fully achieved.

Advantages

- Improved user-friendliness: Codes of Practice that are developed with input from users are more likely to be user-friendly and practical.
- Increased stakeholder buy-in: Stakeholders who are involved in the development of Codes of Practice are more likely to promote them and support their implementation.
- Improved compliance: Codes of Practice that are developed with input from stakeholders are more likely to be complied with.
- Creation of a dedicated group reduces the present resourcing strain on members of the RHC who develop Codes of Practice amongst other roles

Disadvantages

- Time commitment: The establishment and operation of a working group can be time-consuming.
- Cost: There are some costs associated with running a working group as the creation of a dedicated role would incur additional costs
- Potential for conflict of interest.
- Voluntary: There is no guarantee that States and Territories, lawyers or relevant experts will want to commit their time to being involved in the working group.

Implementation considerations

- Membership: The working group should be composed of representatives from a range of stakeholders, including regulatory bodies, lawyers, and other relevant experts. It is important to ensure that the working group is balanced and that all stakeholders have a voice.
- Terms of reference: The working group should have a clear set of terms of reference that outline its purpose, roles and responsibilities.
- Resources: The working group should be provided with the resources to operate effectively including administrative support and funding.
- Communication: It is important to establish clear communication channels between the working group and stakeholders. This will help to ensure the stakeholders are informed of the working group's progress and that they have an opportunity to provide feedback.
- Governance: Consideration should be given to who the working group will report to, what reporting will be provide as evidence of progress and how decisions are made and who enacts them.



Opportunity 4: Establishment of a Feedback Mechanism

Scale of Impact	High	Operational Feasibility	Medium	Prioritisation Category	Immediate priority
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Recommendation

This opportunity for reform considers the establishment of a feedback mechanism to facilitate information exchange, promote transparency and accountability, enhance coordination and collaboration between States and Territories and acts as an educational tool to share best practice principles. It promotes a formalised approach to identifying lessons learned and sharing these lessons between jurisdictions to improve consistency and promote collaboration between States and Territories. One such mechanism could be through the establishment of a central online platform that facilitates communication between jurisdictions on matters related to radiation and nuclear safety. This platform could also serve as an educational tool to share best practice principles. The key features of this options may include:

- **Information exchange:** a central repository of information on radiation and nuclear safety principles, including case studies, research and guidelines.
- **Transparency and accountability:** a transparent and accountable forum for States and Territories to share information on their radiation and nuclear safety activities and performance.
- **Education and best practice:** provide resources and tools to educate stakeholders on radiation and nuclear safety, and to share best practice approaches.

An ancillary mechanism to an online platform may be through the establishment of a formal personnel exchange, where team members from State and Territories might exchange personnel for a defined period to facilitate knowledge sharing between jurisdictions. The key features of the personnel exchange may involve:

- **Secondment to a State or Territory office;** secondees are provided the opportunity to participate in team meetings, understand internal processes for common issues and interact with the commonly used systems.
- **Secondees are provided access to key documentation;** engage in discussions and meetings with key personnel regarding a State or Territory's approach on a range of topics from emergency management to incident reporting and other shared issues.

The establishment of a feedback mechanism, possibly in the form of an online platform or personnel exchange, may create collaboration opportunities between stakeholders, promote knowledge-sharing and create consistency between jurisdictions by enhancing their shared understanding of issues related to radiation protection and nuclear safety.

Evidence

Stakeholder consultation:

Most stakeholders shared the view that there was little communication between States and Territories to share lessons learned or identify opportunities to streamline existing processes in line with experiences of other jurisdictions. Several stakeholders referenced the WA lost source incident as a 'missed opportunity' for understanding how to manage similar incidents in the future. They noted there was no follow-up or communication regarding how the situation was managed, the process and practices for preventing a similar incident happening again. Without these interjurisdictional mechanisms in place, States and Territories have been developing their own systems and processes independently. A large majority of stakeholders also noted that a lack of knowledge and education was one of the biggest challenges they were facing and described interjurisdictional coordination occurring in "siloes".

A minor view shared by stakeholders was the lack of knowledge and information sharing between jurisdictions. In one instance, stakeholders identified South Australia as having the best approach to emergency management and that this could potentially be used as a model for best practice that could be adapted to other States which may have few resources and a smaller budget. They added opportunities existed for members from South Australia to sit with their team to understand how the internal processes worked and favoured this method for facilitating collaboration and information exchange between jurisdictions. Stakeholders also noted that lack of knowledge and education on shared issues was a key concern and bridging the gap between 'theory and practice' through interjurisdictional collaboration and enhanced communication mechanisms was important in the implementation of best practice approaches.

2023 IRRS Follow-up Mission Report

The Mission Report suggests that all regulatory bodies should consider further developing and using a formalised process for identifying lessons learned from regulatory experience from other jurisdictions and for sharing lessons learned from their regulatory experience, with the goal of making better use of existing regulatory resources and improving consistency in Australia (Module 5, Section 5.2, SF1). Considering the challenges faced by most regulators in relation to human resources, the Mission Report promotes the use of interjurisdictional forums to facilitate discussions and suggested a formalised feedback mechanism would significantly contribute to collective continuous improvement and enhance national uniformity across the jurisdictions. Furthermore, BASIS: GSG-12 para. 3.20 states that *“Information and knowledge are part of the corporate memory of the regulatory body and should be managed as a key resource [...]. Effective management for safety will take into account the knowledge and information resulting from both positive and negative experiences (e.g., good practices and bad practices). Examples include:*

- *Lessons learned from regulatory practices*
- *Feedback from interested parties*
- *Feedback of experience from other authorities or national and international bodies [...].”*

Advantages

- Improved communication and collaboration on radiation protection and nuclear safety matters
- Increased transparency and accountability in radiation protection and nuclear safety regulation
- More effective coordination of radiation and nuclear safety activities in Australia
- Improved education of stakeholders

Disadvantages

- **Cost:** Developing and maintain the online platform requires significant financial resources. Consideration must also be considered for funding of personnel exchanges between States and Territories particularly who will pay for the cost of exchanging personnel.
- **Data sharing:** States and Territories may be hesitant to share information on the platform or provide information to seconded team members.
- **Voluntary:** There is no guarantees that States and Territories will contribute to or engage with the online platform or have the capability to engage in the personnel exchange.
- **Sustainability:** The platform must be sustainable in the long term, both financially and in terms of resourcing.

Implementation considerations

- **Stakeholder engagement:** It would be important to engage with all relevant stakeholders in the development and implementation of the online platform/ personnel exchange arrangements.
- **Data security:** Robust data security measures must be in place to protect the confidentiality of potentially sensitive information shared on the platform.
- **Promotion and awareness raising:** An information campaign would need to be implemented to promote stakeholder use and awareness of the platform/ personnel exchange.
- **Content management:** A process must be established for managing the content on the platform to ensure that it is accurate, up-to-date, and relevant.
- **Administrative burden:** A formal process to help facilitate the personnel exchange must be developed including short-term onboarding of secondees to teams, access requirements to systems or buildings and logistics and travel considerations.

Opportunity 5: Definitions Handbook

Scale of Impact	High	Operational Feasibility	Medium	Prioritisation Category	Immediate priority
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Recommendation

This opportunity for reform considers the development of a comprehensive, evidence-based thesaurus for nuclear and radiation definitions. This approach provides a single source of truth to reduce misinterpretation risk and impacts. The development of a definitions handbook for radiation protection and nuclear safety terms may include:

- Compiling a list of common radiation protection and nuclear safety terms – this could be done by reviewing existing glossaries, standards, and other resources.
- Defining each term concisely – the definitions should be accurate and easy to understand, even for people with a technical background but should not sacrifice the detail required to help users understand their obligations.
- Distributing the handbook for public consultation – this could involve incorporating feedback from users or adding new terms as needed.
- Seeking agreement on the finalised terms included in the handbook – distribute the handbook for agreement to relevant stakeholders and de-conflict feedback where required to achieve consistency with defined terms.
- Provide the handbook in web accessible formats, print versions and online formats to enable access and promote user uptake.
- Implement a communication campaign to raise awareness of the handbook and promote its use among the regulated community.

This opportunity addresses one of the most common concerns expressed by stakeholders: inconsistency in definitions and risk of misinterpretation. It creates a benchmark and shared reference point for jurisdictions to refer to and may help to increase collective understanding of shared terms applied across the regulated community.

Evidence

Stakeholder consultation:

Stakeholders expressed frustration regarding the definitional issues and differences in how terms are applied across different jurisdictions. For example, 'occupational exposure' is not interpreted consistently across different jurisdictions and stakeholders noted the wording is ambiguous and increases potential for misinterpretation. There have also been inconsistencies in how different jurisdictions define areas that are only used by radiation workers, such as control rooms. These definitional inconsistencies were said to have cost implications and were also observed to impact the training provided to radiation professionals who had to be trained in the various definitions that may exist for common terms. These inconsistencies in language and application can create risk and lead to unsafe practices, making it challenging for both regulated entities and professionals.

Best practice

There are two examples of best practice which lends to suggestion of the usefulness of a definitions handbook:

- The Australian Government is developing the National Health Terminology System (NHTS) which is a comprehensive and integrated system of health terminology. The NHTS will be used across the Australian healthcare system to improve the quality and consistency of healthcare data and information and promote communication and collaboration among healthcare professionals. The NHTS is based on the international standard, SNOMED CT, which is a comprehensive and multilingual clinical terminology. It includes concepts covering clinical findings, procedures, observables, body structures, organisms, substances and pharmaceutical products. The NHTS is operated by the Australian Digital Health Agency and will include Australian-specific extensions to SNOMED CT such as Aboriginal and Torres Strait Islander health and mental health.

- The *IAEA Nuclear Safety and Security Glossary 2022* defines and explains technical terms used in IAEA safety standards and nuclear security guidance. The primary purpose of the glossary is to promote consistency of terminology and usage in the IAEA safety standards and nuclear security guidance. It explains the meaning of technical terms and any specific meanings ascribed to common words or terms in a particular context. The publication includes valuable information on interpretation of terms and ways of using the Glossary, for editors, reviewers or drafters, or for those using IAEA safety standards and nuclear security guidance or referring to the terminology in their work.

Advantages

- **Consistency:** It would provide a single source of truth for radiation protection and nuclear safety terminology, helping to reduce the risk of misinterpretation.
- **Clarity:** It would provide clear and concise definitions of common terms, making it easier for people to understand radiation safety and nuclear concepts.
- **Accessibility:** It would be a valuable resource for people of all levels of expertise, from the general public to technical professionals.
- **Completeness:** It would cover a wide range of radiation protection and nuclear safety topics, providing users with a comprehensive reference tool.

Disadvantages

- **Time-consuming:** It would require a dedicated workforce to compile a list of terms and seek agreement from stakeholders on an appropriate definition that satisfies multiple user groups.
- **Financial implications** for the development and maintenance of the handbook.
- **Voluntary:** There is no guarantee that States and Territories will implement the handbook consistently.

Implementation considerations

- **Format:** The handbook should be available in a format that is easy to use and accessible to the target audience. This could be a web-based application, a PDF file, or a print publication.
- **Version control:** It is important to have a system in place to track changes to the handbook and ensure that everyone is using the latest version.
- **Maintenance:** The handbook should be reviewed and updated regularly to ensure that it is accurate and complete. This could be done by a team of experts or through a community-based process.

Longer Form Reform Options

During the stakeholder consultations, various stakeholders raised the following alternative recommendations for consideration:

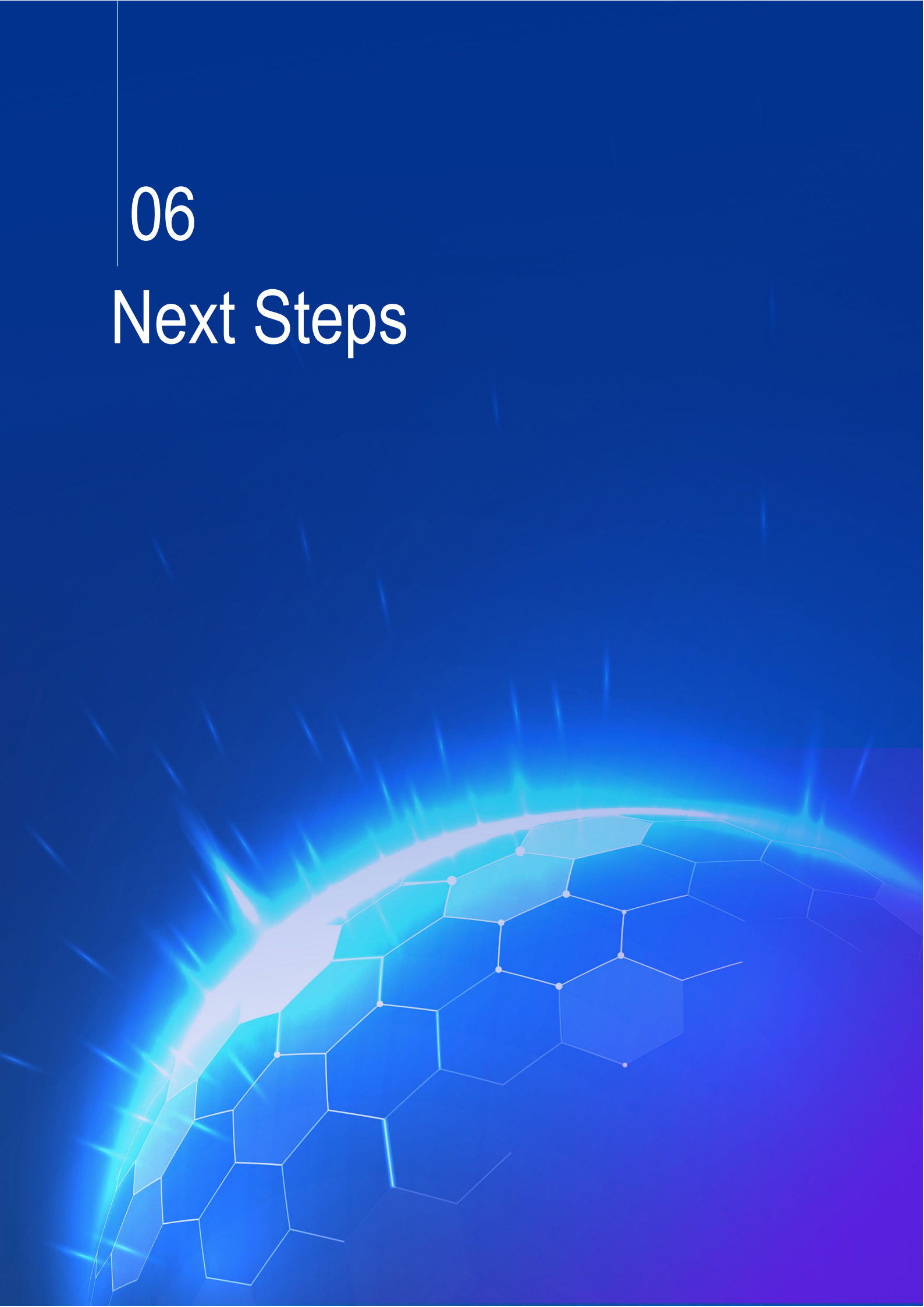
1. Establishment of a single national regulatory framework for radiation protection and nuclear safety; or
2. Introduction of a benchmarked standard through reliance on the NDRP2 or creation of a model legislation, which is promulgated by each State and Territory through an intergovernmental agreement (IGA).

We have considered these options and have included our assessment of these options in **Appendix E**, supported by our case studies in:

- Work, health and safety legislation; and
- Maritime safety regulation.

06

Next Steps



6. Next Steps

Implementation Considerations

While the proposed recommendations aim to strengthen Australia’s radiation safety and nuclear protection framework, their successful implementation relies on several key considerations. Firstly, stakeholder perspectives differ significantly on the optimal reform approach, reflecting the complexity of the current operating environment. Understanding these viewpoints and fostering constructive dialogue will be critical to the implementation of solutions that garner broad support. Additionally, Australia’s radiation safety and nuclear protection framework operates within a multifaceted environment comprising federal, state and territory regulations, diverse application areas (i.e., medicine, industry, transport, agriculture), and evolving technologies. This complexity further necessitates recommendations that are adaptable and account for potential interactions between different aspects of the system.

The recommendations provided in this Report are guided by clear principles, prioritising factors such as rapid benefit realisation and scale of impact. Currently, a comprehensive cost-benefit analysis of the proposed reform options is lacking. This analysis is crucial for understanding potential financial implications, both for stakeholders and the government, and for comparing the relative value of the recommendations for the regulated community.

Although the options for reform vary in terms of political appetite and operational feasibility, if the Department were to take on one or both recommendations, the Department should consider additional next steps such as:

A cost benefit analysis

Whilst each option has its intended outcome, it does not presently balance or delve into in-depth consideration surrounding the extent of resource investment required in order to achieve the contemplated outcome. A cost benefit analysis is recommended to justify which of the options produce significant practical benefit for the regulated community such that the option is worth pursuing.

A regulatory impact analysis

A regulatory impact analysis is recommended to understand the full scope of the proposed options. Although the above options all possess their respective positive impacts and limitations, a regulatory impact analysis will better match the expected outcome with the Department’s desired future state.

A finalised shortlist of prioritised recommendations, informed by a cost-benefit analysis and regulatory impact analysis, will provide a clearer roadmap for implementation of the recommendations detailed below.



Recommendation 1: Targeted legislative or regulatory amendments

This recommendation considers targeted legislative or regulatory amendments to deliver more significant, complex and long-term improvements to the existing framework. Throughout our desktop review, legislative mapping exercise and stakeholder consultations, a recurring finding was that achieving consistency across the entire regulatory framework may be unrealistic. This can largely be attributed to various considerations such as:

- Each State and Territory having differences across regulator establishment (with some jurisdictions having their regulators form part of the Department of Health whereas other jurisdictions have their regulators form part of the Environmental Protection Agency); and
- The nuances of risks related to the industries which each jurisdiction may prioritise (for example, the focus on uranium mining in South Australia).

Accordingly, this recommendation focuses on critical safety areas where urgent attention is required including:

- Dosimetry regulation: amendments to respective State and Territory legislation so that there is 'like-for-like' recognition in dosimetry which reflects the Code of Radiation Protection in Planned Exposure Situations, RPS C-1 e.g., in exceptions to effective dose limitations, interpretations of "occupational exposure" (see case study 1 on page 65 for more detail); and
- Accreditation: amendments to respective State and Territory legislation so that there is a nationally agreed standard of accreditation and extent of training and knowledge which regulated professionals possess. These amendments would mitigate the present AMR scheme from being inhibited through each State and Territory recognising different scopes of practice for each regulated profession.

Further detail of the identified critical safety areas is available in Part 5 of this Report (Case Study 1 and 2 of Recommendation 1). Stakeholders further reflected on the need for greater clarity on the current governance mechanisms, how they work and how decisions are made and implemented when developing Codes of Practice. Accordingly, this recommendation also considers targeted reform in governance areas such as formalising the appointment and powers of State and Territory representatives on key committees such that the appointed people have the sufficient power to commit their represented States and Territories to uniform standards.

Advantages

This recommendation provides a more fit-for-purpose framework as regulation becomes easier to navigate for regulated entities and individuals in select areas. Targeted reform approaches can be crafted to address the unique challenges and opportunities facing the regulated community as opposed to broad reform, which may not be feasible, realistic or of importance to the sector. In the instance of dosimetry or accreditation and licensing, these areas have previously been identified by stakeholders as lacking consistency but have practical implications to the health and safety of users and the Australian public. Narrowing the reform focus could enable the development of more tailored and effective solutions and create efficiencies by helping to prioritise the time and resources required to develop solutions. Finally, targeted legislative approaches may be more politically palatable and may therefore less likely be met with resistance. Targeted reform in governance further aims to traverse the present barrier identified by stakeholders where State and Territory representatives can commit to a Code of Practice, yet never have any intent to implement the Code without ramifications.

Disadvantages

A significant disadvantage of this recommendation is the large commitment of time and resources for positive outcomes in select areas only. By limiting its scope, this recommendation may neglect broader concerns or unintended consequences that arise in other contexts, in particular critical safety areas that may be de-prioritised in favour of more critical ones. This may lead to inconsistencies and gaps in the regulatory landscape, thus requiring further legislation or amendments in the future. Targeted approaches through this recommendation may also create a 'patchwork' across different jurisdictions which can potentially increase the complexity and fragmentation of the current system. This recommendation also relies on voluntary involvement and cooperation from States and Territories which is influenced by potential resourcing, budget and time constraints as well as their motivation or appetite to cooperate, especially if the areas targeted are not ones they consider to be of relevance or are impacted by.

Implementation Considerations

Recommendation 1 will require a regulatory impact assessment and cost benefit analysis to better understand the risks and opportunities associated with its implementation. A cost benefit analysis will help to identify potential unintended consequences of the proposed legislative option and save time, resources and potentially prevent negative impacts on stakeholders. Like a regulatory impact assessment, a cost benefit analysis will require human capital, sound data analysis and policy development skills to support decision-making. Furthermore, this recommendation will require significant stakeholder input from regulated entities and radiation professionals in the design, review and implementation of the identified targeted options, for example dosimetry or accreditation/ skills recognition. Consideration should therefore be given to whether the Department has the requisite resources to invest in the full scope of this option and the political will or stakeholder appetite for adopting this approach.

For governance related targeted reforms, this recommendation will require preparatory work such as scoping the appetite of relevant committees, and jurisdictions on expanding the role of the State and Territory representative. Jurisdictions may be hesitant to introduce such a role with significant power even if not binding due to the mere risk of the representative misrepresenting the State or Territory's priorities or focus areas.

Please note: KPMG can work with the Department to determine and test the best targeted areas for reform with reference to our detailed mapping. Therefore, the considerations described here provide a high-level overview only of the relative advantages, disadvantages and implementation considerations for this recommendation.



Recommendation 2: Maintain status quo with increased governance arrangements

Recommendation 2 considers the implementation of additional governance mechanisms to strengthen the existing legislative and regulatory framework. It does not consider or propose any legislative or regulatory amendments. Instead, this recommendation consists of opportunities two to five: Increasing stakeholder engagement with regulatory tools, working group for code development, establishment of a feedback mechanism and development of a definitions handbook. Collectively, these opportunities seek to bolster the current regulatory framework through the establishment of governance arrangements that are designed to strengthen collaboration between jurisdictions and promote best practice approaches on shared issues.

Advantages

Recommendation 2 presents opportunities with the lowest implementation effort relative to recommendation 1. They have either been proposed by stakeholders or identified by the project team as potential solutions to reducing regulatory burden by creating formal communication platforms and establishing feedback mechanisms to facilitate information exchange. Additionally, the co-design and development of industry resources, specifically the definitions handbook, encourages stakeholder buy-in which can promote a sense of ownership and increase compliance. Finally, given this recommendation does not propose legislative or regulatory amendments, it is anticipated to present the lowest resistance option with an implementation and potential uptake rate faster than that of recommendation one.

Disadvantages

This recommendation relies on significant, volunteer involvement and cooperation from States and Territories, with the success of implementation dependent on jurisdictions' resources, human capital and willingness to participate. This recommendation does not present a binding mechanism and does not incentivise or penalise State and Territories who do or do not participate. Furthermore, the voluntary nature of this option may create inconsistencies in uptake with larger, well-resourced jurisdictions potentially responsible for the majority of development and implementation of this option's initiatives. Disparity of effort and responsibility may cause further fragmentation between States and Territories and may be perceived by stakeholders to have minimal practical benefit or impact relative to the time and resources required to ensure implementation success.

Implementation Considerations

This recommendation considers the establishment of a web-based platform for knowledge and resource sharing, the establishment of a voluntary working group, development and regular update of a definitions handbook, and the implementation and maintenance of an agreements register. Consideration should be given to the significant human capital and resource costs to not only develop these initiatives but also maintain them on a regular basis. It is also important to understand the governance mechanisms associated with each initiative within this recommendation, particularly the ownership of resources developed and used as well as the willingness of States and Territories to share their resources to contribute to the development and overall success of recommendation 2. As with recommendation one, recommendation two will require a regulatory impact assessment and further consultation with relevant stakeholder groups to ensure the regulated community are considered in the design and implementation process.

Appendix A

Interim Report



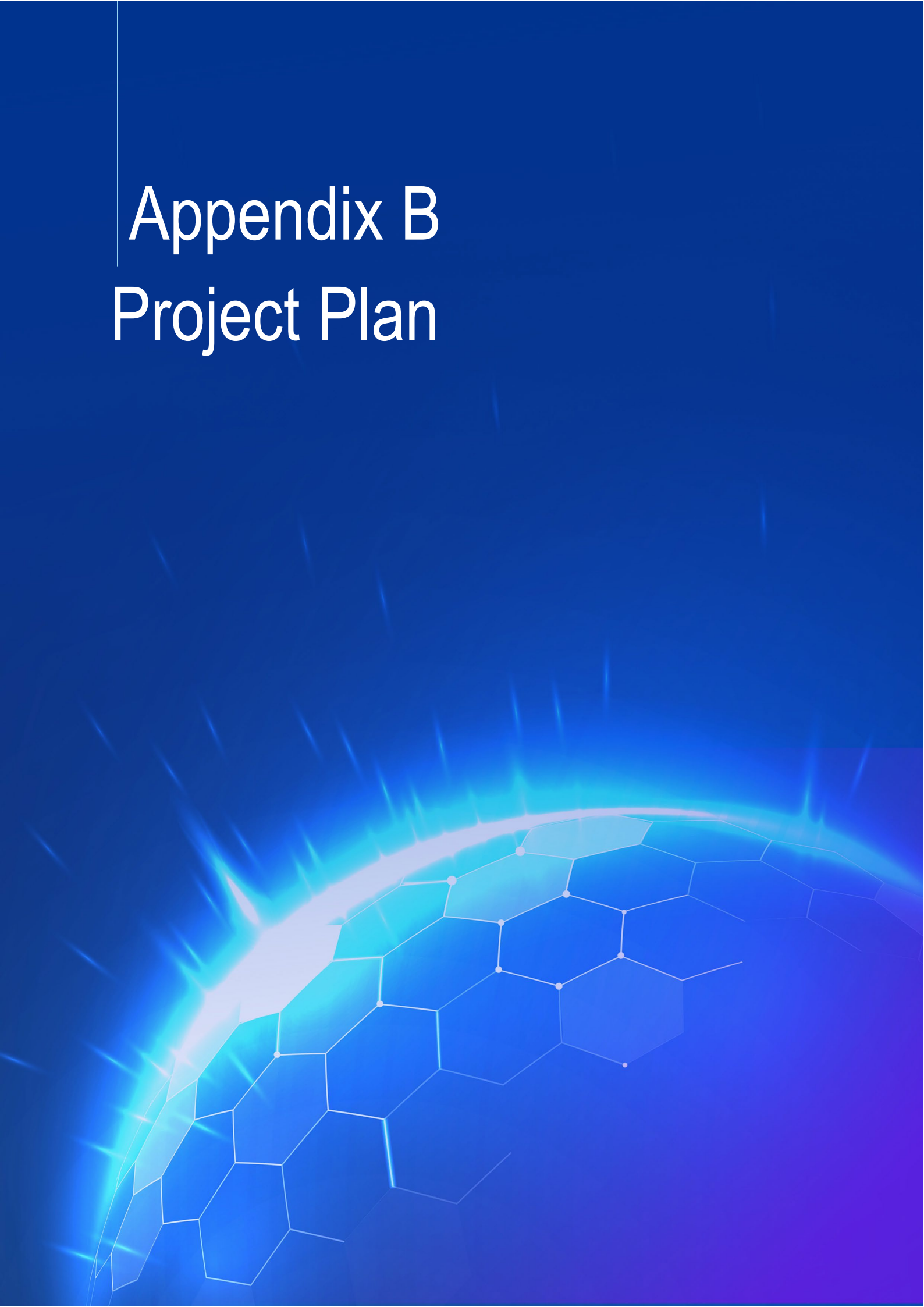


Appendix A. Interim Report

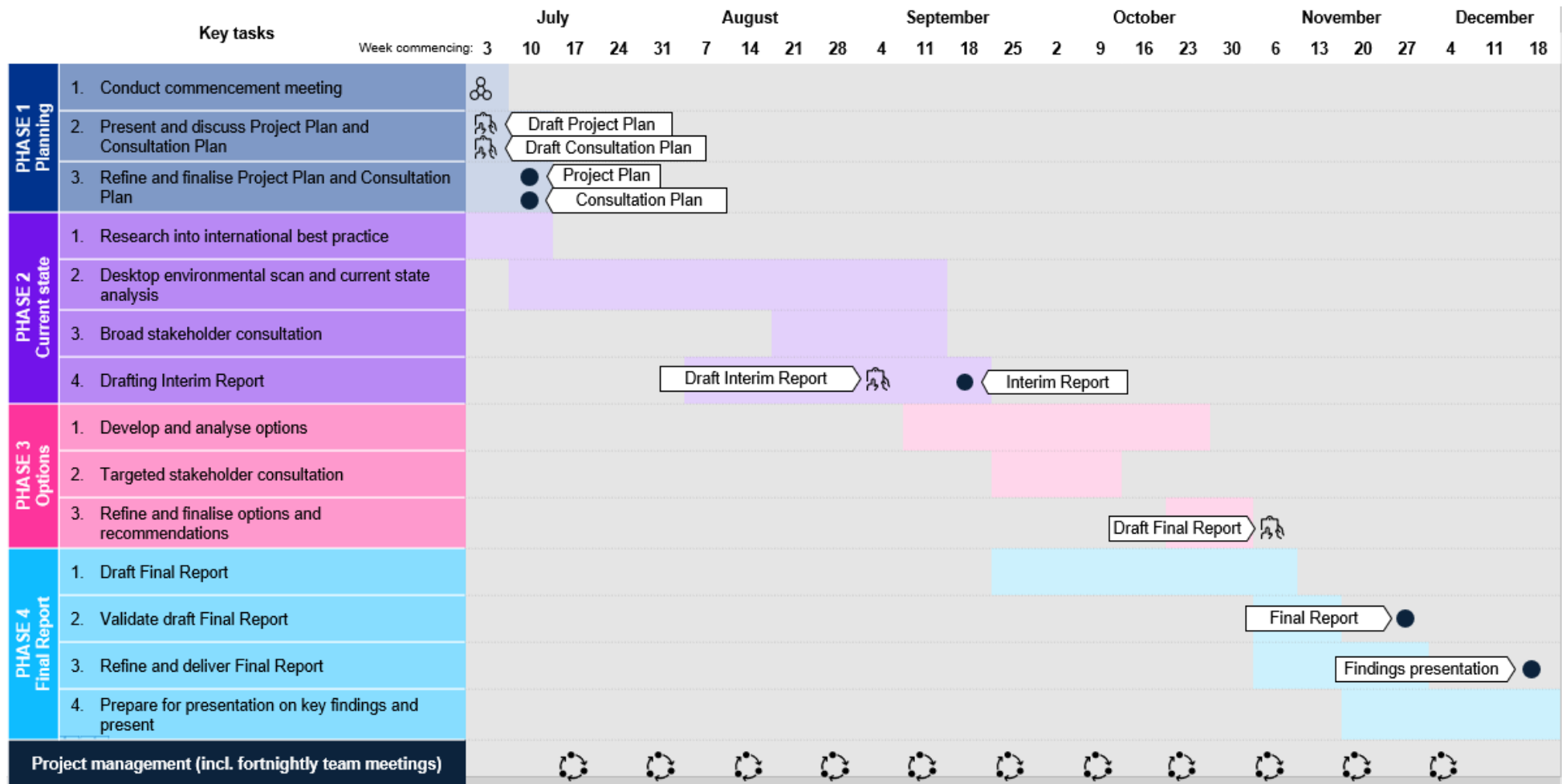
Please refer to the **attached** PDF document titled “**Project Deliverable – Final Interim Report**” which contains detailed current state analysis and comparative analysis of all Commonwealth, State and Territory provisions within the national radiation protection and nuclear safety regulatory framework.

Appendix B

Project Plan



Appendix B. Project Plan



Appendix C

Stakeholder Consultation Methodology



Appendix C. Stakeholder Consultation Methodology

Stakeholder consultations enabled the identification of not only inconsistencies and gaps in the regulatory framework, but also opportunities for reform and priority areas for uniformity and consistency as identified by end-users and regulatory bodies. This was accomplished through detailed thematic analysis of stakeholder feedback that is validated against best practice and insights from data and related research.

Methodology

This section describes the methodologies the project team used to develop the options and recommendations following stakeholder consultation. A three-step methodology was utilised to design, deliver and execute a customised approach. The stakeholder engagement methodology is summarised in the table below:

Table 11: Stakeholder engagement methodology

Stakeholder Engagement Methodology		
	Plan: Consultation Preparation	<ul style="list-style-type: none"> ▪ The project team collaborated with the Department to identify and confirm the stakeholder groups to take part in the consultation process. ▪ Consultation guides informed from the development of the Interim Report were used at workshops. ▪ The project team scheduled and facilitated stakeholder consultations
	Undertake: Conduct the engagement activities	<ul style="list-style-type: none"> ▪ The project team facilitated 21 targeted stakeholder workshops between September to November 2023; a full list of the organisations engaged, and the themes discussed can be found in Table 6.
	Consolidate: Synthesise findings	<ul style="list-style-type: none"> ▪ The project team synthesised findings from the targeted stakeholder workshops using thematic analysis. This involved: <ol style="list-style-type: none"> 1. Familiarisation with data to gain an overall picture 2. Group information, identification and recording of themes 3. Review, modification and testing of themes 4. Defining themes to determine the scope, focus and relationship between each theme 5. Triangulation with other data to support, strengthen or deviate overall research findings

The project team engaged several stakeholder groups during the consultation process. Themes discussed throughout the consultation ranged from alignment to the NDRP2, consistencies or inconsistencies with licensing, codes of practice, definitions or other contextual issues. Workshops were held virtually (via Microsoft teams) between September to November 2023.

Table 12: List of stakeholders consulted and discussion themes

Stakeholder	Discussion themes
<p>Commonwealth Government Agencies:</p> <ul style="list-style-type: none"> ▪ Department of Health and Aged Care ▪ ARPANSA <p>Advisory Bodies</p> <ul style="list-style-type: none"> ▪ Radiation Health and Safety Advisory Council ▪ Radiation Health Committee <p>State and Territory Government Regulatory bodies:</p> <ul style="list-style-type: none"> ▪ ACT: Radiation Safety Health Protection Service ▪ NSW: Environment Protection Authority ▪ NT: Radiation Protection Section ▪ QLD: Department of Health ▪ SA: Environment Protection Authority ▪ TAS: Radiation Protection Unit ▪ VIC: Department of Health ▪ WA: Radiological Council <p>Professional and industry bodies</p> <ul style="list-style-type: none"> ▪ Australasian Radiation Protection Society ▪ Australian Dental Association ▪ Australian Veterinary Association ▪ Royal Australian and New Zealand College of Radiologists ▪ Australian Nuclear Science and Technology Organisation ▪ Australian Society of Medical Imaging and Radiation Therapy ▪ Australasian Association of Nuclear Medicine Specialists ▪ Australasian Radiation Protection Accreditation Board ▪ Australasian College of Physical Scientists and Engineers in Medicine 	<p>Current regulatory framework:</p> <p>The strengths and weaknesses of the current legislative and regulatory approach. Identification of potential gaps and issues. Discussion of the role and function of each organisation, department or agency within the current framework.</p> <p>Future focused options:</p> <p>Feedback gained on proposed gaps and recommendations to create greater efficiencies and improve outcomes. Discussed options proposed in the Interim Report; identification of barriers and enablers that impact implementation of these options; stakeholder perspectives on prioritisation and pacing of delivering reform to ensure business needs are met.</p> <p>Contextual issues:</p> <p>Opportunities to raise any contextual issues related to the review were provided to stakeholders</p>

Appendix D

Assumptions and Options Development Methodology



Appendix D. Assumptions and Options Development Methodology

Assumptions

The authors recognise the interdependencies of the proposed options for the regulated community and the importance of minimising disruption to ongoing operations.

As such, the options are designed to be implemented in a phased manner, with significant consideration given to the potential impacts on the regulated community. The authors also recognise that the options presented throughout this Report will require significant consideration from Government and as such, there may be a time delay in the implementation of the options that may or may not take longer than the proposed implementation timelines described in the Report.

The key assumptions made in the development of the proposed options therefore are as follows:

- There are sufficient resources to implement the necessary changes;
- The regulated community has the necessary capacity, expertise, capability to implement the changes that directly influence their teams and roles;
- The regulated community is supportive of the proposed options to the regulatory framework; and
- There is political will to address the identified issues in the current regulatory framework through the proposed options or those selected and approved by Government.

Scale of impact

The scale of impact of each option was categorised into one of the following categories:

Scale of Impact		
Low	Medium	High
Only one or two members of regulated community are advantaged; benefit is low or negligible	All members of regulated community are advantaged; moderate benefit	All members of regulated community are advantaged; significant benefit
<p>✘ Disproportionate impact compared to cost</p> <p>✘ Option is limited in scope and only applies to a small sector</p> <p>✘ Option may have unintended consequences</p>	<p> Reform option applies widely and broadly</p> <p> Renders the radiation protection and nuclear safety framework more fit for purpose despite minor inconsistencies still existing</p>	<p>✓ Reform option applies widely and broadly</p> <p>✓ Option significantly progresses the current framework to be more consistent and fit for purpose</p>

Effort to Implement / Implementation feasibility

The scale of impact of each option was categorised into one of the following categories:

Implementation feasibility		
Low	Medium	High
Simple to implement; no cross functional dependencies; already has a known solution; can be implemented within a few weeks	Requires some budget or human capital investment; multiple members working together to implement; can be implemented within 1-2 months	Higher level leadership support required; Governance and legislative changes; Significant budget and human capital investment; 6+ months for implementation
<ul style="list-style-type: none"> ✓ Option does not require significant revision to the present framework ✓ Does not require significant investment of resources or extensive preparation such as a cost benefit analysis or regulatory impact assessment ✓ Option does not anticipate requiring extensive cooperation and negotiations with the States and Territories 	<ul style="list-style-type: none"> Option may involve a greater need for negotiation and collaboration May require modifications to existing systems and processes 	<ul style="list-style-type: none"> ✗ Option may involve a greater need for negotiation and collaboration ✗ Significant disruption to the status quo

Appendix E

Long Term Reform Options



Appendix E. Long Term Reform Options



Long Term Reform Option 1: Single National Regulatory Framework

Scale of Impact	High	Operational Feasibility	High	Prioritisation Category	Major reform option - potential long term priority
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Recommendation

This opportunity for reform considers the establishment of a single national regulatory framework with an independent statutory agency for the administration of radiation protection and nuclear safety legislation. This option can occur in two ways:

1. Referral of legislative power by each State and Territory

At present, there is no single head of legislative power or combination of powers under Section 51 of the Constitution that enables the Commonwealth to comprehensively regulate radiation protection and nuclear safety in Australia. Under this approach, a national regulatory framework and regulator which regulates all aspects of radiation protection and nuclear safety can only occur with extensive State and Territory cooperation, with each State and Territory referring legislative power to the Commonwealth.

2. The Commonwealth can enact legislation and establish a national regulator for some aspects of radiation protection and nuclear safety which is supported by a constitutional head of power

Alternatively, the Commonwealth can enact a national regulatory framework and regulator to regulate:

- The import and export of trade items which constitute radioactive materials (as well as the storage and transport of radioactive material intended for trade); and
- The use and storage of radioactive materials by constitutional corporations,

relying on the trade and commerce power (section 51(i) of the Constitution) and the corporations power (section 51(xx) of the Constitution). For completeness, outside the civilian radiation protection and nuclear safety framework, the Commonwealth can also regulate non-civilian uses of radiation under the defence power (section 51(vi) of the Constitution) e.g. for military purposes.

Note: We note that the above approaches are extremely unlikely in practice but have included these approaches to demonstrate the full spectrum of options which are available.

Evidence

The rationale behind this option is supported by insights derived, as follows:

Stakeholder Consultations

From stakeholder consultations, a commonly shared perception is that there are extensive inconsistencies which currently exist across the radiation protection and nuclear safety regulatory framework. This can largely be attributed to the fragmentation of the regulatory regime across the States and Territories due to Australia's federated regime. Due to divergent approaches across key areas such as waste management, emergency preparedness and accreditation, stakeholders have indicated that this has increased the regulatory burden on the regulated community, due to compliance with multiple legislative frameworks. Stakeholders also highlighted that the lack of a uniform approach to regulation resulted in some States failing to implement a Code of Practice or minimum legislative requirement in a timely manner, possibly impacting the health and safety outcomes of the regulated community. Against this backdrop, some stakeholders noted the desirability of a national regulator to propagate and, more importantly, implement a consistent standard of radiation protection and nuclear safety.

Interim report

From our Interim Report, a current state analysis indicated that the States and Territories are inconsistent in their implementation of the minimum legislative standards and Codes of Practices prescribed in the NDRP2. Despite State and Territory endorsement of the NDRP2, the lack of a binding mechanism and proliferation of regulation across the State and Territory regulators have resulted in a largely inconsistent framework. For further detail on the extent of inconsistency across each State and Territory, please see **Appendix A**.

International best practice

From a detailed desktop review of international best practice, the approach of other federated countries has suggested that the creation of a national regulator may be helpful in decreasing inconsistency in Australia's radiation protection and nuclear safety landscape. In Canada for example, the establishment of a national regulator (the Canadian Nuclear Safety Commission (CNSC)) has allowed for the comprehensive regulation of nuclear energy and radiation. Despite the presence of the CNSC however, the provincial and territory regulators in Canada remain responsible for the regulation of radiation equipment. Accordingly, this means that Canada faces similar challenges to Australia in terms of uniformity in the regulation of devices which emit radiation.

Advantages

- Creation of a central repository of information for the regulated community.
- Increased consistency as there would be a mechanism to uniformly regulate radiation protection and nuclear safety in Australia.
- Removal of duplication of licensing, accreditation, training and inspection requirements.
- Decreased regulatory burden on the regulated community and therefore, increased compliance.
- Coordinated response to radiation incidents.

Disadvantages

- No constitutional head of power empowering the Commonwealth to regulate radiation protection and nuclear safety (in contrast to Canada).
- High degree of cooperation required from the States and Territories.
- Requires significant overhaul of the present regulatory regime, which may be met by extensive pushback.
- Requires a significant cost benefit analysis of whether the establishment of a national regulator will proportionately progress uniformity as weighed up against investment of resources required.
- In the absence of State support in enforcement of a national regime, the Commonwealth may be left to resource its own regulatory capability.

Implementation considerations

- Significant investment of time and resourcing is required for this opportunity as the Commonwealth and State and Territory jurisdictions are required to extensively negotiate, consult, and draft amendments.
- Must consider the functions and responsibilities of the proposed national regulator (e.g., if APRANSA was to be this national regulator, would have to conduct a functional efficiency review).
- Requires significant consideration of mechanisms which can support the States and Territories in enforcing the Commonwealth regime.
- A regulatory impact analysis is recommended to understand the full effects of this option.



Case Study

Australian Securities Investments Commission (ASIC)

As a case study, the project team examined the efficacy of having a national regulator through an examination of current operational national regulators, such as ASIC. Historically, despite corporation regulation being conducted through cooperative schemes, there was widespread recognition in 1990 of a national regulatory regime that can guarantee a well-regulated environment for corporate activity.

From there, following multiple constitutional challenges in court and discussions with State and Territory regulators, the States and Territories unanimously agreed to make a broad referral of power to the Commonwealth to restore confidence in the national scheme of corporation's law. In accordance with section 51(xxxvii) of the Constitution, each State and Territory passed a Corporations (Commonwealth) Powers Act 2001 to formally refer the corporation's power to the Commonwealth, allowing the creation of the Commonwealth Act (the *Corporations Act 2001 (Cth)* and the national regulator (through the *Australian Securities and Investments Commission Act 2001 (Cth)*). Upon reflection in 2001, ASIC noted that their new national structure has:

- Increased their capacity to identify emerging risks and to allocate resources to them; and
- Cleared bottlenecks in decision-making.

Learnings for radiation protection and nuclear safety

Learnings which can be applicable to radiation protection and nuclear safety from this case study is that where there is extensive cooperation between the States and Territories and widespread recognition of the necessity of national regulation:

- A national regulator can be established; and
- A national regulator can promote greater consistency.



Long Term Reform Option 2: Model legislation and intergovernmental agreement

Scale of Impact	High	Operational Feasibility	High	Prioritisation Category	Major reform option - potential long term priority
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Recommendation

This opportunity for reform encourages greater consistency in the radiation protection and nuclear safety frameworks promulgated by the State and Territory governments through the introduction of a benchmarked standard, either through Commonwealth enacted model legislation or the NDRP2 together with an IGA. Central to this option is the introduction of a mechanism which formally states the commitment by the States and Territories. This option recognises that whilst an IGA is not legally binding, there is still significant value attributable to an IGA, which can hold State and Territory governments publicly accountable to a commitment made.

The most critical component to this opportunity is the participation of the States and Territories as proposed mirror law schemes, where a State and Territory creates or amends their radiation framework to mirror model legislation or the NDRP2, can only occur with jurisdictional cooperation. Accordingly, this option would require extensive negotiation between the Commonwealth, States and Territories, with the agreed upon outcomes recorded in an IGA. The existence of an IGA following negotiations is critical to ensure that each jurisdiction correctly and transparently implements the cooperative scheme.

Noting the significant political capital required to have each State and Territory government agree to an IGA, this opportunity for reform recommends leveraging the broader political ecosystem, where cooperation on radiation protection and nuclear safety might form one concession provided by the States and Territories in the course of other political negotiations.

Evidence

Stakeholder Consultations

Discussions with stakeholders noted the lack of a binding mechanism which encourages adherence to a uniform set of standards. Multiple stakeholders noted the necessity of an accountability mechanism to incentivise States and Territories to align themselves to a uniform standard, in order to create greater consistency across radiation protection and nuclear safety regulation in Australia. Despite some stakeholders calling the NDRP2 “halfway to an IGA”, there was widespread acknowledgement that whilst initiatives are underway to identify the extent of alignment between jurisdictional legislative schemes and the NDRP2 (and associated implementation of the Codes of Practices annexed to the NDRP2), there is no actual mechanism to ensure the timely implementation of these agreed consistent standards. Against this backdrop, some stakeholders experienced great preference for a mechanism such as an IGA, which strengthens State and Territory commitment to uniformity. This view was noted to be especially pertinent in light of the revision to the Draft Strategy removing the previously contemplated IGA following the AUKUS partnership.

Stakeholders further explored the notion that the present ARPANS Act could well act as the model legislation which the States and Territories can mirror as one viable approach.

Interim report findings

The Interim Report detailed the present state of existing inconsistencies which exist between State and Territory legislation and the NDRP2. These findings make apparent that despite endorsement by State and Territory ministers of the NDRP2, this in itself is insufficient to achieve a true fit-for-purpose and consistent radiation protection and nuclear safety framework. This is because the NDRP2 only captures the jurisdiction's agreement to implement regulatory arrangements in a “timely manner”, with no formal mechanism to encourage true adherence to these standards.

2023 IRRS Follow-up Mission Report

The necessity of an IGA is further explored in the Mission Report, where the IRRS mission team suggested the establishment of an additional binding mechanism to ensure consistent and timely implementation of NDRP2 across Australia (SF3 of the Mission Report).

Advantages

- Ensures that radiation protection standards are applied consistently across Australia.
- Greater State and Territory accountability to ensure timely adoption of agreed minimum legislative standards.
- Improvement of the coordination, cooperation, and feedback mechanism between jurisdictions in the event of a radiation emergency.

Disadvantages

- Requires extensive cooperation from the States and Territories: As each State and Territory presently has their own respective radiation frameworks, it may be difficult for the States and Territories to reach an agreed minimum legislative standard (either through the NDRP2 or model legislation) which is backed by an IGA. This is especially the case where the model legislation or NDRP2 decreases the regulatory standard to one which is lower than the State or Territory's present standard, as some stakeholders have expressed their disinclination to modify their legislative standard in the pursuit of uniformity if safety standards have to be lowered.
- Despite IGAs having greater binding power than the present NDRP2 endorsement, due to IGAs being an expression of State and Territory governments commitment, IGAs are not free from legal challenge

Implementation Considerations

- A cost to benefit analysis should be undertaken to consider the investment of resources required under this opportunity compared to the expected outcome which an IGA can provide.
- Requires significant consideration of mechanisms which can support and coordinate the States and Territories in implementing the model legislation.
- Requires consideration of a commitment of resources from all the jurisdictions.
- The transition to an IGA will need to be managed to ensure that existing radiation protection arrangements and the regulated community are not disrupted



Case Study 1

Work, Health, and Safety Legislation

As a case study, the project team examined other instances in government where there is use of model legislation supported by an IGA.

In the 1980s, despite development of national standards and codes of practice to achieve consistency across work, health, and safety (WHS) legislation across the States and Territories, a similar issue faced WHS legislation as currently affecting radiation protection and nuclear safety legislation. This is because similar to the NDRP2, the national standards did not have legal status, leading to significant differences across WHS regulation nationwide.

In July 2008, the Council of Australian Governments (COAG) signed an IGA following Minister agreement that model legislation was the most effective way to harmonise WHS laws. This resulted in Safe Work Australia becoming the national policy body which is responsible for the development and evaluation of the model WHS laws, which are comprised of the:

- Model WHS Act;
- Model WHS Regulations; and
- Model Codes of Practice.

The model laws have been developed for implementation by all jurisdictions however they do not apply in a jurisdiction unless the jurisdiction has separately taken action to implement the laws as their own WHS laws. Currently, the model laws have been implemented in all jurisdictions except for Victoria, with each jurisdiction having their own WHS regulator.

Central to Safe Work Australia's approach to model legislation is also the development of an evaluation program to review the effectiveness and implementation of the model WHS laws.

[Learnings for radiation protection and nuclear safety](#)

Learnings which can be applicable to radiation protection and nuclear safety from this case study are:

- Model legislation and an IGA can be achieved with extensive consultation with the States and Territories;
- Even with a model legislation and IGA approach, it is important to have an evaluation or audit function in place to ensure effective implementation of model legislation; and



Case Study 2

Maritime Safety Regulation

As a case study, the project team examined other instances in government where there is a national system administered by a national regulator, such as in the case of maritime safety regulation.

Prior to the commencement of a national system through the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (National Law), the regulatory framework for Domestic Commercial Vessels was comprised of eight different marine safety regulatory systems. Similar to the present radiation protection and nuclear safety framework, this resulted in significant inconsistencies across jurisdictions in safety requirements, certification, monitoring of compliance, with comparable concerns surrounding the duplication of administrative requirements, increased costs, and inconsistent safety outcomes.

To achieve this single national system, State and Territory governments entered into an IGA which formalised the agreement of all governments to a national system. The effectiveness of this approach is evidenced as follows:

- All jurisdictions have now enacted complementary application legislation to apply the National Law to any gaps in the Commonwealth's constitutional reach (despite some delays); and
- The [August 2022 report](#) produced following the Independent Review of Domestic Commercial Vessel Safety Legislation and Costs and Charging Arrangements found that a National Law framework has improved safety outcomes, by noting:
 - The number of operational-related fatalities on domestic commercial vessels decreased; and
 - There has been a decrease in domestic commercial vessel serious injuries.

[Learnings for radiation protection and nuclear safety](#)

Learnings which can be applicable to radiation protection and nuclear safety from this case study are:

- An IGA can promote greater consistency, which in turn, has positive impacts on safety outcomes; and
- Despite delays in enacting complementary legislation, all States and Territories demonstrate strong adherence to IGAs.

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