



AUSTRALIAN-FRENCH ASSOCIATION FOR RESEARCH AND INNOVATION Inc.

2 April 2020

The Senate
Senate Foreign Affairs, Defence and Trade References Committee
By email: FADT.SEN@aph.gov.au

Dear Committee Members,

Submission to the Senate on Opportunities for strengthening Australia's relations with the Republic of France

Thank you for the opportunity to make this submission to your Inquiry.

Executive Summary

The Australian-French Association for Research and Innovation (AFRAN) Inc. is an association which promotes the development of cooperation between France and Australia in the fields of research and innovation. Today it has over 600 members. It organises a range of events and outreach activities, including an annual call for projects to support bilateral initiatives, and an Annual Forum bringing together its members and relevant actors around a particular theme.

Our submission is concerned with opportunities for strengthening Australia's relations with the Republic of France, within the sphere of research and innovation. In summary we contend that:

- Research and innovation drive economic development and social change, with mutual benefits for both Australia and the Republic of France;
- France is a vital partner for Australia's research and innovation;
- Culture is critical to the establishment of understanding between our countries and our shared Indo-Pacific interests, including in research and innovation. Exchanges in the arts, cultural and educational sectors are foundational in bilateral communication, whether they be through DFAT programs such as the New Colombo Plan or Australia Now – France 2021. These activities represent opportunities for humanities and other researchers/innovators to assist in the promotion of understanding and collaboration across academic disciplines.
- There is extensive potential for increased French-Australian cooperation in research and innovation in a range of sectors, especially through inter-disciplinary and inter-cultural programs with clear links to future growth and development, as well as for defence cooperation and strategic regional cooperation.



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Based on the above, AFRAN proposes the following key recommendations:

1. Strengthening and expanding existing and new French-Australian research and industry collaborations, which can result in substantial benefits for Australia and the Republic of France, with lasting global impact in sectors including **energy, health, space economy, environmental technologies and management services, and AI and autonomous systems.**
2. Australian government support via policies and processes to develop relations between bilateral research communities and the EU, which will increase research and innovation partnerships and possibilities. This includes **co-funding for French and EU research schemes in bi-lateral priority areas**, and where they underly opportunities for French-Australian trade relationships.
3. Increasing collaboration on specific higher education schemes, including **supporting Australian students to undertake industrial work placements and joint ('co-tutelle') PhDs with French companies and laboratories**, to ensure Australians gain vital skills for future industry and technologies. This is also a specific way in which defence cooperation can be supported, including for the *Strategic Partnering Agreement signed in 2018 for the Future Submarine Program*

1. Background on AFRAN

The Australian-French Association for Research and Innovation (AFRAN) Inc. actively promotes the development of cooperation between France and Australia in the areas of research and innovation. Today it has over 600 members. It organises an annual call for projects to support bilateral initiatives, and a Forum bringing together its members and relevant actors around a particular theme. The Association's goals are to provide Australian and French researchers, R&D managers, industry players, innovators and policy makers with frameworks to enable collaboration, cooperation, innovation and transformative thinking beyond the capability of individuals. AFRAN provides tools to initiate and grow bilateral research collaboration and bilateral innovation with global impact.

With nine scientific communities¹ in a range of key areas, AFRAN represents an extensive network of experts and existing collaborations in fields of particular relevance to Australian-French relations. These priority areas include energy (1); advanced manufacturing (2); space and remote sensing (3); Internet of Things (4); health and medical science (5); defence (6); Industry 4.0 (7); environment, agriculture and sustainable development of communities (8); and culture and governance in Oceania (9). AFRAN actively supports the up-scaling and out-scaling

¹ <https://www.afran.org.au/scientific-communities>



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of French and Australian research and innovation relationships, for the benefit of both our countries, and the world. AFRAN is thus well positioned to outline opportunities for strengthening Australia's relations with the Republic of France, to which this submission now turns.

Australian-French cooperation in research and innovation

Australian-French relations are already well established in Research and Innovation development, in areas of key interest to market development. France has some of the biggest and most successful global businesses in certain sectors of the market, including aerospace, defence and water management as examples. France is indeed one of the key drivers of the entire European research and innovation ecosystem and thus one of the most important partners for Australians who have a desire to collaborate in EU research and innovation programs.

There is strong political support for cooperation in research, innovation and higher education from both nations. The French Minister of Higher Education's visit to Australia in February 2019 resulted in 25 agreements of research and training² collaboration being signed, demonstrating the existing desire for bilateral research and innovation cooperation. Australia's research institutions are considered an attractive partner for France's National Centre for Scientific Research (CNRS)³, due to the quality of Australia scientific research.

Australia and France support both a comprehensive approach to address common scientific and societal challenges, mobilizing the whole higher education, research and innovation continuum. The France-Australia roadmap for science & innovation is currently being drafted. Thematic priorities include health, energy and materials, environment and agriculture, industry 4.0, and space. Within the research domain, there is a growing number of co-publications. There were 3 650 publications in 2019 that involved at least one French and one Australian institution. An increase of 8% since 2018 (3190) and 51% since 2015 (2400). There are also a growing number of strategic partnerships between research intensive universities:

- Paris Sciences et Lettres / Australian National University (with PSL representative based in Canberra); cooperation in astronomy, space domain awareness, laser communications, policy analytics for the environment and security, and economics and management.
- Paris-Saclay / University of Queensland; cooperation in aerospace engineering, hypersonic research.
- Sorbonne University / Sydney University (signed in October 2019); cooperation in climate/environment, artificial intelligence.

² <https://au.ambafrance.org/Visite-en-Australie-de-la-Ministre-de-l-Enseignement-superieur-de-la-Recherche>

³ <https://www.abc.net.au/news/2019-02-28/france-hoping-to-build-australian-ties-after-subs-deal/10853362>



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2. Increasing bilateral trade and investment, including future growth areas for exports and imports, in:

- i. Energy*
- ii. Health*
- iii. Space economy*
- iv. Environmental technologies and management services*
- v. AI and autonomous systems*

Key areas of interest for **increasing bilateral trade and investment, including future growth areas for exports and imports**, include the energy sector, space research and collaboration, and skills exchange particularly for Australians to train in key future skills required for artificial intelligence and autonomous systems.

Energy sector - Future growth areas for bilateral trade and investment exist within the energy sector, an area of increasing interest and opportunity for both Australia and France. French-Australian research and innovation in the Energy sector has unprecedented room for innovation and new market opportunities. By strengthening and expanding existing and new French-Australian research and industry collaborations, such a cooperation can generate substantial benefits for Australia and the Republic of France, with global impact.

Existing successful bilateral cooperation and business opportunities are already evident in the energy sector. The 2017 Australian Investment Awards nominated French energy company Neoen's \$1 billion worth of investments in renewable energy projects in Australia, including a 20-year investment in the Renewable Energy Skills Centre of Excellence at the Canberra Institute of Technology⁴. Evidence such as this highlights a strong basis from which future investment, trade and cooperation may be developed.

Specific areas of strategic importance for bilateral cooperation in research and innovation within the energy and material sector include energy storage, renewable energy, hydrogen, electrical engineering and smart systems. These areas were outlined and discussed with prominent and high-level French and Australia academy and industry partners at the inaugural French-Australian Energy symposium in 2018⁵, initiated by AFRAN.

AFRAN has been working to enable new mechanisms to strengthen scientific cooperation between France and Australia in the energy sector. One concrete outcome of this work is the International Research Network FACES: French-

⁴ <https://www.exportawards.gov.au/neoen-france>

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https://au.ambafrance.org/IMG/pdf/flyer_energy_symposium.pdf?11883/21734c38272ea273ad737b5c3b813df8d9f5e243



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Australian Research Network on Conversion and Energy Storage⁶ for stand-alone & maritime applications, which was to be officially launched on the 26 of May 2020 at UNSW Sydney⁷. IRN-FACES aims to frame the scientific bilateral collaboration on energy materials and integrated systems. Such investment and collaboration in research and innovation highlights a concrete example of the powerful bilateral relations the two countries currently enjoy and demonstrates the importance of research and innovation leading to economic development for Australia.

Health sector – Strong potential for large investment in Australia-France cooperation in the health sector exists, including with public-private partnerships.

Firstly, building on existing cooperation in the Infectious diseases area with potential for global impact (e.g. HBV and other viral infections) presents a particularly timely and relevant area for increased cooperation. Secondly, personalised oncology, the combination of genomics with phenotypic/functional characterisation to personalise cancer treatment, is a further area of large potential. In this area, the strong industrial connections and the ability to lead clinical trials efficiently and in a timely manner (e.g. University of Melbourne/Victorian Comprehensive Cancer Centre/Illumina) are a major Australian strength, meaning that Australia could play a leadership role. France is currently investing large amounts of money in genomics for medical use, and this would have strong positive impacts on other medical fields, as cancer research is currently leading in this space. Thirdly, incorporating digital technology and artificial intelligence in the clinical decision-making process (from primary to tertiary care) and in the research training space, presents a key area for investment and partnerships.

Other important areas with far reaching public health impacts, though less likely to attract immediate investment from the private sector, are as follows:

- Decision analytics and big data analysis to map the effectiveness of mental health services in France and Australia.
- Common interest in Health issues surrounding communities of the Pacific/Indian ocean areas. Further engagement is needed in this field, for example to support health care services for indigenous, rural and remote areas (e.g. New Caledonia and Pacific Islands).

Cooperation for expanding the space economy - With the Australian government predicting Australia's space economy to triple in size by 2030, reaching \$12 billion and creating an additional 20,000 jobs⁸, **bilateral cooperation in research and innovation in the space economy is a unique opportunity for both nations for trade and investment.**

⁶ <https://www.afran.org.au/single-post/2020/02/13/The-International-Research-Network-FACES>

⁷ Now likely delayed until February 2021 due to COVID-19 impacts.

⁸ <https://www.itnews.com.au/news/space-institute-lifts-off-at-anu-514359>



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Bilateral cooperation in space research and innovation is already present in Australia. Research and innovation collaborations have developed marketable technologies, for example space mission's software development developed by UNSW harnessing the expertise of the French Space Agency⁹. Further research collaborations exist, for example the recently signed MoU between the Australian National University (ANU) and French National Space Agency (CNES) which supports and implements cooperative activities in space, focusing on quantum communications, optical communications and earth observations¹⁰.

Expanding research and innovation in this sector directly supports the growing space economy. ANU's new InSpace Institute, as well as the CRC SmartSat, facilities which bridge academy and industry¹¹, highlight the importance of investing in research and innovation as a pathway for future growth and development. French-Australian bilateral cooperation in space R&D and space economy has great potential as a future growth area.

Environmental technologies and management services - Strategic bilateral cooperation in existing fields of environmental sensors and high-speed data transmitters¹² demonstrates the existing possibilities for scaling-up and out research and innovation partnerships within future growth areas of environmental and agricultural technologies. There are long-term partnerships in water management, climate change adaptation and agriculture between INRAE, CIRAD, AgroParisTech, CSIRO and multiple Australian universities including ANU, UTS, UNSW, UQ and the University of Adelaide, including those working in the Pacific Islands. With some of the largest companies in the world in water, environmental management and agrifood business, France has a thriving industrial research and development complex that presents significant opportunities for future cooperation, including through industry-based PhDs and joint research and innovation labs.

AI and autonomous systems - A future in which a wide range of industries use artificial intelligence and autonomous systems is already upon us, and Australia needs to skill up in order to ensure the country maintains a competitive advantage in the global market. Considering the rapid technological change currently taking place, **French-Australian cooperation in higher education and skills training represents a unique opportunity for both nations.** Such collaboration can be of vital importance to address the skills shortages Australia is currently facing¹³, including in advanced mathematics and statistics, cyber security, robotics, artificial intelligence and machine learning, and data management and analysis.

⁹ <https://stories.scienceinpublic.com.au/2019/mission-design-at-rocket-speed/>

¹⁰ <https://www.itnews.com.au/news/anu-teams-up-with-french-space-agency-research-powerhouses-519934>

¹¹ <https://www.itnews.com.au/news/space-institute-lifts-off-at-anu-514359>

¹² <https://stories.scienceinpublic.com.au/2019/making-light-work/>

¹³ <https://www.industry.gov.au/data-and-publications/australias-tech-future/skills/where-do-we-need-to-focus-our-attention-in-skills>



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The Nicolas Baudin “Internships in France” initiative¹⁴ is just one example in which bilateral cooperation supports Australian skills and French industry ties. The internship scheme allows Australian students the opportunity to undertake a research internship at a French host university in collaboration with an industry partner, connecting Australian research and French industry.

This initiative is of particular interest to **enhancing defence cooperation**, with the recent announcement to establish the new OzCean Technocampus, ‘an international research laboratory to push naval and maritime innovation in Australia’. The Technocampus is to be founded in Adelaide by France’s Naval Group and the key French national science research organization CNRS together with 14 Australian companies, universities, R&D institutes and various government bodies¹⁵. Research and innovation on artificial intelligence and autonomous systems will take place at the campus, and Naval Group will also fund students to participate in the Nicolas Baudin “Internships in France” initiative¹⁶ to support skills and research cooperation between the two nations.

3. Enhancing political, security and defence cooperation, including through initiatives such as the Joint Statement of Enhanced Strategic Partnership between Australia and France signed in 2017, and the Strategic Partnering Agreement signed in 2018 for the Future Submarine Program

Supporting Australian students to undertake Industry PhDs in France is a specific measure Australia can take to increase collaboration for the ***Strategic Partnering Agreement signed in 2018 for the Future Submarine Program*** and beyond. **These could be as full French programs** or under joint ‘co-tutelle’ PhDs with an Australian university partner.

Industry-based PhDs are practice-orientated doctoral programmes in France and represent a specific model of higher education that supports close cooperation between the education and the labour market. French industrial PhDs are regulated and defined in legislation and aimed to foster public-private research partnerships¹⁷. One clear benefit of such a model, that does not exist in Australia, is that students gain specific skills needed for the labour market. Such an effort will support Australian’s to gain industry specific skills, and more directly, relevant and important skills to ensure the success of the Future Submarine Programme and initiatives in other research and innovation sectors, including those specifically highlighted above. Specifically, almost a third of all industrial PhDs (under the ‘CIFRE’ scheme) are for

¹⁴ <https://au.ambafrance.org/Nicolas-Baudin-Program-Internships-in-France-initiative>

¹⁵ <https://www.defensenews.com/global/europe/2019/02/27/france-australia-deepen-naval-research-ties-in-wake-of-submarine-deal/>

¹⁶ <https://au.ambafrance.org/Nicolas-Baudin-Program-Internships-in-France-initiative>

¹⁷ <https://www.universityworldnews.com/post.php?story=20131210130327534>



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social scientists, as the future of business and technology has a fundamental need for knowledge of human factors and societal functioning. This could be a valuable area of cooperation for Australia beyond STEM graduates, and provide lessons for expanding Australian industry-based PhD training programs.

4. Options for enhancing strategic cooperation, including in the Indo-Pacific region and through multilateral fora

Bilateral research and innovation cooperation represent clear **options for enhancing strategic cooperation in the Indo-Pacific region**, with examples of such cooperation already evident. Examples of French-Australian cooperation through **multilateral fora** are evident in environmental research in the fields of water, climate change adaptation, coral reef and fish stocks, amongst others. There is active research work undertaken in the Pacific region. Much of this has been documented by the PACE-Net Plus project, including the institutions involved. PACE-Net Plus was the second project funded by the European Commission¹⁸ to further bi-regional science, technology and innovation (ST&I) cooperation between the South Pacific island nations and the European Union.

Examples of cooperation relevant to strategic regional cooperation can be found in environmental sciences. Recently, French and Australian researchers working in New Caledonia have found 50 species of coral that thrive in climate change-like conditions¹⁹. Such research not only has important ties for bilateral and indeed multilateral cooperation in the region and future tourism prospects, but also offers lessons for Australia and global management of reefs and fish stocks and markets in the context of predicted climatic change.

Currently AFRAN is in the active development of an Oceania hub of the Association that will help support research and innovation with researchers and innovators not only in the French Overseas Territories, but with regional organisations like the Pacific Community and SPREP, as well as Australian and French-based members with interest in Oceania. **AFRAN's work facilitating community building for research and innovation collaboration over the coming years in the region will be invaluable for enhancing strategic cooperation.**

5. Australian engagement with intergovernmental organisations headquartered in France including the Organisation for Economic Co-operation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization (UNESCO)

Australia has a long history of strong contributions to intergovernmental organisations headquartered in France, many of which stem from the academic

¹⁸ <https://www.afran.org.au/research-in-the-pacific>

¹⁹ <https://stories.scienceinpublic.com.au/2019/reef-rescue/>



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community. UNESCO in particular relies in large part on volunteer hours, and these are often provided by later career Australian academics who play extremely active roles in scientific diplomacy and supporting foreign governments, most commonly in the Indo-Pacific region. Australian researchers are often engaged through the OECD's programs and the organisation employs our PhD students and public servants who have analytic insights and expertise to support the organisations global goals. Both these outlets and other intergovernmental organisations based in France including the International Science Council, International Astronomical Union, International Water Council provide important avenues for Australian and joint French-Australian collaboration and influence globally and in regions of mutual importance. **These organisations present an important avenue for Australian expertise and research impact, and participation in them is typically beneficial for seeding further interest in Australian-French cooperation and cultural exchange.**

6. Opportunities to build on shared historical and cultural values and promote tourism, cultural exchanges and people-to-people ties

Culture is critical to the establishment of understanding between our countries and our shared Indo-Pacific interests, including in research and innovation. Exchanges in the arts, cultural and educational sectors are foundational in bilateral communication, whether they be through DFAT programs such as the New Colombo Plan²⁰ or Australia Now – France 2021²¹. **These cultural activities represent opportunities for humanities and other researchers/innovators to assist in the promotion of understanding and collaboration across academic disciplines.**

There is extensive potential for increased French-Australian cooperation in research and innovation in a range of sectors, especially through inter-disciplinary and inter-cultural programs with clear links to future growth and development, as well as for defence cooperation and strategic regional cooperation.

Should you require any further information, we would be willing to provide it and engage in future discussions.

Yours sincerely,

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²⁰ <https://www.dfat.gov.au/people-to-people/new-colombo-plan/pages/new-colombo-plan>

²¹ <https://www.dfat.gov.au/people-to-people/public-diplomacy/australia-now/Pages/australia-now>