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Submission: Submission2 to Defence White Paper 2008 (ACOSP)

This is a second submission where I take the opportunity to focus on issues in defence related to networked anti-submarine warfare in the context of the Australian Centre for Oceanic Signal Processing (ACOSP) in Western Australia that I raised with the Community Consultation Panel when it convened in Perth (September 2008).(\*)

In my first submission, I raised these distinctive issues as crucial for Australia's defence and associated industry:

1. The importance of encouraging and supporting a strong, domestic Australian industry centred on software and systems engineering as foundational disciplines for the conception, design and construction of modern defence systems.
2. The importance of continuing to support research and development in underwater acoustics, advanced signal processing and algorithms for the development of anti-submarine warfare systems in order to maintain Australia's strategic advantage and dominance in naval operations.
3. The importance of developing networked anti-submarine warfare as part of the wider development of the networked battlefield in order to enhance information management and situational awareness from multiple sensor networks and data sources.

The formation of a new centre of excellence in oceanic applied acoustic research will fill a void in the national capability left by the closure of the RAN Research Laboratory in 1987. The centre will conduct applied R&D in science and engineering related to acoustic survey, data acquisition and processing in the ocean marine environment. The science feeds into knowledge management, software and systems engineering for security, marine, resources, oil and gas industries.

Western Australia is the ideal location for the centre because of the concentration of marine, undersea, offshore oil and gas industries and excellent local universities. The state of Western Australia has the longest shoreline of all the Australian states giving the greatest potential applications, commercial and economic benefits, and strategic value to the security of Australia.

#### Networked Anti-Submarine Warfare

Australia is starting to plan for a follow-on submarine as the Collins Class is scheduled to retire from 2025. Planning activities for the new underwater capability are gathering momentum and this is directly relevant to WA since the Collins Class submarines and their support are based here. The Submarine Institute of Australia (SIA) notes that in order to place this contract with acceptable risk requires investment now to:(\*\*)

- \* Continue to develop the technology in the Collins class.
- \* Develop Australia's submarine science, engineering and design capability.
- \* Prototype solutions to identify and address the high risk areas.
- \* Engage technology partners to accomplish these preparations.

The technology areas of particular interest relate to next generation sensor development, signal processing algorithms and networked anti-submarine warfare (ASW). The problem of submarine detection has been approached for many years using a number of conventional SONAR techniques based on doppler processing and beamformers in the frequency and time domains. It is highly plausible that increased detection sensitivity can be achieved by applying a combination of techniques from the disciplines of underwater acoustics and target characterisation, advanced signal processing and systems engineering.

An area of investigation should be in network architectures for creating an adhoc network between multiple, intermittent participants in subsea, surface, air and land communications. Subsea communication has until recently been a challenge due to the propagation characteristics, absorption and dispersion of radio and sound waves under water. Properties of pseudo-random noise (PRN) codes allow coherent detection and has enabled the construction of effective underwater communication systems. The goal is information management of multiple sensor networks and data sources to aid real-time decision making in a network-centric warfare (NCW) environment.

Australian Centre for Oceanic Signal Processing (ACOSP)

While it is necessary to deal with foreign governments and other collaborators, as noted in the earlier submission, it is strategically unacceptable to defer high-level software and systems architectural and design decisions to remote authorities. In this context, and at the risk of repetition, Australia needs to grow and enhance the capabilities of our existing software and systems engineering sector, in defence and wider academic and industry communities, by:

- \* Committing to support of innovative projects, systems and R&D.
- \* Supporting the development of software and systems centres of excellence.
- \* Encouraging the growth in undergraduate and postgraduate degree training in software and systems engineering.
- \* Focusing on implementation of best practice in software and systems architecture.
- \* Promoting Australian industry capability and purchasing from local small and medium enterprises (SMEs) in addition to multinationals.
- \* Encouraging joint venture and cooperative R&D and product development between multinationals, local corporations and SMEs.

At the Community Consultation Panel, I advocated for the capability of WA defence industry in "acoustics and systems to develop networked anti-submarine warfare capability," and for the creation in Western Australia of the Australian Centre for Oceanic Signal Processing (ACOSP), "the focus on acoustics signal processing, scientific and algorithm research and development".

The creation the Australian Centre for Oceanic Signal Processing (ACOSP) in Western Australia and its partial funding through a defence-linkage or similar grants, will ensure that algorithm and systems development related to networked anti-submarine warfare can take place in the relevant contextual environment, close to the centre of gravity of the Australian submarine force based at HMAS Stirling, acoustic ranges and maintenance facilities, including those at ASC West located adjacent to the nearby Australian Marine Complex and Common User Facility.

## Conclusion

We conclude that the formation of a centre of excellence in oceanic applied acoustic research is in the national interest and make the strong recommendation that funding should be secured to further this end. Western Australia is the natural location for the centre because WA has the longest coastline and potential for resource discovery. In the defence context, WA has longest coastline to secure and the fleet of six Collins class submarines is based in Western Australia.

(\*) <http://danielberinson.blogspot.com/2008/09/defence-white-paper-2008-public.html>

(\*\*) <http://www.submarineinstitute.com/?doc=42>

I agree to my submission being published on the Defence website

I agree to my submission being quoted in the Community Consultation Report