

Science industry collaboration in Australia: a case study in failure.

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Abstract

Given Australia's 'outstanding' position at the bottom of the OECD (Organization for Economic Co-operation and Development) scale for collaboration between science and industry, and the fact that that level of performance is not echoed in the more traditional analyses, involving Australia's contribution to basic science for example, this note has been designed to achieve two objectives: first, acknowledge and describe one example of a failure at collaboration between science and industry in Australia, and, second, reflect on a sample of the systemic issues that facilitated, and compromised, collaboration in this case. The challenge involved the discovery of the wrecks of two World War II warships. The engineering, maritime and industrial expertise was provided by a private entity, the FSF (Finding Sydney Foundation), in a context that honoured contributions from the RAN (Royal Australian Navy), the WAMM (West Australian Maritime Museum), and the state and federal governments. The collaboration originally involved two senior scientists from UWA (University of Western Australia), scientists with strong track records including in excess of 150 published articles in refereed journals. By mid-2005, three years before the in-water search, the scientists had created the following: a database comprising more than 120 records from archives in Australia, the UK and the USA indicating the absolute or relative locations of the wrecks; two 2004 analyses involving semi-independent procedures specifying the location of the wreck of the German raider *Kormoran*, each accurate to approximately 3 NM (i.e., Nautical Miles) from the now known position of that wreck; an accurate and efficient search box of 400 SNM (Square Nautical Miles) for the German wreck; one analysis specifying the position of the Australian cruiser HMAS *Sydney*, accurate to 9 NM; and an accurate and efficient search quadrant for that wreck. Four years later, the scientists were utterly invisible. The wreck-hunter, hired by the FSF on the recommendation of the Chief of Navy, re-assigned the scientists to a new position never recommended by them, and the FSF and the WAMM failed to acknowledge the accuracy of the scientist's early recommendations, all of which passed through their hands.

Keywords: Science, Industry, Australia.

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Introduction

The following analysis has been designed to explore the often tenuous links between scientific performance on the one hand and industrial support for science on the other. The analysis is restricted to a primarily Australian challenge, however it is not the author's assumption that the explanation tabled for consideration is restricted to Australian science and industry. The starting point concerns what journalist Ross [1] referred to as "Australia's woeful co-operation rates between universities and industry". According to Ross' article, Australia ranks highly in regard to PhD graduation rates, the proportion of international students enrolled in advanced research, share of world publications including highly cited publications, and publications in the social sciences and humanities. However, where 'collaboration between "innovative-active" businesses and public research institutions is concerned, Australia ranked last out of the 26 nations considered by the Organisation for Economic Co-operation and Development'. Why?

The German raider *Kormoran* and the Australian cruiser HMAS *Sydney* were lost in combat off the coast of Western

Australia on November 19th 1941. *Kormoran* had received fuel and provisions for an extended cruise during an October 16th to October 26th meeting with supply ship *Kulmerland* and, following an engine refit, planned to lay a minefield off the coast of Western Australia. The meeting place between *Kormoran* and *Kulmerland* occurred ~1000 NM west of Fremantle. *Sydney* and *Kormoran* met 24 days after *Kormoran* and *Kulmerland* separated. *Sydney* was en-route from Sunda Strait - in what was then referred to as the Dutch East Indies - to Fremantle, near Perth, in Western Australia, whereas *Kormoran* was scouting the Australian trade routes for merchant vessels and mining opportunities. *Kormoran* and *Sydney* were on NNE and SSE courses respectively when they detected each other, and the meeting was almost certainly coincidental. *Sydney* outclassed *Kormoran* as a fighting ship at ranges in excess of approximately 8 NM but its advantages in regard to firepower, director control, armour and speed declined at closer ranges until they virtually disappeared at a range of one NM; the approximate distance between the vessels when *Kormoran* opened fire. Each of the vessels sank after the engagement, *Sydney* with all hands at about 2300

h and *Kormoran* with approximately 320 survivors after scuttling at about 2400 h. The engagement was recounted in detail by Australian historian Hermon Gill in the History of the RAN, and he located the engagement at or near 26°34'S 111°E, a conclusion he attributed to reports from Detmers, the Captain of *Kormoran* [2]. This position is approximately 30 NM south of the true position of that wreck, but that error is not surprising in view of the fact that Detmers provided 16 reports involving positions that varied across 90 NM and 60 NM in latitude and longitude respectively.

The history of the search for the wrecks as distinct from the battle opened quietly in the 1980s with two rather different accounts of the engagement and therefore the presumed location of the wrecks, accounts that involved distinct assumptions, and accounts which refuted and endorsed the German accounts of the battle respectively. The first account, by Montgomery [3], the son of the navigator of HMAS *Sydney*, rejected Gill's official analysis, and located *Kormoran* and the battle approximately 70 NM to the ENE of the actual position of the wreck of *Kormoran*; that is, much closer to the coast. Winter [4] endorsed the general account advanced by Gill, however her recommendation in regard to the location was actually more accurate than that provided by Gill because she translated and interpreted a supposedly secret diary attributed to Detmers and located the wreck of *Kormoran* near 26°S 111°E, just seven NM from the true position of the wreck although, given the absence of 'minutes' from the solution, it has to be assumed that the position was intended to be accurate only to the nearest degree (i.e., ± 27-30 NM).

The first in-water search for the wrecks of *Kormoran* and *Sydney* was mounted by the WAMM working with support from the RAN in 1984. Although the search 'accepted' the argument advanced by Montgomery against the broad consensus provided by the *Kormoran* survivors, it did not actually implement the search in the position advanced by Montgomery, but 130 NM to the SE of that position, close to the coast near Kalbarri, and close to the Houtmann Abrolhos Islands. Thus, the specific arguments advanced by Montgomery about the location of the wreck were set aside, as were all of the positions associated with the *Kormoran* survivor's reports, and a new position was adopted by the Museum. The new position was based on two considerations; first, a single report from the sample of 70 or so reports from the *Kormoran* survivors, a report which implied that *Sydney* was last seen by the *Kormoran* survivors heading for the coast; and, second, information about the location of one of the many magnetic anomalies off the coast. The extent to

which the search reflected professional analysis of the reports from the *Kormoran* survivors and the direction, velocity and variability of ocean currents in the area is unknown, but there is no suggestion in the report that preliminary research was conducted.

Following a lifetime of interest in naval history, the author entered the search definition arena in 1991, when he proposed that WAMM hold an Oceanography Workshop to identify an appropriate target area for the wrecks. The WAMM held the Oceanography Workshop in November 1991, however as the museum followed an 'outreach' as distinct from 'review' model for inclusion, the workshop failed to place effective geographical limits on future argument.

Status Quo as of December 1999

Joint standing committee on foreign affairs, defence and trade (JSCFADSC)

Between 1997 and 1999 the JSCFADSC received in excess of 400 reports from interested parties. The reports were not solely concerned with the location of the battle or the wrecks; however this issue shaped a significant fraction of the debate. The major products of the work of the committee comprised 19 volumes containing the reports, and a 150 page summary of recommendations (JSCFADSC (1999)). As of 2001, the FSF was faced with at least six claims or recommendations in regard to the position of *Kormoran*. A sample of the relevant claims is summarised in Table 1 [5]. The sample reveals recommendations that ranged from 7 NM to 196 NM from the now known position of the wreck of *Kormoran*. Each contribution is identified together with a brief precis of the research argument, the recommended position and the error associated with that position; that is, the distance from the position given to the now known position of the wreck of *Kormoran*.

The marches of folly

The feature of Tuchman's work that appeals to the author is that it involved a descriptive theory of human behaviour [6]. The model focuses on systemic as distinct from individual processes. The critical feature that defined the model is that 'Meaning...emerges not from preconceived design but from the aggregation of details and events that fall into a pattern' and the acts have to be: (a) contrary to the self-interest of the organization pursuing them; (b) conducted over a period of time; (c) conducted by a number of individuals; not just one maniac; and (d) there have to be people alive at the time who pointed out why the act in question was folly. The author would qualify the definition by reference to 'experts' as

Table 1. Sample of recommendations.

Authors	Type of Argument	Location (~)	Error (NM)
Whittaker (1998)	Reconstruction of lifeboat voyage	28°39'S 113°22'E	196
Knight and Whittaker as reported by Whittaker (1989)	Map Dowsing	28°38'S 112°50'E	180
McDonald (2001, 2005)	Analysis of oral history/remote memory reports	28°03'S 113°29'E	174
Olson (2000)	Gill's interpretation of report by Detmers (1957)	26°42'S 110°35'E	42
Gill (1957)	Interpretation of report by Detmers	26°34'S 111°E	28
Kirsner and Dunn (1998)	Analysis based on four constraints from <i>Kormoran</i> Database	26°15'S 111°E	10
Winter (1991)	Translation and interpretation of Detmers' Diary	26°S 111°E	7

*Additional items are shown at JSCFADSC (1999)

distinct from ‘people’. The use here flows from the fact that three professional presentations to the 1991 Oceanography Workshop rendered the area around the Abrolhos Islands at best improbable and at worst irrelevant, and yet millions of dollars was assigned to over-water, in-water and under-water (i.e., submarine) searches in that area. Scientists, historians and professional journalists were swept aside in the rush to find the wrecks off the Abrolhos Islands, nearly 200 NM from their true resting place and the area identified by the Oceanographic Workshop in 1991 [7].

The first march: Map dowsing

The first significant departure from the general area identified by the *Kormoran* survivors was tabled by Knight and Whittaker [8], and depended on hand-based and energy-based ‘map dowsing’. The properties of the Knight Detection Location System or KDLS were summarised by Whittaker [9] in the following terms:

“The Knight Detection Location System (KDLS) has been in use for 10 years for oil and mineral exploration. Wrecks can be detected at any depth. In long-range airborne search mode, large targets (steel hulls) can be detected in a strip approximately 50 miles wide. KDLS used the principle of Electron Spin Resonance. The equipment consists of a Transmitter/Receiver connected to a pair of hand held aerials. The transmitter is tuned to the resonant frequency of the element or compound to be detected. If the substance is present in the ground or under water it will absorb energy. When the transmitter is switched off, the substance will radiate energy at its resonant frequency and return to its normal state. The receiver can detect the return signal. The equipment can be operated from aircraft, ship, vehicles or on foot. No external aerials are required. The strength of the return signal is proportional to the mass of material present and inversely proportional to the line of sight distance to the target. Thus, when the instrument is directly above the target, the strength of the signal indicates the quantity of material present. The specially tuned aerials have a direction-finding capability enabling the operator to ‘home in’ on a target”.

Following a not quite secret search by an RAN submarine, RAN Historian LT David Stephens, sought a review from UWA physicist Andrew Lockwood. Lockwood rejected the KDLS energy-based system in the following terms [10].

“In order to measure a 1 mW change in the absorption of the microwave energy due to electron spin resonance at a depth of 2000 m in salt water, the transmitter would need to supply 1.3×10^{52} W, more power than could reasonably be considered safe, given that a domestic microwave oven emits around 1×10^3 W and requires shielding to avoid cooking the owners. In fact, at these levels, the sea water would be boiled away in a matter of minutes, giving a clear view of the missing wrecks” (Management of the FSF and the project generally relied extensively on email communications involving externally employed, widely distributed and pro bona directors and researchers and this is reflected in the citations included in the current article).

Lockwood’s review was not distributed to the 2001

Shipwreck Seminar or a Lifeboat Seminar held by the RAN in 2003, presumably in order to protect the outreach model of the search for the wrecks, however the arguments advanced in the review could and perhaps should have been obtained by WAMM under Independent Peer Review more than ten years earlier, when Knight first distributed the map-dowsing argument.

The second march: Oral history

Oral History is an established and legitimate area of study, and the first generation of stories were reported and collected by a professional journalist, Bryan Clark. Subsequent collection and analysis by people without research experience outside the search for *Sydney* yielded a broad spread of search targets, and indifference to the limitations associated with recollection of remote events. The observations involved positions from near the coast to the horizon or beyond. The reports included the following phrases, for example; ‘seeing a glow far out on or beyond the horizon’; ‘It was a long way away’; ‘beyond the horizon’; ‘well out to sea’; ‘ships were about eight to ten miles out to sea, at the most’; ‘he saw two ships’... ‘closest to the reef was a ship with camouflage markings’; ‘Three to four miles out to sea’; ‘series of explosions off...coast approximately three and a half miles out to sea’; and ‘heard machine gun fire’. Furthermore, the reports emanated from locations that covered nearly 200 NM of coastline, from Geraldton in the South to Dirk Hartog Island in the North, with off-shore locations to the South-West, West or North-West of most of the points of observation. A figure prepared by Neil Brown in 2001 suggested that the reports could reflect sources up to 100 NM from each of the observers, giving an area of ~20,000 SNM [11].

Many of the reports involved remote recall as distinct from Oral History, and they were therefore subject to the limitations associated with memory for remote events. For example, as described by Wagenaar [12], recall for isolated events declines to ~70%, after six months. However, extrapolation from the values provided by Wagenaar for 30-180 days to 18,000 days, the approximately period prior to recall for the coastal eyewitnesses, reveals that recall after that time would have been very close to chance (Figure 1). This then is the

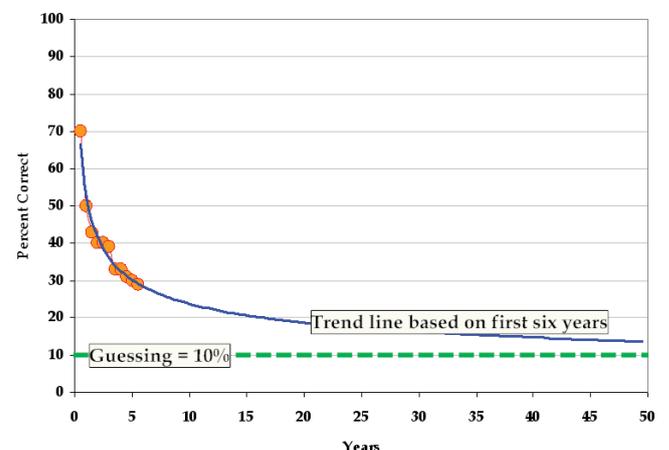


Figure 1. Impact of passage of time on recall. The red circles are from Wagenaar [12]. The blue extrapolation indicates just how close accuracy would be to guess-work after 50 years.

value of the evidence that placed search aircraft, ships and submarines off the Abrolhos Islands in and around the year 2000.

At such a long interval, false memories provide another point of departure. The relevant case highlights the ease with which 'false' memories can be formed. Following the 1992 crash of an El Al Boeing 747 cargo aircraft over Amsterdam, Crombag, Wagenaar and van Koppen interviewed people about the crash [13]. Nearly 60% of their interviewees indicated that they had seen the television film of the crash. Many of the volunteers who participated in this study went on to answer detailed perceptual questions about the attitude (angle) and state of the aircraft moments before the crash. In fact, there was no film of the crash, and the descriptions of the position and attitude of the aircraft prior to the crash were constructed from the student's experiences and expectations about other accidents. This study illustrates the extraordinary extent to which memory depends on *reconstruction*. We need only hear or see a fragment of an event. We then reconstruct the event not as it actually happened, but on the basis of our expectations and predictions about events of that type.

The JSCFADAT was actually provided with the first and arguably most important *warning* by its own expert, Peter Dennis, a retired historian. Dennis' advice cannot be found in the report published by the JSCFADAT, however it can be inferred from a few lines in a chapter he wrote several years after the search [14].

"I have to say that I am no closer in my own mind after listening to her very detailed presentation to deciding what the answers to those questions [when, where, what?] are. This is not to dismiss her theories, but simply to say that the necessary link between the experiences of these individuals and the loss of the Sydney has not been established"

Kathryn Hird subsequently found quantitative support for the argument advanced by Dennis. Using *Leximancer*, a system that extracts quantitative information about themes from a set of stories, and identifies the connections among themes, she determined that 'flashes' (100%) and 'sea' (91%) provided far more 'connectivity' (i.e., relative importance) than either 'Sydney' (11%) or 'ships' (5%). A related and intriguing pointer to the weakness of the Oral History argument came from professional journalist Bryan Clark. Writing in a local newspaper in 1988, Clark [15] invoked night exercises conducted by Catalina patrol aircraft of the USN in 1942 as the possible origin of the reports exploited by McDonald [16].

The issue was further complicated by McDonald's approach to evidence. She routinely skipped across the line between conspiracy and evidence, proclaiming that she was not a conspiracy theorist, while adopting arguments that depended on conspiracy assumptions. Consider the quotation included below [16].

"I have deliberately tried to steer clear of hypothesis which would have required the German survivors to lie for all of these years...However I did consider a scenario which included HMAS Sydney capturing the *Kormoran* and

escorting her to Geraldton with a prize crew, when something went very wrong"

In 1998, McDonald [16] mounted a *political* as distinct from a *scientific* or *historical* argument for a search near Port Gregory, a not unreasonable step in a submission to a committee composed solely of politicians? McDonald advanced the case in the following terms, "The confidences keep coming because the Midwest people finally feel that they are being listened to, a feeling of empowerment, so noticeable result from all community local oral history. The Federal Government must realise that HMAS *Sydney* will not slip quietly away. Those in the 'West' are not ratbags; we just know from our oral tradition that all the truth has not been told".

McDonald attracted extensive support for her claim that the search should be conducted in the vicinity of Port Gregory. A short list of her supporters included the following: her son, LCDR David McDonald; two commercial operators, World Geoscience and Voyager Energy; the Curator of the WAMM, and the RAN, the RAAF and the JSCFADAT. To the best of the author's knowledge, none of the above individuals or entities enjoyed or sought expert advice in Oral History or Memory, the critical domains for evaluation of McDonald's claims. For example, according to a letter from the Curator of the WAMM to McDonald [16], "...I can advise however as a result of your work, I believe and would now recommend that any search or inquiry into the loss of the Sydney must give credence to the possibility that it was heading for Geraldton and that its remains may lie in the area designated."

The WAMM staff did not then include any scientist with expertise in the relevant topic. World Geoscience and Voyager Energy together implemented six or possibly more aerial surveys; one four-engine RAAF Orion AP-3C (crew ~13) flew a search mission from Amberley in Queensland [17]; and two RAN Huon-class mine-hunters (crew ~40 per vessel) spent several days preparing for and conducting in-water search operations under difficult conditions. All of the operations outlined above were conducted in the vicinity of the Houtmann Abrolhos Islands, nearly 200 NM from the wrecks. Finally, following the RAAF and RAN searches, Glenys McDonald was provided with access to 'Top Secret' information associated with the search. According to McDonald [18], "In a voice crisp with excitement, he [LTCO Alex Hawes RN] advised that the RAAF plane had completed its flyover that very day. The crew had recorded the two known magnetic anomalies in the positions further south as expect but at Foale's spot they identified a big steel object in two pieces"

One more warning came from a paper provided to and published by the JSCFADAT in 1998 [19]. In summary, "It is our view that their interpretation of their reports is based on a false appreciation of the strengths and weaknesses of oral history. Oral history has earned a valid place in debates about the experience and the impressions of the individuals concerned. It is arguably the only way to recreate the subjective experience of people who were there. However, when it is put to the test in regard to precise information

about time and location, it will fail, and the magnitude of that failure will increase with the interval between the original event and the moment of recall.

Eyewitnesses usually reach the ‘stand’ in the legal sense under circumstances where the relevant legal officers have no doubt that the people concerned were actually present at the event, and the remaining doubts concern the reliability of their recall about the event. In the case of the Port Gregory reports however, the basic assumption is in dispute; and there was no evidence to support the claim that the eyewitnesses actually witnessed the battle between *Kormoran* and *Sydney*. Their status as ‘eyewitnesses’ was insecure even before questions about the reliability of their reports reached the table!

The third March: Reconstruction of a lifeboat voyage

The third March of Folly was introduced by Warren Whittaker shortly after the death of Lindsay Knight. Whittaker abandoned map dowsing and advanced a new argument based on the diary maintained by *Kormoran*’s Navigator, Meyer. According to Whittaker [9]. “These ‘logs’ (i.e., written records from the German survivors) contain clear evidence that the battle actually took place west of the Abrolhos Islands and not in the northern or Detmers area. The Abrolhos Islands site is consistent with KDLS Target No. 3 (Suspected site of the wreck of HSK *Kormoran*) at 28°39’S 113°22’E”.

The fact that the participants associated with the 1991 Oceanography Workshop pointed to areas hundreds of miles from the Abrolhos Islands went unnoticed, and the RAN explored this hypothesis while ignoring the mass of evidence that favoured a site in the vicinity of 26°S 111°E. Even the fact that the navigator who drafted the diary also reported the total distance sailed at a meagre 150 NM, failed to touch the relevant workshop. Given the non-sailing periods specified by the navigator, the very low net velocity values for current (~0.2 knots) and a total distance to be covered in excess of 300 NM from the Houtmann Abrolhos to Cape Cuvier, an average speed in excess of 4 knots would have been required, for a heavily loaded lifeboat, under the influence of variable winds and currents!

Concluding remarks

Shortly after publication of the JSCFADAT report, in November 1999, a Steering Committee and Working Party comprising senior representatives from the RAN, WAMM and the HMAS Sydney Foundation Trust (the predecessor to the FSF) were established to coordinate a public seminar on the likely search areas for *Sydney* and *Kormoran*. The two committees were charged with overseeing and managing the ‘HMAS SYDNEY (II) WRECK LOCATION SEMINAR’ respectively. None of the six people across the two committees appear to have had a background that involved *active* participation in scientific research, and only one of the six had a background in a relevant academic discipline, namely, history. They were in all cases defined by their association with the navy and maritime affairs.

Following the public seminar, the then Chief of Navy, Vice-Admiral David Shackleton, announced that the outcome of

the seminar did not provide a suitable basis for an official search for the wreck of HMAS *Sydney* [20].

According to the advice provided to Senator Robert Hill by Vice-Admiral Shackleton for example, there was insufficient credible information to warrant the expenditure of public funds on a search for the wreck of *Sydney*. The media release went on to note that this conclusion was based on, “the lack of consensus among historians and researchers as to where the wrecks might be, and hence the huge size of any potential search area,” he said. “Until this area can be significantly reduced in a credible manner, I do not consider that a search can be justified, because of the low probability of success, the large costs that would be involved and the open-ended nature that any such commitment would entail”.

The lack of consensus among the contributors to the search reflected the *political* as distinct from *scientific* model of speaker selection and decision-making adopted by the JSCFADSC, and extended by that body to the design of the 2001 HMAS SYDNEY (II) WRECK LOCATION SEMINAR. The failure of each of these not in-substantial projects to achieve an effective outcome reflected the absence of Independent Peer Review (despite a written request that the Committee create a review process by the late LCDR Ean MacDonald), and the failure of the critical entities to grasp the nettle in regard to distributed and cross-disciplinary expertise!

The Finding Sydney Foundation (FSF)

Advent of the FSF

The FSF was established by Ted Graham, Don Pridmore and the author in 2001 for the specific purposes of finding the wreck and commemorating HMAS *Sydney*. The organization announced its objectives in a mission statement outlining its ‘guidelines and principles’ in 2001 [21]. The first, second and fourth of the principles referred to the status of the wrecks, as war graves, commitment to a non-entry policy for the wrecks and commemoration activities. The third is quoted below:

“Third, HMA3S will give priority to the use of Australian expertise and resources in the search for HMAS *Sydney* and HSK *Kormoran*. HMA3S may never the less seek and capitalise on international expertise and resources where this is justified and necessary.”

The Business Plan was distributed to critical players in the political and business spheres. Section 14 of the FSF Business Plan lists 21 publications associated with the FSF prior to 2003, 19 of which included Kirsner and/or Dunn as authors and the remainder of which involved their professional colleagues. As of 2003 therefore, the search status and capability of the FSF rested *exclusively* on the work of the UWA scientists and their colleagues.

How accurate were the scientist’s predictions for the locations of *Kormoran* and *Sydney* at the establishment of the FSF? The FSF published two recommendations for the position of *Kormoran* prior to 2004. These are summarised in Table 2. The second of the two recommendations was 7 NM from the now known position of the wreck of *Kormoran*.

Table 2. Recommendations by UWA scientists to FSF.

Authors	Basis of Argument	Location	Error (~NM)
FSF (2001): Based on research by Kirsner and Dunn.	Perceptual integration based on selected constraints from <i>Kormoran</i> Database (Kirsner, 1997) plus guidelines provided by oceanography and past tracks of Sydney.	~26°06'S 110°52'E	11
FSF (2003b): Based on research by Kirsner and Dunn (See Figure 2).	Perceptual integration based on four constraints: (1) Distance from coast (120 NM selected by MDP); (2) Distance from NW Cape (160 NM as specified by Bunjes, but accepted as Cape Cuvier); (3) Distance and direction covered by Lifeboat captained by Navigator; (4) Battle position 26°S 111°E (Attributed to Winter (1991)); (5) Circle of equal distance, defined by Dunn and Kirsner (2001).	~26°08'S 111°10'E	7
Hore and Mearns (2003).	Battle position accurate to ± 30' described in Detmers secret report and specified by Winter (1991)	~26°S 111°E	7

The background to the author’s recommendations included the following:

- o Proposed Oceanography Workshop implemented in 1991 to separate arguments advanced by Winter [4,7] and Montgomery [3], a workshop to which three out of the four professional submissions located the wreck of *Kormoran* in the vicinity of 26°S 111°E–26°30'S 111°E [22-24] while the fourth professional submission asserted that oceanography could not be used to define the location of the wrecks [25].
- o Determined that *net* velocity of current in the region was ~0.2 knots when provision for directional instability was included, a value that had little predictive value for the wrecks.
- o Constructed the *Kormoran* Database from archival sources in Australia, the UK and the USA, where the databased comprised approximately 70, 9 and 40 reports about the location of the wreck of *Kormoran* from the survivors, the relative position of the wreck of Sydney from the survivors, and RN and RAN officers about the location of *Kormoran*, respectively.
- o Developed the Minimum Distance Principle (MDP) to resolve ambiguities when alternative interpretations were available for individual constraints.

Chief of navy (2003-2004)

In January, 2004, the RAN intervened in the management of the project. The RAN requested that the FSF include wreck-hunter Mearns in the project, and held out the carrot of RAN support. In an email to Director Bob Trotter the then Chief of Navy Ritchie noted that the Foundation agreed with the conclusions reached by David Mearns’, and advanced the following proposal [26], “It would clearly be beneficial to undertake any proposed searches in a consolidated manner and I would hope that it is possible for all interested parties to come to some form of understanding. To this end I may be willing to reconsider the Royal Australian Navy's position on this issue.”

The Chief of Navy subsequently scheduled a meeting with Ted Graham. The purpose of the meeting was, apparently, to ensure that the FSF. Following a preliminary discussion between Graham and Trotter [27], Trotter prepared a briefing note for the Chairman of the FSF, Graham and the note included the following: “We recognize there are merits in employing David Mearns' (DM) experience in operational search matters and are keen to work in a consolidated manner.” Search Definition by the FSF is “99% complete”, and “based on 26S 111E”.

This is an Australian story. The FSF recognizes that DM has credentials but they are not unique in search area definition, operational management nor recording and commemoration. There is a legitimate concern that the good work of many interests within Australia over the last 15 years might suddenly be exported. We believe that Australia has the resources and know-how to find the ships DM's discovery aim is similar to ours but thus far in the negotiations he seems to assume Leadership status, i.e. it is his game! DM’s secondary aim is fundamentally commercial and he seems to have planned to tell the story in his way, using UK/US resources, authors and production companies.

Trotter deserves recognition as a clairvoyant, an exceptionally useful skill for a submariner! On November 22, 2004 for example, Trotter sent the following message to Begg; Birmingham; Graham; Trotter; Pridmore and King [28]; This is important stuff! Ritchie [26] has told me that “Once David is signed up with you I will go to our Minister advising same and that we would give our support.”

The zone of agreement (2003)

Two papers published or distributed in 2003 defined the Zone of Agreement involving the FSF and Mearns, and it was the presence of the Zone of Agreement that met the RAN condition for supporting funding for the in-water search. The recommendation summarised under FSF (2003b) in Table 2 constituted the FSF contribution to the Zone of Agreement. The position given, ~26°08'S 111°10'E; was 7 NM from the wreck of *Kormoran*. The position was based on a sample of the constraints from the *Kormoran* Database.

The second contribution to the Zone of Agreement is also summarized in Table 2. Hore and Mearns [29] published an analysis of Captain Detmers’ *Gefechtsbericht* or action report of the battle between his ship, the German raider *Kormoran* and the Australian cruiser *Sydney* in November 1941. The product of their analysis was a recommendation that the wreck of *Kormoran* would be found in the vicinity of 26°S 111°E. The critical analysis followed that of Winter [7] and included the following phrase [29], “In the course of this investigation other German sources have been studied. All the available evidence points to the so-called northern position, approximately 26°S 111°E, for the battle between *Sydney* and *Kormoran*”

When the ‘Zone of Agreement’ was established in 2003, Hore and Mearns [29] on the one hand, and the FSF on the other, were each pointing to positions approximately 7 NM from the wreck of *Kormoran*, although for different reasons. The convergence did not pass un-noticed by the Chief of Navy. In an email to Director Bob Trotter, Chris Ritchie noted that the

Foundation agreed with the conclusions reached by David Mearns', and advanced the following proposal; "Thank you for your email of 18 November concerning your efforts aimed at discovering the positions of the wrecks of HMAS Sydney II and the German raider *Kormoran* and commemorating their crews. I was interested to read that you agree with the conclusions reached by Hore and Mearns. It would clearly be beneficial to undertake any proposed searches in a consolidated manner and I would hope that it is possible for all interested parties to come to some form of understanding" and "To this end I may be willing to reconsider the Royal Australian Navy's position on this issue [30]".

The alliance between the FSF and Mearns was eventually celebrated by the Commonwealth and the FFSF. Defence Senator Hill acknowledged the importance of the alliance in an official letter to FSF CEO Trotter [31], thus, "Thank you for your recent update concerning the efforts of the Finding Sydney Foundation to locate the wreck of HMAS Sydney II. Clearly a great deal of preparation and research has been undertaken by the alliance formed between the FSF and Mr Mearns, and I acknowledge that this alliance represents the most concerted effort to date to locate the wrecks of HMAS Sydney (II) and HSK *Kormoran*"

The destruction of consensus (2004)

In January 2004, the author gave a PowerPoint presentation to the board of the FSF and several colleagues from the University of Western Australia including Kirsner and Dunn (Kirsner & Dunn [32]). The presentation was implemented in the head office of Mermaid Marine in Fremantle. The analysis relied on the use of the MDP to solve uncertainties associated with ambiguities involving three constraints: (1) distance from the coast (i.e., 60, 120 or 150 NM), (2) adoption of 160 NM from Cape Cuvier (where the critical lifeboat landed) as distinct from NW Cape (the landmark referred by the crew-member) and (3) the Geraldton signal (i.e., interpretation of '2 (gap) 7 111 15 East 1000 GMT') (Table 3).

The MDP is illustrated in Figure 2. The Geraldton signal has come down to us in two forms. The first form was included in a report prepared by SWACH and dated November 27th. The wording of the report is as follows:

"Geraldton radio reports that at 1005Z/19/11 they received a weak message. The beginning was unintelligible. Then followed "7C 115E 1000 GMT". The radio operator could not estimate the distance. No Qs were distinguished. They waited 2 min but there was no repetition"

The second version of the report is included in the Fremantle

Relation of Cape Cuvier to Possible Transmission Points
(Brown row provides best fit for 160NM on 45°)

Location	Distance (nm)	Bearing (deg.)
25° 47' S 111° 15' E	150.0	51.2
25° 57' S 111° 15' E	156.5	48.3
26° 07' S 111° 15' E	163.3	45.7
26° 17' S 111° 15' E	170.4	43.3
26° 27' S 111° 15' E	177.9	41.1

[Return to Questions](#)

Figure 2. Illustration of MDP: Selection of position that provided best fit in regard to bearing and distance (for 160 NM and 45°). Figure from Kirsner and Dunn [32].

Report of Operations for the period November 24th to 29th. The wording of this report is as follows: "At about the same time Geraldton radio picked up a weak signal unintelligible excerpt for '2 (gap) 7 111 15 East 1000 GMT (These two reports were not received until 1345H/27)"

As listed in Figure 2, five interpretations were considered for the 'gap' in the signal recorded in Geraldton; 26°07' was adopted because it provided the best fit to the information provided by the Navigator, that the lifeboat sailed 160 NM on a North-East course. To test that proposition, and specify the complete value for the constraint, the alternative hypotheses were placed against the given bearing and distance for the lifeboat; that is, 160 NM and 45°. As is evident from Figure 2, 26°07'S 111°15'E provided the best fit for each of the statistics, and it was used as a constraint thereafter. Figure 3 illustrates informal use of multiple constraints where the constraint associated with Linke identified 2601110E as the presumably general location of the wreck and Detmers defined the starting point for the track from 1200H.

Two more of the slides prepared by the author and used for the PowerPoint presentation are depicted in Figure 4. Integration of the constraints was subjective in Kirsner and Dunn [32] although it also involved simple arithmetic. The position shown for the wreck of *Kormoran* in Figure 4b is given as ~26°04'S 111°02'E in the figure, a position just 3 NM from the wreck of *Kormoran*. The figures and the text

Table 3. 2004 - Destruction of Consensus: Summary of recommendations tabled by Kirsner and Dunn and Mearns during 2004.

Authors	Basis of Argument	Location (~)	Error (~NM)
Kirsner and Dunn (2004a, January): Presentation to FSF by author at Mermaid Marine, Fremantle (See Figure 2).	Perceptual or 'subjective' integration by author based on six of the constraints noted in the text.	26°04'S 111°02'E	3
Kirsner and Dunn (2004b, December). Paper distributed to FSF, WAMM and Mearns.	Solution tabled by Dunn with mathematical integration of nine constraints. The research is described in full in Dunn and Kirsner (2011).	26°04'S 111°02'E	3
Mearns (2004), Paper presented to WAMM, with arguments for and against each assumption.	Assumed 26°34'S 111°00'E was Noon position	25°58'S 110°48'E	16
	Assumed 26°34'S 111°00'E was Action position	26°30'S 110°52'E	26
	Assumed 26°34'S 111°00'E was Sinking position	26°34'S 111°00'E	28
	Assumed 26°34'S 111°00'E was Sighting position	26°38'S 110°27'E	46

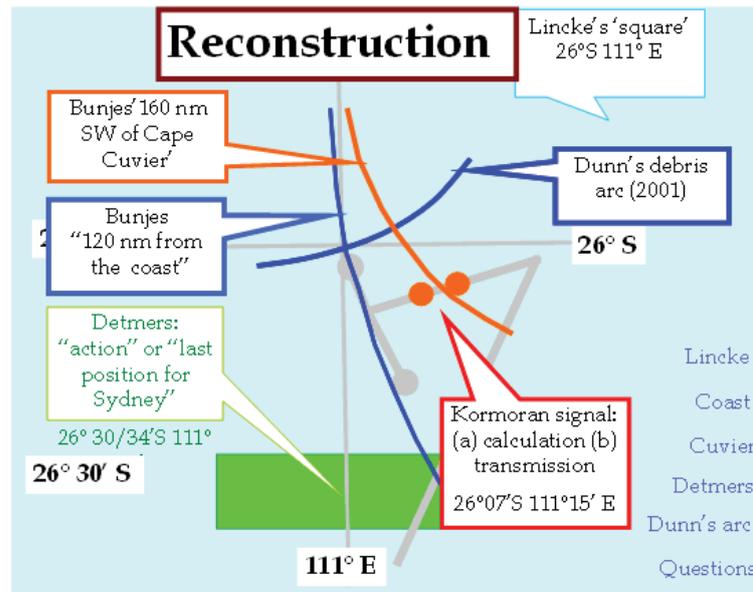


Figure 3. The figure depicts six of the constraints used by the author. Image from Kirsner and Dunn [32].

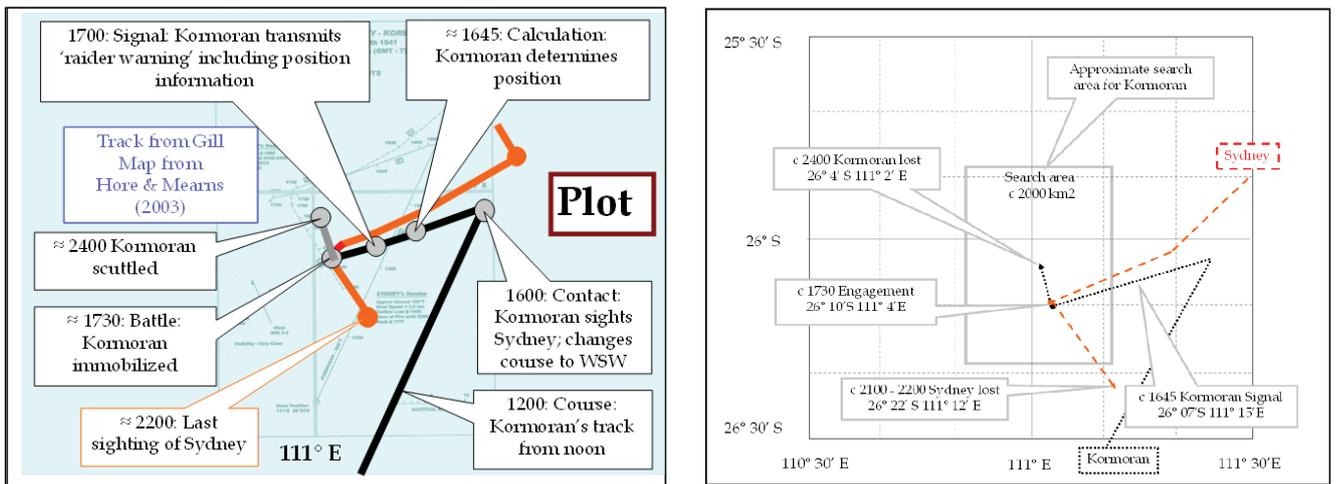


Figure 4. Figures depicting flow of events and locations from 1200 to 2400 on November 19th, 1941. The images are from the PowerPoint prepared by the author (Kirsner and Dunn [32], January, Images 4 and 15). The search area shown for Kormoran in Figure 4b is ~580 SNM.

included references to six of the nine constraints eventually included in the mathematical instantiation of the MDP by Kirsner and Dunn [33].

Kirsner and Dunn (2004b)

Kirsner and Dunn [33] was distributed to the FSF, WAMM and Hore and Mearns [29] in November, 2004, after the author had resigned as a Director of the FSF. The new paper relied on the MDP, as instantiated in a Mathematical Model involving the most efficient position associated with the full set of nine constraints. John Dunn designed and implemented the mathematical generalization of the MDP. The aim of the generalization was to identify the most probable position of the wreck, and the procedure involved selection of the position that involved the smallest “movement” for each of the final set of nine constraints. The model therefore integrated all of the available information under the assumption that each piece of information would be broadly consistent with the remainder and that integration would converge on the most

likely point.

For each candidate location, corresponding to a point in the ocean, and each constraint, the procedure calculated the minimum distance that the candidate location would have to be moved in order to satisfy the constraint exactly. This was referred to as the error distance for each location-constraint pair. The average error distance was then calculated across the set of constraints for each location which then provided a single goodness of fit measure for that location. A candidate location with a relatively small average error distance satisfies the constraints to a greater extent than a point with a relatively large average error distance. No single candidate location satisfied all of the constraints exactly.

Integration yielded 26°04'S 111°02'E as the position of the wreck, the same as that reported by Kirsner and Dunn [32]. This position is 3 NM from the true position of the wreck of *Kormoran* as established by the FSF in 2008. The approach was described in detail in Dunn and Kirsner [34]. The

author ‘adopted’ the solution reported in Kirsner and Dunn [33] for further research purposes because, all other things being equal, mathematical solutions yield products that are precise, objective, robust and independent; and more open to generalization to new projects.

The equivalence of the products of the subjective and objective procedures could reflect: (a) a law of diminishing returns among the constraints, (b) the vagueness of the ninth constraint (that *Kormoran* would be off Shark Bay four hours after she detected Sydney on the horizon, at 1600H), or (c) luck!

Mearns

Mearns visited Fremantle in late 2004 and presented a new account of the Search Definition problem to WAMM [35] and, separately, the FSF [36]. The presentations ignored the conclusion advanced by Hore and Mearns [29] and the simplification associated with that account, and advanced four positions as candidate sites for the wreck of *Kormoran*. Critically, Mearns tabled detailed arguments for and against each of the four positions, underlining the proposition that the issue was anything but settled. The account is illustrated in Figure 5. Mearns did not consult the FSF or its scientists prior to advancing the new analysis. The WAMM failed to include a copy of Mearns [35] in its Final Files Index.

FSF ‘Assigns’ Responsibility for Search Definition to Mearns

Appointment of Mearns as in-water search director

In October 2004 the ‘Board’ of the FSF appointed Mearns to the position of in-water Search Director and it did so without (a) a formal meeting of the Board, or (b) a call for tenders for either Search Definition or management of the in-water search. Put in other words, the FSF failed to follow Due Process! The failure by the FSF to comply with Due Process principles is surprising, as was the FSF Board’s assumption that its scientists would accept the judgement of a secret meeting of a subset of the Board of Directors and fall into line *under the supervision* of Mearns. The author met Mearns in a meeting coordinated by a member of the Board of the FSF during November, 2004 and resigned from the Board of the FSF shortly after that meeting.

Invitation to work with Mearns

In December, 2004 the author emailed copies of Kirsner and Dunn [33] to the Foundation directors, Peter Hore, the West Australian Maritime Museum, David Mearns and other participants in the search. Shortly after transmission of that email, the author received the following ‘invitation’ from Mearns [37]: “What I would like to focus on, with your help, is the possibility that the 11115E component of the QQ position is an accurate piece of detail that has been effectively forgotten by Detmers and his men and was shortened/rounded to 111E. *It is my opinion that this can't be done by theoretical means or by applying oceanography to the drift.* ...Would you be prepared to let me know the extent of your investigation into these messages?” The author decided that pro-bono work for Bluewater Recoveries would not be productive or appropriate, and declined the invitation.

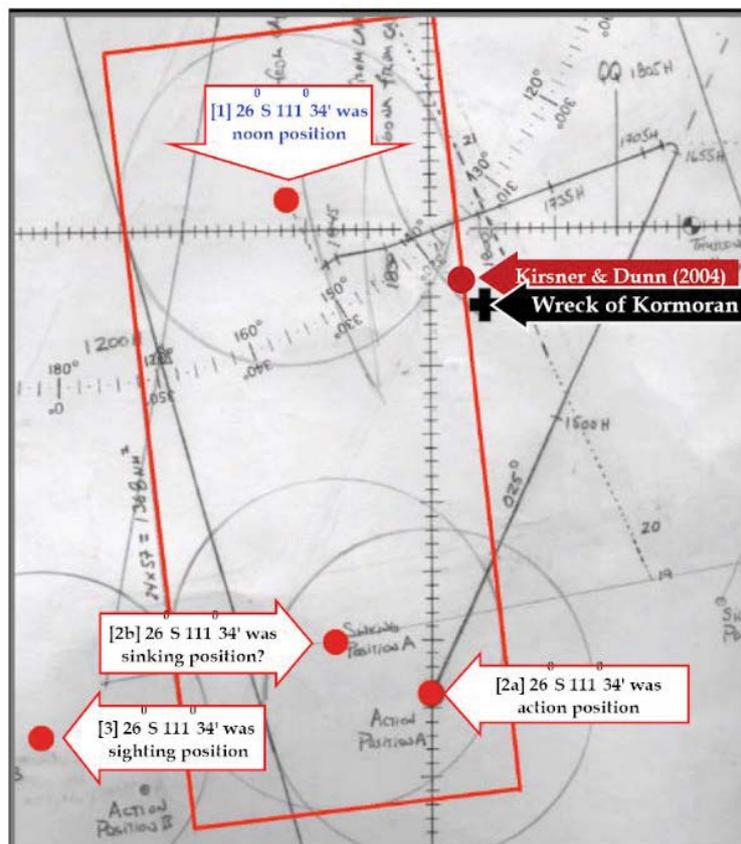


Figure 5. The red positions are those advanced by Mearns at the WAMM presentation and FSF presentations [35,36].

Attempt by FSF to 'acquire' ownership of research by Australian scientists

In 2004, one of the Directors of the FSF drafted a "Directors Declaration" and asked the author to sign it. The Declaration would have imposed an obligation on the author to re-assign Intellectual Property to the FSF. Excerpts from the Declaration are shown below:

As a Director of HMAS Sydney Search Pty Ltd (HMA3S), I undertake the following commitments in addition to the normal fiduciary responsibilities:

- "I agree to make available to HMA3S all intellectual property related to the objectives of the *Finding Sydney Foundation* (FSF), as stated in the trust deed, I currently hold and will develop over the course of my association with HMA3S hereafter referred to as IP (Intellectual Property).
- I undertake not to use the IP (Intellectual Property) in any manner whatsoever without the prior approval of the board of Directors of HMA3S."

The Directors Declaration raised significant ethical and legal considerations. Where did the interest in ownership of our research come from? None of the FSF Directors had shown any interest in the details of our research prior to the injection of Mearns into the project.

Request to Kirsner and Dunn to not publish their research (2004 [32,33])

Two Directors of the FSF urged the author by email to not publish the research conducted by Kirsner and Dunn [32,33]. It should also be noted that the FSF had agreed to let Mearns publish the first account of the search and that they had done so without reference to their pro-bono scientists.

Umbrage

The first of the two quotations included below was attributed to Mearns by Director Keith Rowe [38]; the second is the email distributed to the Board of the FSF by Director Rowe to accompany the email from Mearns. The emails were distributed less than two weeks *after* Mearns had stepped away from his apparent commitment to the Zone of Agreement, and it may be noted that he did not at any time 'consult' the FSF or Kirsner and Dunn about the positions he was then about to advance *in public*. The following communications were not passed on to the author until 2014, long after the FSF had closed.

Attributed to Mearns by Director Keith Rowe [38]

"I think it is important that I make you all aware of my growing concern about how Kirsner and Dunn [29] are going about "resolving" our differences in the search area definition. ...Whilst I am happy to discuss my research with Kim and engage in a good-faith process of evaluating our different approaches I have come to the conclusion that Kim is not about to do this in the same spirit. After reviewing Kim's paper, and then learning that he posted it on a public website before sending it to me and gave others like McCarthy the courtesy of reviewing it in draft form, it is clear to me that

Kim is trying to wage a rear-guard action to dispute my work just for the sake of trying to prove he is right and I am wrong. His paper is full of spin and errors (which I find quite shocking coming from an academic) all written to put my work in the worst possible light. He is not being objective nor is he right."

The accompanying note prepared by Director Rowe [39]

"Unfortunately I don't think Kim has handled this very well by going public. He has certainly not been working for the benefit of HMAS3. Moreover he appears to have made inaccurate statements regarding Davids interpretation of Detmers diary. Kim's approach to collaboration is not of a cooperative nature and certainly does not reflect the spirit of what was discussed at the meeting between David, Kim and myself. Now that Carmello has entered the debate we need to be very careful how this is handled. I suggest that this is a watershed moment in the relationship between HMAS3 and Kim rather than a problem between HMAS3 and David. Can we give David some advice on how he can respond to Carmello. The relationship between HMAS3 is strong. The publication put forward by Kim is not endorsed by the board. Kim's information will be considered, along with all other information concerning the Northern position, when the technical committee determines the final search areas".

The email distributed by Mearns is critical of Kirsner and Dunn [33] for distributing a research solution in December 2004 *without* consulting him or the WAM Curator. In 2004, Mearns [35,36] distributed argument that departed dramatically from that previously published by him [29] without consulting or even informing the FSF in advance. For all practical purposes the FSF is now operating as a pro bono arm of Bluewater Recoveries.

In 2016, the author revisited Kirsner and Dunn [33] and he was unable to find evidence that would support the comments noted above. It should also be noted that the author resigned from the Board of the FSF prior to these communications, and he was not therefore under even notional supervision from the FSF or WAMM.

FSF tables solution to entire set of search definition questions

In 2005, following an approach to the author by FSF Director Bob King, the FSF accepted and re-published further recommendations advanced by the author for the positions and search boxes for *Kormoran* and *Sydney*. As depicted in Figure 6 and published in FSF [40], the FSF specified the positions of the two wrecks with errors of just 3 and 9 NM for *Kormoran* and *Sydney* respectively. The figure also includes the positions of the wrecks and the search areas recommended by the author; of 400 and 570 SNM for *Kormoran* and *Sydney* respectively. The mapping work was implemented. As of May, 2005, therefore, the UWA scientists had solved the entire Search Definition problem, for both wrecks, and placed accurate and powerful solutions in front of both Mearns and the FSF.

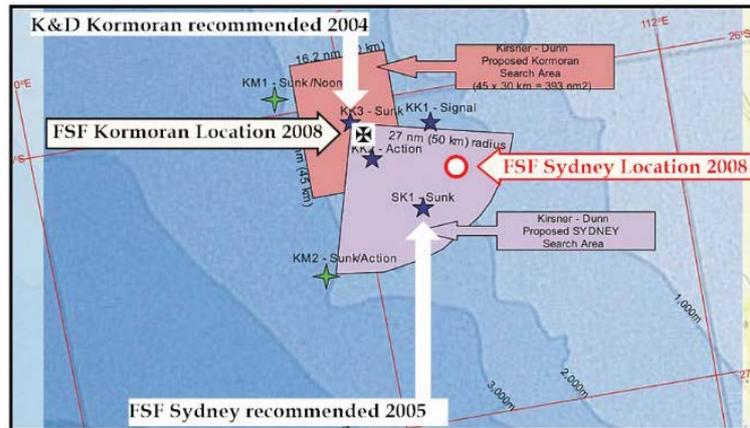


Figure 6. FSF recommendations from 2005. The cross and the red circle indicate the now known positions of Kormoran and Sydney, respectively. The four pointed stars indicate the positions recommended by Mearns for Kormoran at that time [35-37].

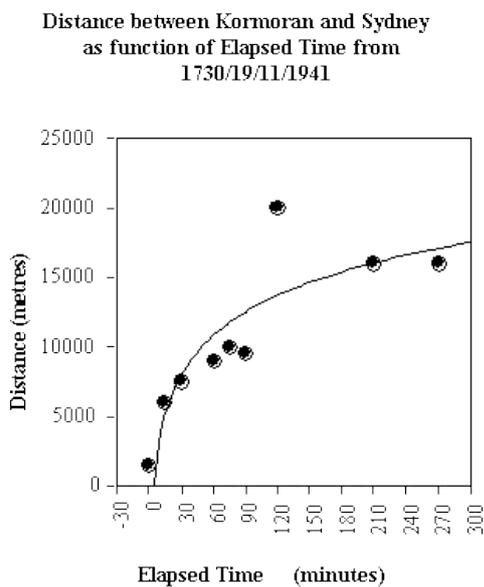


Figure 7. Reports of rate of departure of Sydney from Kormoran for 300 min following commencement of the engagement.

Figure 7 depicts the analysis that underpinned the author’s prediction for Sydney, an analysis predicated on another subset of reports from the *Kormoran* survivors. The analysis reveals that Sydney was moving away from *Kormoran* at a declining rate, a rate that gave little comfort to the proposition that Sydney would reach the coast. The observers also reported the bearing, providing therefore a platform for prediction.

The size of the search box for *Kormoran* in Figure 8 was based on statistical estimates of the variance among the latitude and longitude values associated with the full set of nine constraints. The values were based on positions estimated from the MDP, and the latitude and longitude values were treated independently. The area of the search box for *Kormoran* is 400 SNM, and the wreck is more or less dead centre in that area. For comparison, the search box adopted by Mearns for the in-water search for *Kormoran* was 2,200 SNM, and it included provision for 26°34’S 111°E being the noon position or the battle position.

FSF as ‘subsidiary’ to blue water recoveries

In 2007, some eight months before commencement of the in-water search, the FSF prepared a new paper entitled *Finding Sydney Foundation: Status Report on Achievements and Opportunities* [41]. The paper included a direct comparison of the recommendations advanced by Kirsner and Dunn and Mearns mid-way through 2007, less than nine months prior to the in-water search.

The final comparative positions are included in Figure 8, the original of which was prepared in 2007 and published in FSF [41]. The figure depicted two of the four positions used in the 2004 paper by Mearns being advanced as the critical positions in 2007. The positions are similar to the positions labelled DM2 and DM3 in the earlier figure. also includes the position and the area advocated by the FSF and Kirsner and Dunn during and after 2004. The 2007 report included the following by way of explanation for the change adopted

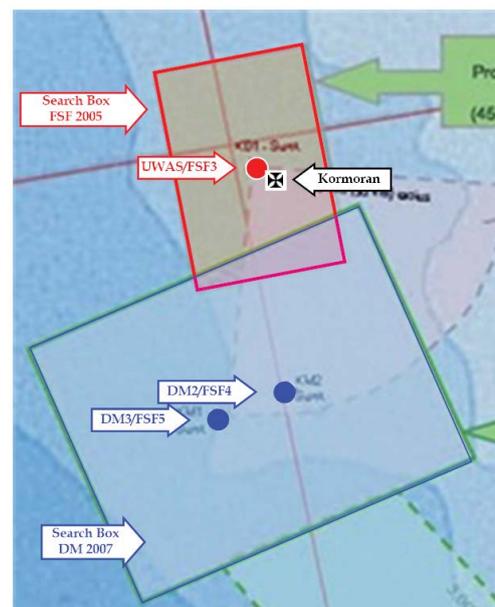


Figure 8. Recommendations by Mearns in 2007 [43] (in blue) in addition to those specified by Kirsner and Dunn [32] and the FSF. Base figure prepared by Bob King.

by the Board of the FSF as it ceded control of the search to David Mearns

“Subsequent personal interviews by Mearns and Hore with a key but aging *Kormoran* communications/navigation officer during early 2006, have caused them to further rationalise their proposed Search Area for the *Kormoran*. Two proposed locations (KM1 – previously KMA and KM2) are located some 7.5 nm apart and are both based on the Action location with dead-reckoning used to predict the sunk position; the variation in location relates to the vessel’s track adjustment resulting from the longitude reference (111°15’E) given in the *Kormoran*’s (final) QQQ radio signal” [41].

The red rectangle (marked FSF 2005) was not acknowledged in either the ‘FULL AND OFFICIAL STORY OF THE SIX YEAR HUNT FOR HMAS SYDNEY’ by Mearns or critically, the formal report submitted to the Commonwealth by the FSF [42]. It is the author’s understanding that the FSF sought legal advice on the issue, and they were advised that they could omit reference to the research distributed by their scientists without fear of legal challenge.

Kirsner and Dunn were not consulted in the FSF decision to focus on 26°34’S as distinct from 26°S and we did not therefore endorse the decision made by the FSF. Figure 8 was prepared by King in 2007 and he resigned as a Director of the FSF shortly after completing the image and the report. The FSF added the following, by way of explanation [41], “HMA3S considers that the rationale for the (two) locations of the *Kormoran* sinking position proposed by Mearns and Hore (KM1 and KM2) form a more robust basis for the Search than that offered by Kirsner and Dunn. Accordingly, the planned Search will be based on these locations. To account for navigation inaccuracies, the resultant Search Area for the *Kormoran* is rectangular of dimension 30 nm × 38 nm and approximately 1,150 sq. nm. Once wreckage of the *Kormoran* has been identified, the Search for the Sydney will commence within a smaller Search corridor of approximately 400 sq. nm to the SE of the *Kormoran* location”.

The following text is from attachment F by Mearns to a formal note from the Hon Bruce Billson to the Hon John Howard, dated 13th July 2007 [43]. The primary search area I recommend for *Kormoran*’s wreck is an area that covers two probable sinking positions and a large surrounding area to account for inherent navigational uncertainty. The first probable sinking position is keyed to the 26°34’S 111°E position recorded by Detmers on the basis that this position represents where *Kormoran* was at the time of the action began at 1630(H) on November 19th. Taking into account the known course and speed changes made by *Kormoran* up to the moment she was disabled and became dead in the water at about 1645(H), in addition to the leeway drift the ship would have made up to the time she sank at 0035(H) the following morning, the first probable sinking position is determined by dead reckoning to be 26°30’S 110°52’E.

The net effect of this factoring is to shift the probable sinking position approximately 7 NM East 26°29’S 111°01’E.

Graham: FSF Director, ‘summary of communications’ (2007)

The archival record of the FSF included one more gem, from 2007 and it foreshadowed the final removal of Australian science from the credits. The note was prepared by Graham, Chair of the FSF and included in a document referred to as a ‘Summary of Communications’ by Ted Graham [44].

‘DM again doesn’t favour KK position ‘Quote from David Mearns: “whilst there is a case to be made that a search a bit further North around 26S/111E would be second choice of search area, this case is NOT strengthened by KK and JD’s research...etc.”

Mearns was being asked and expected to occupy two roles; first, domain expert for Search Definition for the in-water phase of the wreck-hunt; and, second, independent ‘peer’ reviewer for recommendations based on a topic in which he does not possess any qualifications, cognitive science. The concept of a ‘peer’ is also of interest. Overall, Dunn and the author have published more than 150 articles in peer reviewed journals; to the best of the author’s knowledge, Mearns had published just one such article at that time.

Other Agencies and Entities

Western Australian Maritime Museum (1992-2013)

Consideration of the performance of the FSF is complicated by the approach adopted by the Curator of the WAMM. The Curator had apparently lost confidence in Australian science and technology to solve the Search Definition problem as early as 1992 and he embarked on a campaign to attract support from the USN at that time. The following quotations were extracted from a FAX from the Curator to Gallo of the Woods Hole Oceanographic Institute (WHOI) in Falmouth, Massachusetts in 1992: “My hopes for the search now lie in anti-submarine warfare records, for it has long been my understanding that many of the magnetic anomalies on the seafloor throughout the world are known and have been mapped for strategic purposes” [45].

And significantly, “If the approximate locations of the Sydney/*Kormoran* are to be found by that route, my problem will be how to keep confidential my source and yet not pretend that we had found the wrecks purely by our own means.”

The author’s understanding of the last of the above quotations is that the Curator is offering to collude with WHOI, but that a cover story of some sort will be required! Were erroneous reports and ridicule of local scientists by WAMM part of the cover story?

The Curator was responsible for a significant index comprising papers relevant to the search for *Kormoran* and *Sydney*. By 2011, the *Final Files Index* included more than 7000 items. The entries commenced in the 1980s, and the Database included everything from defamatory emails to serious research articles and arguments. In all of the years that the WAMM supervised the record-keeping associated with the search, the most important presentation involved or should have involved that by Mearns to the WAMM in

November 2004. Why was the relevant paper omitted from the *Final Files Index* by the Curator?

The *Final Files Index* included two further clues to the stance of the Curator. The editors of the database created short commentaries for many of the seven thousand articles, letters and notes that comprised the database. Two of these notes are attached to Kirsner and Dunn [33] in the file. The first note – for the note that defined the *FSF* recommendation - is worth quoting [46]:

“HMAS *Sydney* – Search – ‘*The Search for Kormoran and Sydney: A Cognitive Perspective*’ – draft paper by Kirsner and Dunn – challenges all other locations save that determined in 1991 by Kirsner and others (i.e., Hughes)”.

Sam Hughes was a Search and Rescue expert, and he used established oceanographic procedures to define the general area of the wrecks. Writing in 1991 Hughes identified a circle of 8000 SM that included both wrecks but did not approach the Abrolhos Islands, the area routinely searched by the RAN and RAAF on the advice of WAMM. The area identified by Hughes included the wreck of *Kormoran* although the centre of that area was wide of the mark, at an error of 33 NM [23]. The location advocated by Kirsner and Dunn [33] was 3 NM from the wreck. The text of the second commentary is as follows [47]:

“McC to Mearns – concern is about possible repercussions of Kirsner and Dunn’s paper – see pages 60-66 above – need for calm – email.”

What are the ‘possible repercussions’ and what is the ‘need for calm’?

In 2013, following an extensive correspondence concerning a variety of errors in two of the Curator’s publications [48], the museum produced a note that included the first acknowledgement by the Curator and WAM of the contribution by the UWA scientists [49]. The following is an extract from the new note, “It was the work of the FSF and extensive research, notably by Professor Kirsner and Professor Dunn, both then at the University of Western Australia that persuaded the Federal Government to provide crucial funding for the search. They used cognitive psychological techniques to analyse the testimony of *Kormoran* survivors to postulate the likely resting place of the two ships. It was a team led by David Mearns, a professional ‘wreck-hunter’ then engaged by the FSF, who discovered the locations of both shipwrecks. Mearns maintains he also played a part in persuading government to help fund the search, and that he located the wreck sites independent of Kirsner and Dunn’s work. There is little doubt, however, that not only had Kirsner and Dunn identified the site of HSK *Kormoran* to within 2.5 nautical miles, but that their efforts had been instrumental in building the case for resourcing and initiating the ultimately successful search”.

The Cole Commission (2009)

In 2009, the Cole Commission requested that the author provide a report and a copy of the database referred to by author. The author submitted a 16,000 words report together

with the database. Intriguingly, although Kirsner and Dunn provided accurate target positions for *Kormoran* (Error=3 NM) and *Sydney* (Error=9 NM) together with accurate and efficient search boxes for each wreck, the Commission did not interview the authors. Glenys McDonald was treated quite differently however. Despite errors of approximately 200 NM for her analyses, she attracted eight hours of interrogation. Why? From a project perspective, the two research programs fell inside the remit for the Cole Commission of Inquiry or they did not? Why was the project with a 3 NM error treated with contempt while the project with a 200 NM remit was assigned eight hours on the stand?

The potential value of the *Kormoran* Database is evident from the following quotation from AUVNav [50], “BWR has provided Odyssey Marine Exploration of Tampa, Florida with proprietary trade-secret research and survey information used during their successful searches for the wrecks of SS *Gairsoppa* and SS *Mantola*. In the case of *Gairsoppa*, BWR’s extensive and high-quality survey data, covering a search box of approximately 650 square nautical miles, enabled Odyssey to rule out this area encompassing where the wreck was reported to have been sunk by the German submarine. With BWR’s information Odyssey was able to focus its search on the nearest probable sinking position of *Gairsoppa* resulting in the wreck being located well ahead of schedule”.

According to Paton, the *Gairsoppa* was sunk with all hands except one off the coast of Ireland on February 17th, 1941. The search eventually yielded the following quotation from Paton [51].

“In 2013, Odessey Marine Exploration recovered £S48M worth of silver from the wreck of the SS *Gairsoppa*. The UK Ministry of Transport retained 20% of the value of the haul, for an estimated £S9.6M, but it subsequently agreed to pay out £S15M (~\$A30M) to Bluewater Recoveries in an out-of-court settlement over the contract awarded to Odessey Marine Exploration”. Bluewater Recoveries is the company owned by David Mearns.

State Government of Western Australia

The government of the state of Western Australia contributed \$250,000 or more to the FSF for the search, and it surely enjoyed the right to an accurate report from the FSF about the performance of scientists from the University of Western Australia. Furthermore, if the information provided to the author is correct, a 2009 meeting at UWA was attended by the Chief Scientist appointed by the Government of the State of Western Australia. The concept of chief scientists at both the Federal and State levels in the Australia political spectrum is superb, and the author endorses it unconditionally. However the appointment entails a number of risks and, if the appointee and the state government are not alert to those risks, the outcome will be insecure. Four risks associated with the appointment of Chief Scientists merit consideration. The first risk flows from the fact that there are arguably more than 300 disciplines or specialities in the broad family of science and the odds on a given Chief Scientist being an expert in a particular domain is therefore in the vicinity of

one in one hundred or less. A second and closely related risk concerns the extent to which a Chief Scientist is aware of and cognisant of his or her limitations, the bane of scientists and humans, everywhere. The third risk involves the potential gulf between the perceived and real roles of Chief Scientists. Are they expected to protect scientists damaged by the failure of public and publicly funded institutions to acknowledge their performance, or is their brief limited to the protection of the commercial and public entities involved? The fourth risk involves our old friend, *Due Process*. A chief scientist, who asserts his or her authority with regard to a remote domain of expertise without following *Due Process*, or seeking *Independent Peer Review*, is in a very dangerous place indeed.

University of Western Australia (UWA)

UWA was not involved in the search or search supervision in any way. It was however provided with an opportunity to recognize the fact that two of its scientists had solved the critical problems accurately before the in-water search. In 2009, following completion of the search, and aware of the fact that the FSF was not going to acknowledge our work, the author asked the Vice-Chancellor to review our research and provide formal recognition for the success achieved by John Dunn and the author. The VC failed to reply to the author's request for review! In subsequent years four further requests for review at the level of Deputy Vice Chancellor or above were ignored or rejected. One of them actually 'asked' the author in writing to not bother the Vice-Chancellor with the issue again, while another asserted that the reporting for the search for *Kormoran* and *Sydney* was correct in all details, a comment that was made by the senior scientist of WA (an ex-UWA scientist) without any preparation or background that could have been confused with *due process*.

The obvious implication is that the senior scientists and managers at UWA have little genuine interest in the *protection* of science, and even less grasp of the issues actually raised in pioneering publications by Mooney [52], Mooney and Kischenbaum [53], Oreskes and Conroy [54] and Schnieder [55]. Sadly, the university to which the author has had the honour to belong for 44 years failed to implement *Due Process* and thereby ignored the all too pungent lessons provided by the Rindos affair [56]. They apparently followed their *political* interests, and, if the author's understanding is correct, sealed the event and the correspondence.

Mearns

We – people - are all flawed and we all make errors; it is an integral part of our humanity. The following paragraph is from *The Search for HMAS Sydney: How Australia's Greatest Maritime Mystery was Solved* by Mearns [57].

“They (i.e., Kirsner and Dunn) didn't accept Wes' original idea which I felt merited serious consideration, that Detmers' 26°34'S 111°E might have been *Kormoran*'s noon position even though this would place the battle and sinking of *Kormoran* very close to the nominal 26°S 111°E position that in general we all agreed should be searched. To me the argument was becoming overly *academic* and more about

whose ideas were right or wrong. Kim had been involved with the research for more than a decade and had placed a lot of his *academic* credentials on the line. His views on where to search and what information was reliable had evolved over the years, which was evident in the spread of different positions he had nominated in various papers. I thought his most recent work was very good but that his *academic* rejection & of the validity of the 26-34S 111E noon position was weak and not based on solid evidence. His argument lacked the *common sense* and understanding of German naval navigation that was needed to see our point. A robust *academic* debate was all well and good, but at the end of the day I knew that if I was going to lead the search at sea it would be my responsibility to make *real-world* decisions about the search box and where to look first and regardless of whether we were successful or failed the buck would stop with me.”

The author has reviewed the nine publications/submissions to the maritime world prepared in whole or part by him between 1991 and 2005, and he has been unable to find even one that endorsed the proposition that 26°34'S 111°E was the site of the battle or which exclusively used one of Detmers' reports to define the position of the wreck.

A salute to the old navy

The *Kormoran* Database provided the platform for a review of another agency, involving the RN/RAN officers who collated and analysed the reports provided by the *Kormoran* survivors in 1941 and 1942. The arguments advanced in the section entitled The March of Folly (above) implied that the record of events accumulated so laboriously by the RN and RAN in 1941 had no value, and that the officers concerned failed to see through even the most obvious deception.

Fortunately, because we now know the positions of the wrecks, we are in a position to re-evaluate the reliability and accuracy of the relevant body of work. Although all of the analyses in the earlier chapters were based on reports attributed to named *Kormoran* survivors (or survivors identified by rank or position), the author created two other sections of the database; first, reports by the RN/RAN agencies and officers from 1941-1942 and, second, historical accounts published since 1941 and prior to 1992.

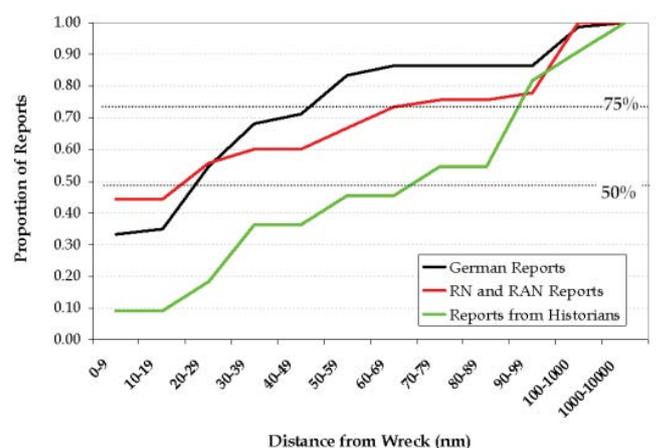


Figure 9. Summary of evidence available from German Reports, the RN/ RAN reports and reviews and the historians.

Figure 9 depicts three types of reports; reports attributed to (a) *Kormoran* survivors (i.e., the black function), (b) the RN/RAN agencies (i.e., red function), and (c) historical sources (i.e., the green function). Reports were included in the first category if they were attributed to a named survivor or even to a survivor with a named role, as a Wireless Telegraphy Officer for example. Reports were included in the second category if they were attributed to a specific RN or RAN agency, involving the Admiralty for example. Reports were included in the third category if they were published by an historian. The ordinate or the y-axis shows the proportion of cases. The abscissa or x-axis shows distance from the wreck of *Kormoran*.

Consider the function for the *Kormoran* survivors in detail. Approximately 33% of the *Kormoran* survivor's reports fell within 9 NM of the wreck. The *Kormoran* survivor's reports fell off after that, with 50% of the reports falling within 29 NM of the wreck and 75% within 55 NM of the wreck. The Abrolhos Island claims by contrast are 200 NM or more from the location of the wreck of *Kormoran*. Even the position searched by the Museum and the RAN in their first search in 1984 is nearly 150 NM from the wreck. Now consider the function for the RN/RAN reports. The function is actually better for the initial group, with 45% of the reports falling within 9 NM of the wreck, 50% within 29 NM of the wreck, and 65% within 55 NM of the wreck. Clearly the reports from the RN/RAN reflect the reports from the *Kormoran* survivors. The historical reports behave quite differently however. This set does not climb through the 50% and 75% points until the function approaches the 80 NM and 100 NM points, respectively. Thus, while the RN/RAN reports mirrored those provided by the German survivors, as they should have, the historical work is surprisingly 'sloppy', with a very substantial loss of accuracy.

Winter is of course the exception. Of the historical writers, she and she alone put *Kormoran* within 7 NM of its resting place. The author avoided double counting, and the excellent work implemented by historians Hore [29] and Olson [58] is covered elsewhere in descriptions of the search. Should this type of evidence be duplicated for other sets of data it would stand as a warning for historical work generally. The weakest of the historical accounts actually came in a technical book about British cruisers. Raven and Roberts [59] put the battle between *Sydney* and *Kormoran* and therefore the wrecks in the South-West Pacific, and that was in a book otherwise obsessed with detail.

With the battle of Teutoburger Wald in mind and that battle was 'located' at as many as 700 sites in 1992 [60], it is possible that historical treatment tends to amplify the amount of noise in a 'system', where the system is the body of knowledge about an event. However, rather than viewing these claims as a manifestation of conspiracy theory, and something for which the perpetrators should be held accountable, the author is inclined to the view that such performance is a 'normal' product of the dissemination of information. Thus, unchecked, historical 'facts' will be embraced as 'memes' and sail off on mythologically rich journeys of their own!

Acknowledgement

Finding Sydney foundation

The author was invited by the FSF to submit a report for inclusion in the Final Report submitted by the FSF to the Commonwealth of Australia in 2009 [61]. The FSF omitted our report as well as the research submitted to them by the UWA scientists. According to one source, the decision was based on the fact that David Mearns defined the search parameters.

However, prior to and following closure of the FSF, several individual directors included or published commentary on our research.

Rowe, FSF Director: Recommendations by Kirsner and Mearns

In November 2004, FSF Director Rowe coordinated a meeting between Mearns and Kirsner. The meeting was held in the author's home and attended by Rowe and the author's wife, Professor Hird. Following discussion about a number of points of uncertainty in their analyses, Rowe invited Kirsner and the author to indicate their preferred locations on a map he had brought for the purpose. The product is shown on the map entitled Figure 10. The positions marked 1, 2 and 3 are the positions nominated by Mearns. The position beside the cross and marked K was that nominated by Kirsner. The black cross indicates the now known position of the wreck of *Kormoran*. The map was prepared by FSF Director Keith Rowe, apart from the cross. Rowe endorsed the accuracy of the predictions by the UWA scientists by email a few hours after the discovery of the wrecks in 2008.

FSF directors as individuals (2010-2016)

Elements of the account advanced here and in earlier papers have now been endorsed by a majority of the FSF Directors including in particular Graham [62,63]; Trotter [64];

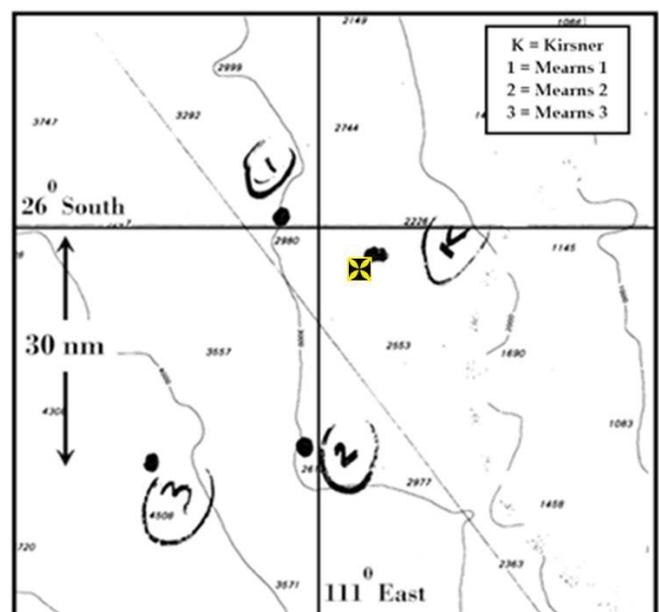


Figure 10. Positions recommended by Mearns [35-37] and Kirsner (K) [68] at the November 2004 meeting.

McDonald [65] and King [40,41] as well as Rowe and the author.

Towards an Explanation

Based on the foregoing, three candidate hypotheses merit consideration for Australia's failure in Science - Industry Collaboration. The first hypothesis involves the concept of a 'Cultural Cringe'. As coined by Phillips [66], the term has come to refer to Australia's inherent lack of faith in its own culture, often at the popular level. Phillips originally used the term with reference to local dramatists, actors, musicians, artists and writers, however the treatment of Australian science by the FSF, the WAMM and other agencies suggest that the concept was alive and well throughout the project, and the preparation of reports associated with completion of the project. An extension of the concept to science might be appropriate. Selective application of the concept to Science - Industry collaboration as distinct from general scientific performance would require an additional step however, suggesting why the cringe is valid for Science - Industry collaboration but not for Science in general. But this caveat collapses when it is considered in the context of the treatment of the research reported by Kirsner and Dunn by senior scientists associated with the UWA and West Australian communities.

The second candidate hypothesis involves the lack of acceptance of research by scientists working across discipline boundaries, a particular challenge where professionals in the 'obvious' domain assume ownership of that domain, a point that emerged again and again throughout the long history of debates that led up to the in-water search for the wrecks of *Kormoran* and *Sydney*. The critical issue involved expertise, and not only is the source of expertise not in all cases obvious where ad hoc challenges are on the table, but expertise often resides on the boundaries of the established disciplines [67], posing a potential challenge to the self-proclaimed 'owners' of the domain. A further expansion of this concept was recently developed by the author [68] and involved the concept of *decomposition*. It is possible that the owners of a given domain tend to see 'their' domain as a unified and integrated system, and not therefore open to decomposition. In other words, 'navigation' is 'navigation'; it is open to sailors and sailors alone and it cannot be decomposed into components; components that might be open to cognitive problem-solving for example. The current paper is also about expertise, and the challenges faced by the characters (i.e., scientists) that live on the borderlands of various forms of expertise, and the institutions whose managers are charged with supervising and capitalizing on the products of scientific research.

The third and most intriguing hypothesis involves the shadow of the gradually unfolding Defence Trade Controls Act (DTCA), an act that puts at 'risk fundamental research and education in science and technology in Australia' [69]. The original aim of the bill 'was to give effect to a Defence-related treaty between the United States and Australia regarding control of sensitive technologies which might relate

to the military and strategic environment' [70]. According to Korb [71] for example, 'obtaining prior approval for each project (or even communication) will put an end to a lot of research activity in Australia, directing researchers, students, innovation and almost all subsequent economic activity elsewhere. This is a bleak prospect for "Innovation Australia"'.

Korb [69] went on to note that the Department of Defence will have oversight for not only military goods but also for 'dual use goods'; that is, innovations that might have *some* military use and they listed domains involving the following key innovation areas: epidemiology; biotechnology; neural, optical and quantum computers; high-performance computers; optical telecommunications; signal processing; fault-tolerant systems; image processing, and robotics. If it is assumed that the listed domains involve five percent of the sciences, and that the presence of ambiguous boundaries doubles that, and that say 30% of new collaboration between Science and Business would have occurred in the listed domains of the science universe, the plight of Science - Business innovation in Australia is entirely predictable. Perhaps the paradigm developed by the UWA scientists piqued the interest of a commercial operator with a background involving the USN and underwater search operations!

Reflections

It is the author's contention that the terminal board of the FSF had a responsibility to ensure that the Commonwealth Government; the Government of Western Australia; the Government of New South Wales; the University of Western Australia and the broad domains of science and history were provided with an accurate account of the search. That it failed to provide an appropriate summary to the Australian public raises fundamental questions, not about the terminal directors, but about the limitations associated with the management of multi-million dollar scientific projects by people without an appropriate range of scientific, legal and ethical skills. The case study described here provides depressing evidence about the vulnerability of scientific research, however, it cannot be invoked to alone explain the fact that Australia languishes in last position among 26 countries in the Organisation for Economic Co-operation and Development in regard to Science - Industry research engagement. That conclusion would depend on a more extensive review and analysis.

But the critical issue thrown up by debate prior to the search for the wrecks of *Kormoran* and *Sydney* actually involved expertise, and the challenges posed by decomposition and the possible presence of unexpected sources of expertise on the boundaries of the older and more obvious disciplines and domains, the problem recognized in principle by Ian Chubb, the Chief Scientist of Australia. This challenge requires an inclusive approach; adoption of open-sided problem definitions, and invitations to interested parties to put up their hands, and specify the approach they would use for a specific problem.

Another principle that ran through the search from its

beginnings off the Abrolhos Islands in 1981 until the report by the Cole Commission in 2009 involved a consistent preference for mate-ship and status where ‘expert’ opinion and advice were required. This preference is perhaps not surprising where the small private agencies or the services or even the Museum are concerned but when it extends to the university community it is another matter altogether, and provides an obvious explanation for our failure in regard to the Science – Industry nexus. This is of course what a community is left with when it abandons Independent Peer Review and Due Process.

One way to approach the review and protection questions for future challenges to Australian science would be to establish a virtual committee comprising the Chief Scientists of the Commonwealth and the states, and to add a layer comprising a virtual network of scientists from around and beyond Australia to provide expert advice on to-be-specified topics. This is of course our old friend *Independent Peer Review* dressed up in new clothes, and should offend no-one. But the critical step involves the selection of scientists and industrialists who might be able to contribute to ambiguous and challenging projects.

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