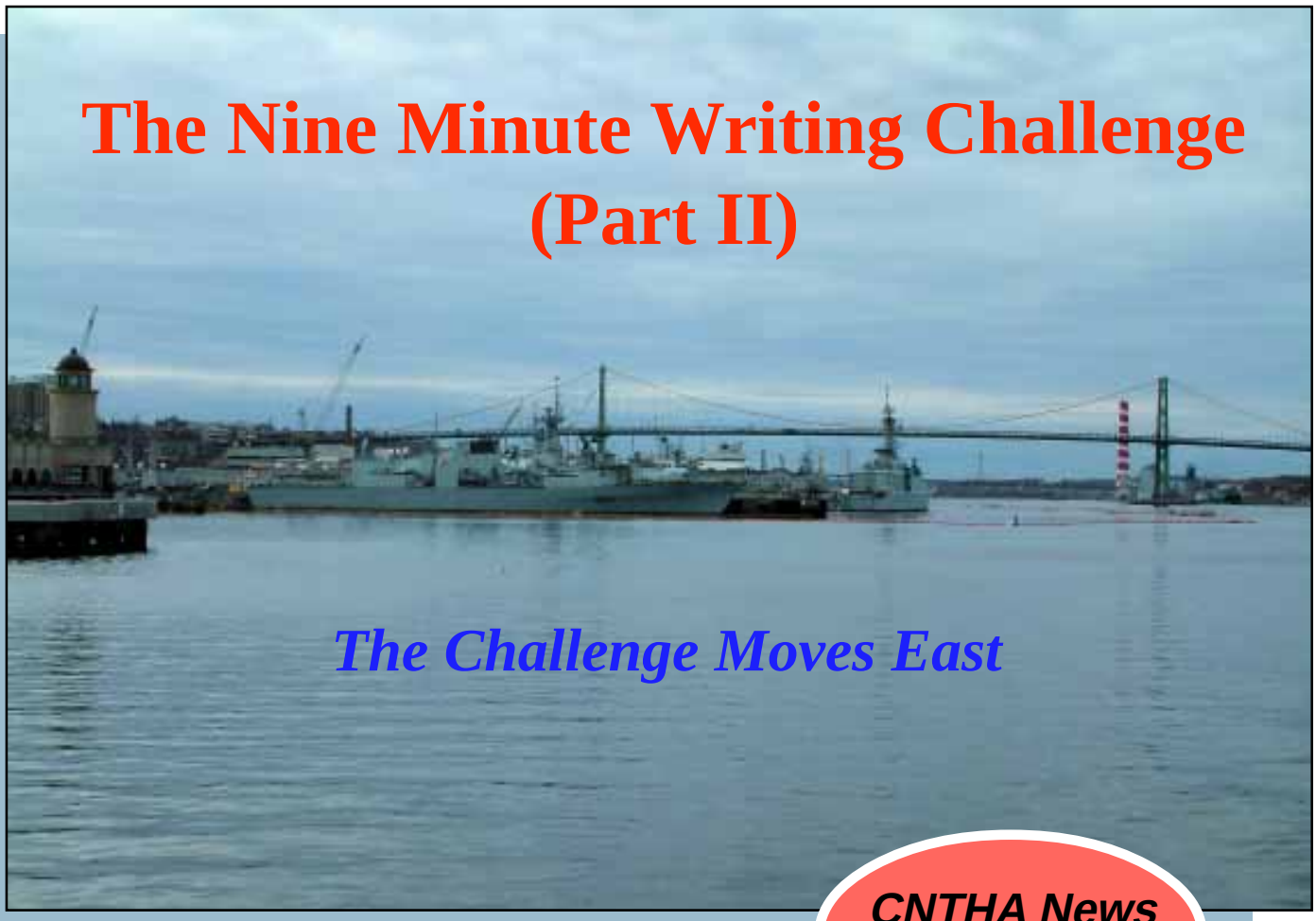
National Defence Défense nationale

Maritime Engineering Journal

64
Since 1982

CANADA'S NAVAL TECHNICAL FORUM

Spring 2009



The Nine Minute Writing Challenge (Part II)

The Challenge Moves East

CNTHA News Inside!

Also in this Issue:

- **First Frigate Rollout of the MASIS "Deployed Solution"**
- **Forum: The Requirement for Requirements**
- **A Measure of Seaworthiness**

Canada

West Coast “whale” watching —

Photo: Brian McCullough

HMCS *Orca* (PCT-55) may look like a killer backyard building project in this October 2008 photo, but the patrol training vessel was simply in for repairs at the Point Hope Maritime Limited shipyard in Victoria’s Upper Harbour.

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Director General
Maritime Equipment Program Management
Commodore Richard W. Greenwood, OMM, CD

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DEPARTMENTS

FEATURES

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Commodore's Corner

Engineering Knowledge — Understanding the requirement is fundamental in the search for solutions

By Commodore R.W. Greenwood, OMM, CD
Director General Maritime Equipment Program Management

One of the benefits of my position as DGMEPM is that I get to enjoy the *Journal* articles ahead of the general readership. And "enjoy" is the operative word. I am continually impressed with the scope and quality of the articles, ranging as they do from the deck-plates engineering immediacy of the "Is this *YOUR* ship?" feature, to a more philosophical perspective such as you'll find in this issue's Forum offering from Gordon Forbes on "The Requirement for Requirements."

This ongoing juxtaposition of the practical and the philosophical serves to highlight the reality of life in the naval engineering and technical support community. Naval engineering (or engineering in general) is not so much about the steady accumulation of a growing body of increasingly sophisticated and arcane factual information, as it is about *developing* knowledge and applying it to our work. In his interesting book, "What Engineers Know and How They Know It,"* Walter G. Vincenti uses examples from aeronautical design history to make the point that engineering is not a mere subset of applied science. Much as it may employ the same products, Vincenti maintains that engineering is a distinct and unique intellectual endeavour in its own right, developing knowledge of a fundamentally different nature from the raw facts of physical science.

I believe we have always known this. Engineering knowledge *is* different from the sciences, principally in that it is objective-specific. As Walter Vincenti notes, "engineering knowledge reflects the fact that design does not take place for its own sake and in isolation... (but) is a social activity directed at a practical set of goals intended to serve human beings in some way. As such, it is intimately bound up with economic, military, social, personal, and environmental needs and constraints."

Where have we seen this before? A number of readers may recall me saying in a naval architectural context that the hardest thing about ship design is designing the requirement. If the requirement is feasible, coherent, internally consistent and affordable, then the rest is "just" engineering; but if the requirement is not all of these things, then no amount of engineering brilliance can solve the problem. In our search for solutions, which is after all the essence of engineering in the design sense, a comprehensive understanding of the mission requirement is fundamental to the development of new capabilities. Gordon Forbes' excellent Forum article takes this idea a step farther by illustrating how our understanding of the mission requirement is best translated into a suitable specification of the material requirement.

As we embark on what promises to be the busiest, most sustained period of fleet renewal activity since the steamers were built in the 1950s and 60s, it is important that we understand the special nature of our engineering and technical knowledge, and how best to apply it. The generation and sustainment of naval capability at sea is our primary objective, and it is also the performance measure by which all of our work today and in the months and years ahead will be judged. The onus therefore rests with each one of us to evaluate, every single day, the effectiveness of our activities and efforts in contributing to the technical capability and readiness of Canada's current and future naval fleets.

[*"*What Engineers Know and How They Know It: Analytical Studies from Aeronautical History (Johns Hopkins Studies in the History of Technology),*" by Walter G. Vincenti, The Johns Hopkins University Press, 1990.]

Letters

Dear (Editor):

I'd like to thank you for recently received copies of the *Maritime Engineering Journal*. We at BC Ferries read each edition with considerable interest and a more than occasional application to our fleet here on the west coast.

Yours aye,

Jeff Smith
Director Fleet Planning & Projects — B.C. Ferry Services Inc.
12800 Rice Mill Road, Richmond BC V6W 1A1

Subject: An Engineer's Tale

I found the Nine Minute Writing Challenge tales (*MEJ: Issue 63*) very entertaining, and thought you might find the following of interest. In fact, why not start collecting amusing tales from the naval engineering world?

— Commodore (Ret.) Ed Murray

[*Thank you, sir. Great idea. We'd welcome the opportunity to hear from anyone with a naval story, amusing or otherwise. — Editor*]

Diving in the Engine Room*

By Commodore (Ret.) Ed Murray

One day in 1962 while HMCS *Saguenay* was at anchor in the Queen Charlotte Islands, I was shaken at 0530 by the chief petty officer in charge of the flashup. He told me the chief ERA needed to see me as there was uncontrolled flooding in the engine room. When I arrived in the engine room, water was spraying from somewhere in the starboard bilge area so heavily it was impossible to locate the source. The level in the bilge was about two feet, but holding steady as the main circs (circulation pumps) had been switched to bilge suction. All hull valves had been checked shut except for the main circ outlets. An extremely agitated chief ERA wanted me, the ship's diving officer, to dive under the hull and check whether one of the hull openings was jammed open with a broom handle or like object. That there might be a hole in the hull was not mentioned.

Another diver and I went over the side but found nothing amiss. When I went back to the engine room to report, I found the console surrounded by an impressive group of very unhappy people — the captain, the XO, the engineer, the chief ERA and assorted others. As I had recently completed my engine room ticket, I decided to crawl into the bilge area in my wetsuit and facemask so that I might more clearly appraise the situation. In less than a minute the source of the flooding was found. Crawling out of the bilge, I quietly told the CERA that if he shut a certain valve the flooding would stop. He did so and, looking amazed, observed peace return.

The problem arose when the chief in charge of the engine room flashup sent an apprentice below to clean a salt water strainer. Unfortunately the apprentice was inexperienced and opened the lid on the main circ discharge to the lube oil cooler by mistake…which meant the starboard main circ was now discharging the water it was pumping from the bilge back into the bilge.

I must admit feeling very "chuffed" with myself. I was a mere sub-lieutenant, and everyone (except the CERA) thought I had performed some sort of magic. The high point occurred later in the day when daily orders included an announcement that there would be swimming during the first dogwatch in the engine room, and that I would be the lifeguard!

*[*Bylined by the Journal for indexing purposes]*

The Requirement for Requirements (or how to get what you want)*

Article by LCdr (ret.) Gordon Forbes

[*A*dapted for the* Journal *from a presentation delivered by the author to a joint DND/Project Management Institute symposium in Ottawa in 2005.*]

Let's face it. Most people who write requirements have a picture in their mind of what they think they need. You need an airplane, I need a ship. It seems simple enough, but the reality is that many customers end up *not* getting what they think they asked for. And so they get angry and frustrated, and they blame the project manager and lose faith in the process. And why? *Because they didn't actually ask for what they want.*

I first started writing requirements in the Directorate of Maritime Requirements more than 30 years ago. Since then, I have worked with requirements as an interpreter, as a vendor in industry, as part of a team reviewing DND capital projects, and most recently as a project manager in industry on a DND project. You could say that requirements are in my blood. This present article is my somewhat light-hearted take on what makes good and bad requirements, a few "do's and don'ts" for the requirements writer to consider when it comes time to ask the question, How do I get what I want? or, more importantly, How do I get what I need?

The Importance of Requirements

When you get right down to the heart of it, written requirements serve three important purposes:

• Requirements are how you **define** what you need. (Obvious, isn't it?);

• Requirements are where you begin to **track the evolution of design** to specifications, product descriptions and test requirements. (This is the part that gets engineers excited.); and

• Requirements are what you **verify** against to ensure you receive what you asked for. They are the *only way* of knowing exactly what it is you got — or, often, what you did not get.

There are requirements, and there are requirements. The ones that describe the *product* are contained in a *Statement of Requirements (SOR).* Requirements that describe the related work or services are contained in a *Statement of Work (SOW).* Every project director and operations requirements manager knows about SORs, which the engineers translate into specifications for the contract. Something of a back-and-forth process goes on between the operators and the engineers regarding the SOR, but eventually a document is hammered out that is accepted by both arms. How do you know what belongs in the SOR and what goes into the SOW? One easy way is to remember that the project manager owns the SOW; the system engineering manager is responsible for fulfilling the SOR.

Horror Stories

Ah, yes — the dreaded horror stories. All of the examples that follow represent things I have actually seen in SORs, so never say, "It can't happen here."

Oh, horror — The Incomplete Requirement

"The system shall detect airborne targets..."

This certainly seems like a worthwhile thing to be able to do, but could you design or select a product based on this alone?

"...at a range of 10 km..."

Ah, this is better. At least we now have a performance goal — but is it enough? Well, we know that most sensors have certain limitations depending on the environmental conditions they are working in, so...

"...under ideal conditions..."

...we define some conditions, but we also know that no sensor is perfect. So how about some performance tolerance?

"...with a probability of at least 95%."

There. You can quibble over the details, but at least it is now a complete requirement. I once had a contract in industry to examine the contract requirements for the end product of a DND major Crown project. What we found was that only one-third of the requirements contained all the elements of a complete requirement. To put it another way, *two-thirds* of the requirements we looked at were untestable and therefore unenforceable. Explain that one to the minister.

Oh, horror — The Too Precise Requirement

"The system shall measure distance with an accuracy of 30.48 cm."

It is probable that someone did a hard conversion to metric of one foot to end up with this kind of accuracy.

Is the .08 cm really significant, or even the .48?

"The maximum speed of the vehicle shall be 125 km/hour."

What's wrong with this? Of course we want it to go 125 km per hour. But the way it is written, if it goes *126* km per hour it does not meet the requirement.

"The ship shall have three radars."

This an example from a DND SOR which meant to specify that there are three *functions* the radar suite has to fulfill, but this stated requirement would rule out the possibility of acquiring a multi-function radar unit such as is found on board the U.S. Navy's Aegis cruisers. Why does it have to be *three* radars? From an operational point of view, if the job can be done by one, two, or for that matter six radars, do we really care? Precision is a good thing – but sometimes you can have too much of it.

Oh, horror —
The "I want one of these and one of those" Requirement

"The system shall have the following capabilities:

- one of these characteristics (from system A),
- two of those characteristics (from system B), and
- six of those other characteristics (from system C)."

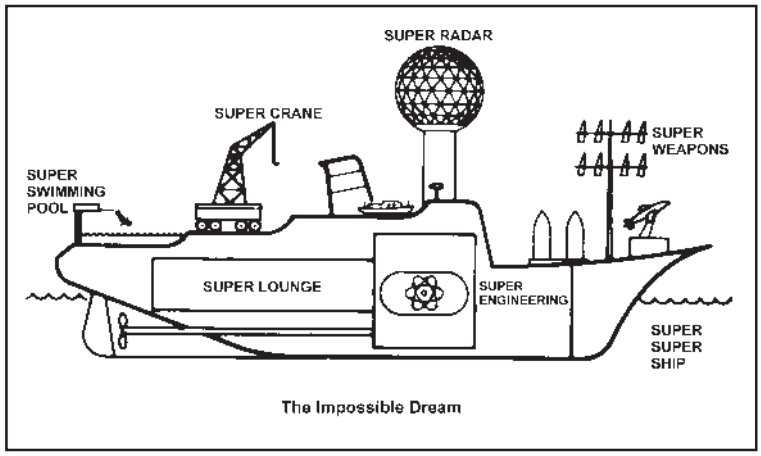
[But they wanted an off-the-shelf solution!]

Ah, yes. The "brochure approach" to requirements writing. We read all of the brochures, then pick and choose the features we want. What could be simpler? This may not be a problem when you have the time and money to develop the product you want, but it won't serve you well if you are trying to work within strict schedules and budgets. It is like specifying a Ferrari with the characteristics of a pickup truck.

Oh, horror —
The Impossible Dream (Man of La Mancha Requirement)

"The system shall defeat all current *and future* threats with a 99.9 percent probability of success."

I may be dating myself with the reference to the musical, "*Man of La Mancha*," but the hit song that came out of that show was "*The Impossible Dream*." The message here is, we all want the best we can get, especially the people who actually have to use the system (and possibly fight with it)...but we have to work within the realm of possibility.



The Impossible Dream

Oh, horror —
The "We seem to have lost the bubble" Requirement

In the middle of an SOR for a new computer you find the following:

"The computer desk shall be grey in colour and have two bookshelves."

We don't always realize we are doing it, and this is but a very simplistic example, yet requirements like these have a way of finding their way into SORs more often than you might think. They can become monsters unto themselves, obscuring what it is we are really trying to specify. This SOR was for a computer, not a desk.

Some Useful Tips

So how should we structure requirements? The following is not an exhaustive list of points to consider, but it should help:

Tailoring Requirements

To tailor or not to tailor — that is every project's conundrum. If we tailor our requirements to meet what is available (or to ensure enough bidders), do we lose the ability to later make system improvements or fill gaps in capability? If we don't tailor requirements, can our project succeed?

With the modern realities of limited budgets and the desire to buy COTS or MOTS (commercial/military off-the-shelf) equipment, the temptation or pressure to tailor requirements is a fact of life. But in making that decision we have to consider what it is we gain and lose. Can we live with the compromises? Will they still fill the deficiency we are trying to close? Or will the lack of compromise jeopardize our project due to not enough money, or not enough time, or not enough personnel to manage a more complex project? There used to be a saying among requirement staffs that "One hundred percent is the enemy of good enough," meaning that it is the last few requirements that usually cost the most. In other words, that final ten percent could add 50 percent to the price.

Product vs. Work Requirements

Requirements can describe the product or the service (work). However, the product definition and the

work definition should not be in the same place. That is why there are SORs and SOWs. It is amazing how often we get work and product mixed up in requirements documents. A Statement of Requirement should never specify how the product is made or demand a deliverable. Similarly, nothing that could be construed as describing the product should be found in a Statement of Work.

Ways to Achieve Performance

Be realistic. Make the required performance realistic to the scenario. I recently saw a criticism of some military equipment because it would not operate at –50°C. Then I thought, what soldier is going to be fighting at 50 degrees below zero? At that temperature, soldiers on both sides of the battle are just trying to survive.

Think about how you will verify the performance. Every requirements statement must be verifiable. If you don't think about this when you are writing the requirement, chances are it will not get properly verified.

Make the performance requirements consistent. Consistency is important if you want an integrated and useable product. In the above analogy, it is no use specifying a –50° requirement for one part of a system if you aren't asking for it for the entire system.

Make the performance statements meaningful. Does the requirement really contribute to the overall effectiveness of the product, or is it only in there as a filler or, more often, to rule out one or more viable candidates? Trivial performance statements more often than not lead to the most controversy, and are the ones you will spend the most time defending.

And finally, make sure the requirement states what you *need*, not what you think you want. There is a difference. It may be better to present the problem rather than your perceived solution, and let others (engineers, contractors, scientists) figure out what you need to solve the problem.

Ways to Achieve Precision

There can be too much precision, but a certain level of precision is essential in our requirements. Here are three things to keep in mind, and two questions to ask yourself in formulating a requirements statement.

Remember:

- use measurable quantities;
- use quantities that make sense in the real world; and
- use measurable, precision statements.

Ask yourself:

- Does the decimal place make sense or is it too precise?
- Will you refuse to accept the product if it does not precisely meet the requirements you have specified?

Some Good Requirements

Good performance requirements have the following four characteristics:

- a clear, unambiguous performance statement...
- against a measurable target...
- with a defined and measurable precision...
- under a defined set of conditions.

In Summary

Requirements are fundamental to your project. In the classic project management triangle — *cost, schedule, performance* — performance, which is represented by the requirements, must be known before an honest estimate of cost or time can even be thought about.

Poorly defined requirements ensure that you will not get what you want or need. I guarantee it.

Understand the difference between product and work requirements. Keep these two separate and clear in your mind.

Decide what is realistic. Realism is what really counts. The unrealistic will never get approval (nor would you be satisfied with it).

Concentrate on the important things. Think about the criteria your end users will use to determine if your procurement was a success or not. For the operators switching on the system for the first time, the issues of how much it cost and how long it took to put in service will be largely academic. What they want to know is, did they get the right product.

If we did it right, I'll get my ship and you'll get your airplane. Just like we pictured it.

LCdr (ret.) Gord Forbes retired from the Canadian navy in 1988 after 27 years' service as a Maritime Surface officer and, later, as a Maritime Engineering combat systems engineer. He has worked in the defence industry as an engineer, consultant and project manager, and in June 2008 retired from SNC-Lavalin Defence Programs as the in-service support project manager for minor warships (maritime coastal defence vessels) and auxiliary vessels. Gord is a certified Project Management Professional (PMP).

2008 MARLANT Naval Technical Seminar —

The East Coast's "Short Answer" to the Nine Minute Writing Challenge

Introduction by Brian McCullough,
Production Editor, Maritime Engineering Journal

If you happened to read the last issue of the *Journal*, you will be aware of the on-the-spot writing challenge that was put to attendees at the 2007 MARPAC naval engineering seminar in Victoria. In honour of the *Journal*'s 25th anniversary, I had asked people to write down their best memory of working with the navy...which they did in fine form.

Well it's the East Coast's turn this time. At the spring 2008 naval technical seminar in Halifax I asked people to write about their "most memorable naval technical challenge." Not surprisingly, they too came through in style, especially considering they had only (wait for it) *eight-and-a-half* minutes in which to write their marvellous Nine Minute stories. (A case of regional one-upmanship? Bad time-management on my part? We'll never know.)

My thanks to LCdr Helga Budden for sharing with me the delightful task in Halifax of reading these 71 fine stories over the lunch hour and selecting three that stood out in their own special way. The two winners, **LCdr Dan Riis** and **PO1 (ret.) Ken Berry**, were on hand the next morning when the book prizes were handed out, but we had to chuckle when **SLt Emil Schreiner**, the author of the Honourable Mention essay he called "Simply Showing Up," uhh...simply did not show up for his own book prize. Of course, he wasn't aware he'd won anything, but you have to love it.

Essay winners LCdr Dan Riis and PO1 (ret.) Ken Berry with yours truly on the front steps of the Canadian Forces Maritime Warfare Centre in Halifax.

Back in Ottawa, Bridget Madill and I once again had our work cut out for us in the cipher room, divining some of the more runic glyphs being passed off as handwriting. In one case I actually thought someone had slipped a vibration analysis trace into the story pile, but no...on closer inspection this too turned out to be a "handwritten" anecdote. Anyway, all this to say we did the best we could. We enjoyed the stories very much, and sincerely hope you will as well.

Let the stories begin....

Most memorable naval technical challenge

The Winners...

Winner

Big Technical Challenge

Was first and foremost the implementation of MORPS (Maritime Other Ranks Production Study) in 1985. I went from being a radar tech to a tactical tech overnight, complete with the challenges of Fire Control and Electronic Warfare systems. Training was provided, but experience was lacking. It was a very steep learning curve for a PO2. But this experience and challenge prepared myself and many others for the changing technology of the CPF and TRUMP programs – this challenge has helped in many aspects of my career, some examples being duty tech packages, working at various positions within CFNES and FMFCS. Although it was the greatest challenge, it was positive and built experience. — **PO1(ret.) Ken Berry**

Winner

My Own Serious Error In Engineering Judgement

My greatest technical challenge resulted from my own serious error in engineering judgement, followed by being bailed out by my exceptionally skilled engineering department. Having authorized the repair of the constantly leaking CRPP (controllable reversible pitch propellers) hydraulic system while in a work period in the Gulf in *Algonquin*, I failed to provide adequate oversight of the work being done by the foreign contractors. New hoses were installed which were discovered to not nearly meet the pressure requirements of the system. When one blew the first day at sea, we lost a shaft line – and it was only then that we discovered all fittings had been changed to metric so the old leaky hoses/fittings that we had kept were useless. It was a very ashamed EO briefing the Capt(N) that day, and a very high priority request sent ashore for the properly rated hoses. Faced with several days without the port shaft in the Gulf off Afghanistan, my engineers set about manufacturing a repair. Several hours on the lathe and in the machine shop resulted in high pressure fittings which adapted metric to standard threads and fittings and a repair was made that returned the shaft to full operation. Several nervous days later the correctly rated hoses were installed. An important lesson in oversight and configuration management learned the hard way – but it could have been worse. — **LCdr Dan Riis**

Hon. Mention

Simply Showing Up

As an extremely junior NTO undergoing Phase VI Afloat training, the single most important contribution I have made is simply showing up. The importance of just being present has been reinforced in me countless times. At the oddest times, I have learnt the most important things. It is hard to "try and learn" something, but is much less hard to learn when others around you are learning as well. Being present at general shipboard learning experiences, for myself, for the most junior stoker or for the EO himself has made me realize that the single most important thing I can do is simply show up. For myself, and for others. — **SLt Emil Schreiner**

...and more Great Writing

Acquiring the necessary skills

My most memorable technical challenge has been acquiring the necessary skills to become an NTO. Since I am at the start of my career, I have been in the training environment. Although at times it can be frustrating since all I want to do is my job. On the other hand it has been a challenge to complete an engineering degree and all the training on shore and at sea. This training although challenging will give me the necessary skills to excel at my profession and thus is my most memorable moment to date. **—Anon.**

Troubleshooting the KH-1007

I remember troubleshooting the KH-1007 on *Charlottetown* for weeks in the North Atlantic trying to find the reason for radar video shifting. After many, many hours of brainstorming with the entire team, we found that a breakdown in the cable shielding had allowed EMI leakage from the SPS-49. This leakage affected the azimuth clock pulse (ACP) which in turn affected the radar video. The radar pedestal and cabling were regrounded and the problem repaired.

— CPO2 Lenihan

"Borrowing" New Technology

In 1991 Iraq invaded Kuwait. The rest as they say, is history. The Canadian Government's response was to deploy a task group consisting of HMCS *Terra Nova, Protecteur* and HMCS *Athabaskan*. As the navy was in the midst of a rebuilding program — the Canadian Patrol Frigate — a number of new weapon systems were being purchased as part of this program. At the time, two of the three deployers lacked defensive and offensive capabilities to allow them to fight a "modern-day" war. It was decided to "borrow" some of the new technology and "strap" it on. I was attached to HMCS *Protecteur* as one of four CIWS maintainers — newly trained with no experience. It was our job in conjunction with FMG & SRU to install, test and operate this "new" weapon system.

— CPO1 Fewer

Removal of Port Propeller during HMCS *Saguenay*'s NATO Deployment (1986)

I was an OS when, during NATO, our ship was hit by a German submarine at sea while it was trying to surface. It damaged our #10 [fuel] tank and port prop. The ship was jerking at high speed. Therefore, it was decided to remove the prop underwater, where explosives had to be used to remove it. This operation was all done in Haugesund, Norway in late November, early December 1986. As the prop was removed and in order to keep weight balance on the ship, it was secured and welded on the port side of the AX (quarterdeck) next to the mortar well covers. The ship was now ready to come back to Halifax, but because of rough seas, the CO decided to use a south route which took around 10 days to complete. **— PO1 Laberge**

Taking Ownership

...being involved in a BOI (Board of Inquiry) while deployed on the other coast and the procedure and outcome and its effect on all involved. Also, the changes that were made to ensure this event wouldn't happen again. Taking ownership of an action that occurred even when you're not on scene when it happened! **— PO1 Luxton**

(Keep going. There are more...)

Objectives of the Maritime Engineering Journal

- To promote professionalism among maritime engineers and technicians.
- To provide an open forum where topics of interest to the maritime engineering community can be presented and discussed, even if they might be controversial.
- To present practical maritime engineering articles.
- To present historical perspectives on current programs, situations and events.
- To provide announcements of programs concerning maritime engineering personnel.
- To provide personnel news not covered by official publications.

Most memorable naval technical challenge

HF System Repair

While working as a naval communications technician on board HMCS *Iroquois* I had the opportunity to repair the ship's HF system. This seems like a straightforward task but the situation was very unique.

I was deployed on NATO '99 and the *Iroquois* had been given an extensive comm suite upgrade in order to sail as the task group command ship. In order to learn the systems that had been upgraded the master seaman in charge of me had proposed we split the systems. I would be the SHF guy and he would be the HF guy. Sounded like a good idea.

So now here we are off the coast of Denmark. My master seaman had gone home on leave and we were a week away from one of our two major exercises, when the HF suite crashes! The entire darn thing stops working! After briefing the chief, CSE and the commander's staff I set to work. If I couldn't fix the system, staff had to disembark and sail on another ship. Not good.

I narrowed the fault down to a circuit card and it had to be brought in from Halifax. After much sweat it worked! **— SLt MacMullin C.D.**

CPF Leadyard HMCS *Halifax* CPF-01

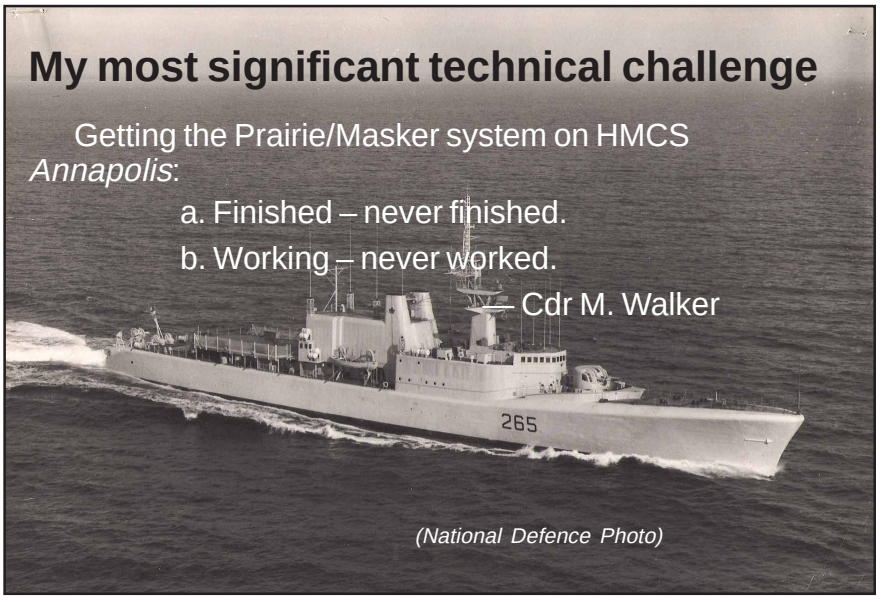
Conduct of the "heeling trial" during builder's trials:

- aim of trial was to ensure equipment would operate when ship was heeled over due to damage
- shipbuilder did not want to do – said it was unnecessary as all equipment had been certified at factory
- was vigorous discussion on jetty between senior shipyard officials and naval mil and civ (a.k.a. "the Scot") personnel
- finally senior shipyard official agreed (reluctantly)
- continued with trial
- when ship went to a certain angle of heel (below the max design) she blacked out electrically
- much investigation revealed diesel generator had ingested lube oil into the fuel system and essentially burned out engine
- final investigation revealed basic design flaw — manufacturer had to redesign
- significant event for CPF program
- resulted in the "Canadian modification"

— **Capt(N) Eric Bramwell**

We Are Not Alone

Undoubtedly when challenged to write on the most technically complex issue I have faced during my 27 years in the navy, it would be too easy to revert to the gas turbine change out in Toulon, France during my dog-watch stint as MSEO on board *St. John's*. However, that was not as onerous as one might suspect due to the drive, determination and like-minded technical people who formed the repair team. Rather I would state that it [could] be any technical issue thrust upon me: from the *Terra Nova*



Gun Feed System

Most interesting technical challenge was dealing with the 3"-70 gun feed system on HMCS *Gatineau*. The system needed constant attention, and ammo feed stoppages were common and frequent. Countless messy and frustrating hours were spent by the NW Tech team fixing shear pins and sprags. But the rewards were incredible. Nothing was better than hearing the gun go "bang" and the smell of gunpowder/propellant after a long day on the range after countless hours of gun repairs the night before. **— Cdr Purcell**

dampers closing on my port boiler at 186 RPM, to faulty turboblower sequential valves, to a noisy rudder on *Fredericton*, blah, blah, blah. It always comes down to one thing – we are not alone. I don't mean the aliens are invading, but rather we have so much talent in and around the navy, no problem is insurmountable if we only just talk to others and ASK FOR HELP! **— LCdr Roger Heimpel**

Most Interesting:

Bringing DCTF (Damage Control Training Facility) *Kootenay* from cold & dark to fully operational during posting as DC Div Cdr (Damage

Control Division Commander). Involved factory acceptance, trials, training development and finally: open for business.

— Randy Comeau

Wire Drawn Steam Leak

I've had a number of interesting technical challenges over the years. The one that sticks with me most occurred when I was the MSEO of HMCS *Ottawa* in 1985. A brand new CO, Cdr Kim Beardmore, had just arrived on board as we were sailing from Halifax on a six month NATO SNFL deployment. I recall telling the CO, unwisely as it turned out, that the warranty expired at Chebucto Head.

Sure enough as we were leaving harbour the port main throttle valve developed a wire-drawn steam leak. This was a show stopper. There was no way we could let it continue to wire-draw.

So up to the CO, standing proudly on the bridge, to tell him we had to turn around and head for home.

My guys turned to with FMF and we changed the valve in only two days, got back to sea and still made our SNFL rendezvous on time.

Talk about first impressions!

— Capt(N) Jim Jollymore

Fire in HMCS *Chicoutimi*

By far my most challenging problem was the work on determining the cause of the fire in HMCS *Chicoutimi* that resulted in the death of Lt(N) Saunders. Conducted under the spotlight of the media, and with intense political pressure to move quickly, the results of this work would have significant ramifications: the future of our submarine fleet. Many leapt to conclusions and wanted to quickly lay blame; however, we worked very hard to complete a detailed fault analysis and to ensure that every aspect of the problem was investigated. Using experts from various fields, we conducted research in DC power generation; electrical insulation; smoke hazard; fire analysis; and many other areas.

I am proud of our results and the detail we presented in the report; and our efforts to remember Chris Saunders.

— Pat Finn Capt(N)

Cross Connect Gearbox Inspection

The most interesting event in my illustrious career as an NTO with almost one year sea time would undoubtedly be the inspection of *Halifax's* cross-connect gearbox. FMF gearing inspector Bob Steeb flew to Hamilton, Ontario to meet the ship on a Great Lakes deployment. No great discoveries were made, it was not an event worth being captured in the *MARE Journal*. However, for me [it was] a chance to do a hands-on job and to learn. To learn from doing as opposed to studying and to learn from years of experience. As mentioned, the engineering community learned nothing from this inspection, but it taught me a lot.

— SLt Phillip LeBlanc

Happy Times @ Sea

This story was already printed in the *Journal* circa 2000 [Fall 2001 / Winter 2002 issue. – Ed.]. Then it detailed my personal experience as the exchange officer with the USN as Supervisor of Shipbuilding Pascagoula, Mississippi. As a new exchange post and first-time Canadian integrating into a US Naval Team, working in a very large US civilian shipyard there were many lessons to be learned. A new country, a new culture and a sizeable difference in navy size, scope, mission, resources, etc.

Major challenge was learning the AEGIS program management, being responsible for the build of a warship as the USN overseer and then moving up to become the production officer for the USN's project on site.

The technical aspect grew in complexity when Flight 2A ships were announced that would incorporate the addition of helo hangars to an existing *Arleigh Burke*. The first of class was built and integrated during my watch. "USS *Roosevelt*" (DDG-80) rendered numerous technical challenges of bringing a design to fruition in a cost conscious environment. A real navy success story that was instrumental in my development and experience.

— Capt(N) Paul Catsburg, D Mar Pers

Preparation of Ships for Deployment to Persian Gulf — Op Friction

Responsible for installation of deck cranes on 3 ships and RHIB boats. Foundations had to be designed, fabricated and fitted to ships over several days. A mortar well had to be closed in. Cranes were acquired, fitted and STW (set to work). We worked around the clock and took decisions as required — technical, financial, configuration, etc. Coordination of simultaneous work to fit CIWS, etc., to load ammunition (special dispensation to do in dockyard), restricted ability to do hot work. It was a successful evolution that remains a strong memory to this day in teamwork and intense cooperation by all, making this a particularly inspiring experience.

— Cdr Ken Holt

(Don't stop yet. There are plenty more mini-essays ahead...)

Most memorable naval technical challenge

What It Means To Wear Our Uniform

Unfortunately, my most memorable technical challenge does not come to mind at the present moment. I think however it may be rewarding for many of us to ask ourselves what it means to be in the navy and what it means to wear our uniform every day. Do we really understand what the values associated with representing the most senior service are? Do we appreciate what the navy has done for us? The navy has enabled us to create relationships with people from everywhere in this country. It has enabled us to feel passionate about our work, our ships, our people and even ourselves; it has enabled us to discover things about ourselves that were completely unknown; it has taught us teamwork, leadership, friendship...and it has done so all over the world.

— Cdr Simon Page

Tech Challenge

The most memorable tech challenge I have faced in my career was preparation for the unknown. In the summer of 2001 I was posted to HMCS *Charlottetown* as the CSEO and was looking forward to my HoD (Head of Department) tour. The ship was just coming back from a 6-month deployment so I was not expecting any major issues or deployments in my tour, but that was OK, I was the HoD! Much to everyone's surprise and dismay, Sept. 11/01 happened and we were given word that we were deploying in 30 days. The problem was, although we knew when and roughly where we were deploying, we did not have any idea of what the mission would be.

It was more of a leadership challenge than a technical one, but thanks to the GTO (Group Technical Officer, then Cdr Smith) we were able to work through it. Thirty days can seem like an eternity for some things, it was light-speed when preparing for an unknown deployment. In the end, strong leadership within both the technical and MARS communities led us through.

— LCdr R.T. Billard

My most interesting technical challenge in the navy

I've had a number of these, some on the macro scale and some on the micro. I could write about my role in the development and implementation of "first-of-kind" tools in support of the materiel certification of submarines, or running battles on some of the evolution of this very fine mechanism for assuring the safety of our submarines. Instead, I will focus on the micro...my time as a submarine CSE — specifically while at sea in the latter part of '05 doing workups and inshore ops with some other elements of our own navy and the USN off the eastern seaboard and southern N.S. [Nova Scotia]

In submarines, there is one radar usually while dived — a KH-1007 with a telescoping mast. The waveguide runs from the port aft control room out to the scanner head atop the mast. After days of rough weather, we started to notice anomalous operation of the mast — not that we use radar much in a dived boat. After a few days, we started getting drips in the control room.

We surfaced to discover the scanner head had been ripped off. The repair proposed by CPO2 Cam MacDonald, our CERA, was to pack the waveguide holes with liquid metal — Belzona. We dived, tested the repair and got on with business until the next planned port.

— LCdr Keith Coffen

Tour in HMCS *Iroquois*

As a junior officer in the navy, I have had little opportunity to experience many technical challenges, let alone interesting ones. That being said, my tour in HMCS *Iroquois* as a Phase VI CSE, specifically while sailing on NATO operations in the fall of 2006, presented the most interesting technical challenge.

The aforementioned was my first operational tour. Not only was it a privilege to be a part of it but it was also incredibly exciting. It was difficult at times to focus on work with so much to experience; beautiful ports around every corner, an international fleet of ships sailing together, and the fact that we were in the Mediterranean!

My CSEO kept me on my toes with pre-boards every other day which was a challenge in itself. A specific day I remember was when we were sailing off the coast of Greece. My family being of Greek origin, I could not focus on work at all, spending my time on the bridge looking at the islands. I was offered a flight in a Sea King and before getting suited up I went online and found the GPS coordinates of the village in which my mom was born. The pilots were nice enough to fly me over those coordinates, open the rear cargo door, and take a few pictures from the air. Needless to say, I had not studied at all and my CSE was expecting a board. When I explained, he smiled and offered a short extension. **— SLt Raphael Liakas**

From TRUMP to CPF

As a former Naval Weapons Technician, I was trained on the equipment for the 280 TRUMP class ships. Once I left the *Iroquois* to attend my NWT 6A course at CFNES I was confident I would return to the *Iroquois* or *Athabaskan*. (Once you go TRUMP, you die TRUMP, right?) To my surprise I was posted to HMCS *Charlottetown* upon completion of my course...a CPF!

My most significant technical challenge was to familiarize myself with an array of weapons systems for which I had no formal training, for example, the 57-mm gun, the CAN-

Most memorable naval technical challenge

Combat Camera photo
ET 2003-0316-66a
by Cpl Charles Barber

Blackwater Treatment Plant Cells Explode

My most memorable technical challenge in the CF was as a young sub-lieutenant posted onboard HMCS *Regina* in 2003. The situation was that two book cells for the blackwater treatment plant exploded. I was selected to be the investigating officer for the technical investigation. Without getting into too much detail about the actual incident, what made it so memorable was the fact that I was still so green and I was put into responsibility to use my technical ability to create a conclusive report. In hindsight the actual TI was peanuts but it is my most memorable. **— Lt(N) Francis Leung**

TASS, Harpoon and GMVLS Sea Sparrow systems. A challenge, but a rewarding one nonetheless. By reading technical pubs and talking to my fellow NWTs and asking lots and lots of questions, I was able to gain confidence with these systems.

— A/SLt Jon Hopkins

The Next Two Years

My most technical challenge in the navy has not yet arrived, but will shortly start, as I prepare to go back to sea as a Head of Department. After five years ashore, working in recruiting and CFNES, as well as raising two young children, I now feel that this next two years will be my most challenging ones.

— Lt(N) Bélisle

Algorithm And Software To Model Missile Engagements

My most interesting technical challenge to date came as a junior officer under training while employed at DRDC(A) for the summer. I was working in operational analysis and was tasked to design an algorithm and develop software to model missile engagements. This software would be used to analyze the projected improvement of various engineering changes in areas such as signature management and to determine the expected improvement in the ship's ability to defeat an attack. This was a great opportunity, as a junior officer, to be exposed to an area beyond my normal employment opportunities. It was interesting technical work and served to greatly expand my horizons.

— Lt(N) Brian Mury

Fault in the MTTU of the STIR

My most technical challenge in the navy so far has come not as an NTO but when I was an NET(T) (tactical technician). It had to do with a fault in the MTTU (multiple task track unit) of the STIR fire-control system. It proved to be a problem with five different cards within the unit. The five different cards failed due to a possible power spike but this could never be fully confirmed. The reason it was the most challenging is the problem was never seen before and even a phone call to FMF did not shed light on the problem. Also the MTTU of the STIR is one of the most reliable units in the system and problems with it are very rare. It took many days of fault finding, reading manuals and the input of the whole NET(T) department on board HMCS *Fredericton* to bring a successful conclusion to the problem.

— SLt Sorensen,
NCS Eng Student

Variety of Individuals

Having joined the Canadian navy as an ordinary seaman stoker and serving over 28 years in all classes of ships, submarines and shore establishments on both coasts I have had the opportunity to be part of many efforts, projects and outright larks. Throughout this time I have experienced these events from various perspectives as my role evolved within the organization. Without a doubt, the greatest part of all this was the variety of capable and unique individuals who continually rose to the occasion to overcome difficulty and turn challenges into fun and memorable experiences.

— LCdr Pierre Boucher

(Turn the page for even more of these great snapshots of technical life in the navy...)

Most memorable naval technical challenge

Most memorable Technical Challenge

...repair & clean-up of a bridge flooded at sea through a broken window by a rogue wave (with some fire-damaged equipment too!).

As the Chief Electrician — make the bridge equipment work again for the rest of the still-long deployment time, & you guessed it...Now or right away (ASAP)...even after SALT-WATER damage to sensitive electrical/electronic equipment that would normally be written off.

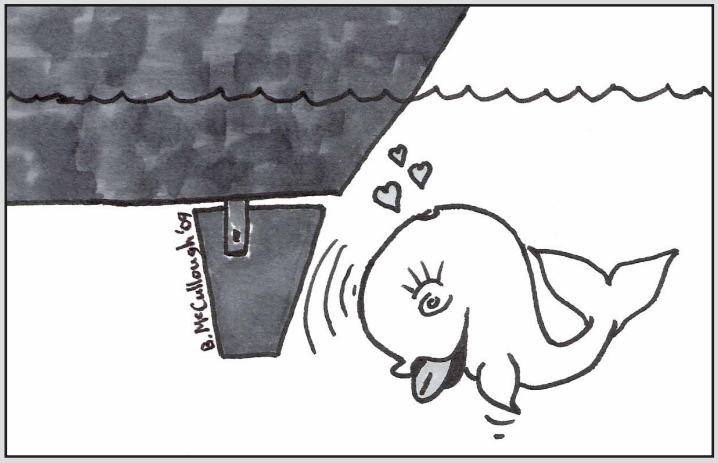
The biggest technical challenge really was picking the people resources and convincing them that it could be done. Although the electronic equipment clean-up was difficult, it was not the most inspiring or rewarding outcome that saw the light in the end.

— **Anon.**

CSE Tackles MSE Problem

In 2002 I was employed at DRDC Atlantic in emerging materials. I needed summer employment so I asked them if they needed a computer guy. John Porter said, "Sure, we never had one before!" So I worked as a CSEO in training surrounded by MSEO stuff. MCDV was experiencing hull cracking and the engine raft was cracking as well. NETE collected massive amounts of strain gauge data and dropped the whole bunch on my lap. John indicated, just use Excel and use graphs to figure out the problem. Then they all went on leave for two weeks. Using my programming skills, I modelled the data in real time, showing how the raft was experiencing strain. I was able to use CSE technology to assist in an MSE problem.

— **Lt(N) Shawn Ellis**



La Baleine (The Whale) — Steering gear jump ring clearance & hydraulic oil X-contamination with seawater

AHoD *St. John's* — FISHPAT somewhere off the coast.

Every once in a while the rudder stock would make a noise that sounded like a whale in heat in the depths of the sea — only when passing through helm movements in or about midships position.

We had no idea. We did know we had cross-contamination at the same time, but the two were coincidental. With proper maintenance the clearance of the jump ring and rudder stock assembly was silenced, and the hydraulic oil flushed and changed.

Solution: We had to record an MP3 of the sound and e-mail it to FTA (Fleet Technical Authority) for guidance and prebriefing on what to expect. **— Anonymous**

First Principles and Some Hard Work

It was as part of the run up towards refit where I had my most interesting challenge. Before heading out to pre-refit trials, HSI (Hot Section Inspections) were required for both main engines in *Iroquois*. Of course, with the OPSCHED, this task was embarked upon and so straddled over the Christmas/New Year's break.

After Christmas with four working days (Thurs.-Sun.) we were still unsuccessful in starting either port/starboard main. The troubleshooting and teamwork that unfolded were incredible! The CERA (CPO2 Bob Polvi) was set up in the MCR with the engineers and control techs. A whiteboard was set up. On the board he wrote what we knew and what we didn't. In the end, it came out that both engines were exhibiting the exact same symptoms — impossible.

So with a "what do you need to start a gas turbine," off they went. First principle troubleshooting with a pen and a whiteboard. The CO was briefed that it was down to four items that all could be replaced. A few more hours and the problems were found. Teamwork, first principles, and some hard work and off to sea we went. To have a team to put a ship to sea was an incredible experience.

— LCdr Helga Budden

Most memorable naval technical challenge

HMCS *Margaree* – NATO 1991

While it may not be the most technical memory of my naval career, it is one that resides with me and has for years.

We had just completed fuelling ship in the Azores as the Canadian ship representing the Standing Naval Forces Atlantic Fleet during the Persian Gulf War. A consequence of the war was the requirement to search the hulls of all ships for potential enemy or terrorist mines. We were berthed inboard of an *Oliver Hazard Perry* class American destroyer, and they, without a ship's dive team, required the services of our dive team to search their hull. After they completed a diving safety checklist, ensuring that all our auxiliaries were shut down, our dive team commenced a hull search. I had just completed fuelling and as the A/HoD I was responsible for checking over the side for burped fuel (as the steamers were known to do this), and as I looked over the starboard side a Canadian diver surfaced announcing a diver was down – sucked up into the condenser circ pump inlet. The Americans failed to confirm this during their checks. The end result, two good divers drowned from HMCS *Margaree's* dive team and an entire ship's company impacted.

— LCdr Trevor Scurlock

Mini-Refit Disguised as an SWP

I was the Engineering Officer of HMCS *Cormorant* and it had been rumoured the ship was being paid off in two years or so. Once formally announced, the priority for getting work done on the ship would fall even lower than it currently was. There was an SWP (short work period) scheduled starting in a few months. The challenge was to get a mini-refit for the ship under the guise of an SWP. My senior techs and I sat down and assessed every major system and developed a list of priorities for the work. Then we looked at how much the ship staff could do to reduce the workload on the FMF. Then we looked at scheduling this work to allow the ship to work in some manner. An amazing amount of repairs were accomplished. This effort allowed the ship to sail without major problems for another two years.

— LCdr Wade Temple

Perceived Professionalism

I have been in for two years, joined as DEO (direct entry officer)....I have been in training for all of those two years.

I have 2½ weeks of sea time and can honestly say that I have not experienced a real technical problem since I've been in.

Perhaps the biggest struggle for me was putting aside my drive for results and replacing that with time spent learning material I already know. Also, replacing that drive for results with the drive for perceived professionalism.

Perceived professionalism is doing what is expected, even if better results can be obtained in another less professional manner — it's kinda hard to explain with little time.

During course presentations, I was told to not get caught in the weeds, however I find that those weeds also exist in professionalism and mannerisms. **— [Name withheld at editor's discretion.]**

1st Multinational Civil/Military Co-operation Group – Bosnia

[My most memorable tech challenge? The question of what was my most technical challenge while in the navy...and to do this in under 10 minutes!]

I've had a lot of technical challenges from many different perspectives, all having their own difficulties to overcome. At the end of all the challenges, the most technical would have to be the one that was not with the navy. It would have to be my time spent in Bosnia.

You ask how does a "fishhead" serving with a UK air force officer in an army environment face technical challenges? Well, imagine trying to build business cases to "sell" NGOs on the need for funding for special projects, but not being able to talk directly to the individuals [looking for funding] because of the language barrier, and having to deal with technology from a communist era...after a war...and following each project through to completion...

Non-technical, you say? Well a wood shop / welding shop / technical school were all tech projects.

— C. Grant Heddon

Potable Water Maintenance

An ongoing challenge which is carried on by many of us as stokers (and yes, this is a personal pet peeve of mine!) is potable water maintenance. Starting on *St. John's* 4-5 years ago, I began looking at the training we DO NOT receive in this fine art. As an engineer with Public Works for a municipality, a person is formally trained with years of experience and a degree of legal responsibility. We, as the navy, leave the safety and quality of our water supply in the capable hands of an 18-19 year-old OS with as little as a grade 10 education

I have expended a great effort and personal financial obligation in the hope of instilling in the department on *Halifax* the importance of this. Fair or not, this is our responsibility, our dilemma. **— Pat Devenish**

(Need a break? Why not have a read of Hugues Létourneau's fascinating book review on page 28, then come on back and pick up the stories at page 16.)

Most memorable naval technical challenge

Detection System

My most technical challenge in my naval career thus far has been the freon detector in the *Kingston*-class ships. The detector was not detecting small freon leaks occurring over extended periods of time. My task was to improve the detection system by either moving the detector, or putting in a new detector with more or improved sensors. **— Anon.**

AFFF in My SPS-49 Radar

The MSEO and his band of fire fighters were "testing/trialling" the fitted dry pipe system on board. The plan was simply to bring pressure to the system until AFFF (aqueous film-forming foam) appeared at the end of the line. On completion the "trial" called for blowing out the system with LP air. Unfortunately, after successfully trialling the system (and I guess due to the satisfaction of this) the team forgot to completely de-isolate the dry pipe, so that when the LP air line was connected to blow out the system, AFFF and sea water was forced back through the LP air system...Can you guess exactly how many systems are fed by LP air onboard? I unfortunately no longer have to guess...and yes, the SPS-49 waveguides use LP air as part of the air dryer system...

— LCdr S. Curran

Super-Heated Steam Leak

While EO of *Preserver* in the Adriatic Sea, we developed a superheated steam leak on the superheater header drain line. The steam was impinging on the casing and the risk was that the leak would grow, causing the loss of the boiler or, if left unresolved, a serious safety hazard. The solution arrived at with the collaboration of the main propulsion petty officer, CERA and myself, was: clear the outer surface of the pinhole with a small rotary grinder; pack with Belzona (liquid metal); wrap with grey fibrous material (asbestos); fabricate a large area piece of sheet metal as a backing plate; install four jubilee clamps...and problem solved. Obviously this was done when not under pressure.

Repair worked perfectly for remaining five months of deployment until properly repaired by FMF *Cape Scott*. **— LCdr Craig Bradley**

My most significant technical challenge

"Introducing" and implementing the necessary safety and environmental changes at FMF *Cape Breton*.

This involved changing cultures, attitudes and approaches to safety and environmental issues, developing solid and achievable implementation plans and finally, building the necessary internal and external relationships to ensure unit successes and goals. — **Cdr M.W. Batsford**

Largest Technical Challenge

HMCS *Halifax* at 48 hours Notice for Power with many key systems either disabled or removed. Ship tasked on a SAR (search and rescue), managed to patch most key systems together and deployed in approximately 3 hours of receiving tasking. Ship left without vent system for heads — i.e., NO operational heads. Had to figure out how to run a below deck vent system from a cut-off pipe to an emergency overboard discharge hull fitting on the fly while travelling at 25 knots.

— Anon.

The Most Callenging...

I am currently completing the Marine Systems applications course. My ship time adds up to approximately six weeks and my sea time to three. The technical challenges I have faced have been in the comfort and safety of my training environment. So, instead of discussing my most memorable technical challenge, I'll briefly mention what I have found to be the most challenging in my career thus far...the length of training. Being a mil col graduate, my training as been spread out over five years. Although I see the need for this extensive training, it makes it difficult to keep your eye on the prize...

— SLt Hartzell

TIC Camera

Using technology of a thermal imaging camera to find the clog of a DG drain line where it is all welded joints and awkward areas. The TIC camera helped pinpoint clog location.

— Anon.

None

None to date in the fleet. Still in training. **— Anon.**

***Sultan* Duty Watch**

My most memorable technical challenge was to undertake duty watch during our training in *Sultan*; the scenario they create and the hands-on practical experience the facility gives us. The time limit, understanding the technical aspects, problem-solving and the bombardment of questions while on the scenario was wonderful and challenging.

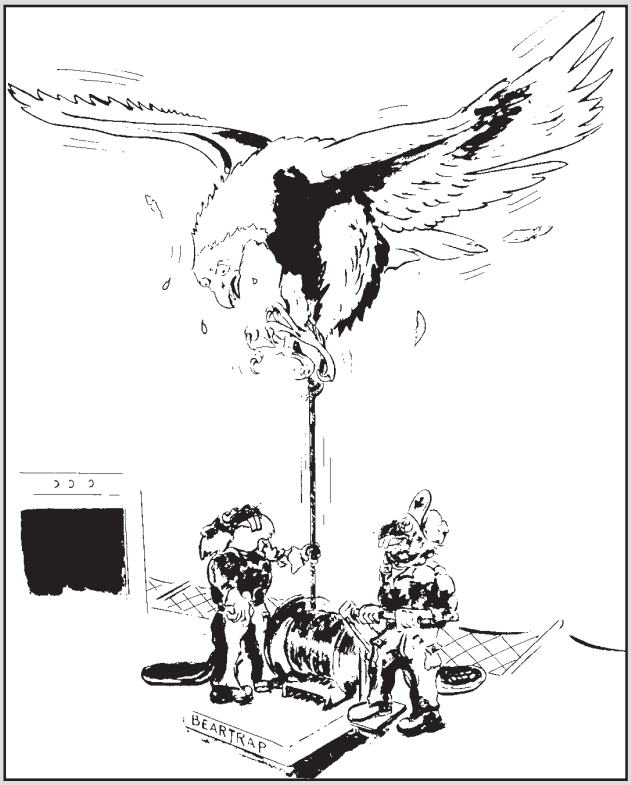
— Anon.

I.T. Issues

Software within the Forces suffers from a nearly perpetual state of obsolescence. During DC (damage control) school we tried to bring in interesting videos that fit with lesson material from previous classes. The videos we brought turned out to be in the wrong file format. We took the videos home to convert their format, but when we brought them back in we found that the version of the file format we brought in was too new for our computer to read. It ended up taking three days to convert the file to a useable format when all that was needed was permission to update Windows Media Player. Maybe instructional computers need fewer locks. **— A/SLt Marasco, NT**

Most memorable naval technical challenge

Beartrapped



As a former NCM I had the pleasure of being flight deck stoker while serving on board HMCS *St. John's*. Having had the course I thought I was prepared to handle anything the job could throw at me. One time while performing maintenance on the beartrap I noticed it would not close. After performing several checks I could not figure out what was wrong. I opened the beartrap up and realized what a mechanical nightmare was inside. Realizing I was in above my head I had to call in FMF to resolve the issue for me.

— Anonymous

Big Sense of Accomplishment

Understanding the redesign required for [equipment name withheld – Ed.], I submitted the research and UCR (Unsatisfactory Condition Report) for it, only to be told...that a "plan" already existed.

I realized that the..."plan" was not good enough. So I pushed and pushed...and eventually was successful in having the...hardware/software changes implemented as per the original UCR submitted two years prior.

It was a big sense of accomplishment to see an essential engineering change be addressed after a struggle with senior engineers...

[Name withheld at editor's discretion]

Loss of Refrigerant

I conducted a Technical Investigation into a loss of refrigerant from the main refrigeration system on HMCS *Charlottetown*. The findings resulted in an addition to the Engineering Officer's Technical Instructions (EOTIs) to help prevent future losses of refrigerant.

— SLt David Pittis

A Call in the Night

I was the UWGTO (Underwater Group Technical Officer) in MOG5 in the late 90s...working long hours to push the O-boats through their last few years of service. At about 3:00 a.m., unbeknownst to me, sound asleep in my home, *Okanagan* was at Emergency Stations, powerless, a few miles south of Chebucto Head. The phone rang and I got out of some deep sleep. On the phone is the EO of the boat on a cellular call broken up by seconds, feeling like hours, of silence. The much broken message is conveyed and it is not good — the rocks are near and we need assistance — is in a nutshell the order of the day that has not started yet. More to follow... — **Anon.**

Most Significant Technical challenge(s)

1. Operational — Unitizing the main propulsion plant to repair "condenseritis" whilst maintaining course and speed (12 knots) in order to continue shadowing/escorting a Soviet task force (one *Krivak* and two *Krestas*) off the West Coast (HMCS *Kootenay* — 1981).

2. Program — I could write a book (some day!) on the challenges and complexities, both technical and program, of the "TRUMP" project.

— Capt(N) Rick Payne

It All Just Seems Like a Blur

My most memorable technical moment...wow! I can honestly say I don't really have any one moment. I've been in the navy for almost 19 years and it all just seems like a blur. I've spent time on steamers, the good 'ole Dirty 230 (HMCS *Margaree*) to CPF HMCS *Halifax*, *Fredericton*, *Montréal* and more; both as an NCM and as an officer. All a blur, the good times of cleaning sprayer tips in the wee hours of the morning to humping shore cables (not so fun really, but I remember all too well).

— CGY

Most memorable naval technical challenge

Courses not Sufficient

My biggest challenge (technical) so far is not related to equipment, but rather, the courses and qualifications needed to be a successful NTO that were presented/delivered to us during various phases of our training. I feel that the courses are not sufficient enough to prepare us when we enter the fleet. I've been told by many of my predecessors that some of the courses are of no or little relevance. I find it frustrating that these issues were recognized, but not addressed.

— Anon.

***Huron's* Gearbox Issue**

Huron's gearbox issue while I was MSEO/NEUP (Naval Engineering Unit Pacific):

• bolts failed and material went through *Huron*'s bullwheel during WUPS (work-ups)

• FSR (field service representative) from [gearbox manufacturer] MAAG brought onsite to repair in-situ

• closed off Engine Room and instituted clean room procedures

• LCdr Mark Sheppard MSEO *Huron*

• involved NEUP main gearing inspector Dick Mills

• several months to repair — did repairs twice

• FOD (foreign objects) found way back into gearbox after first repair

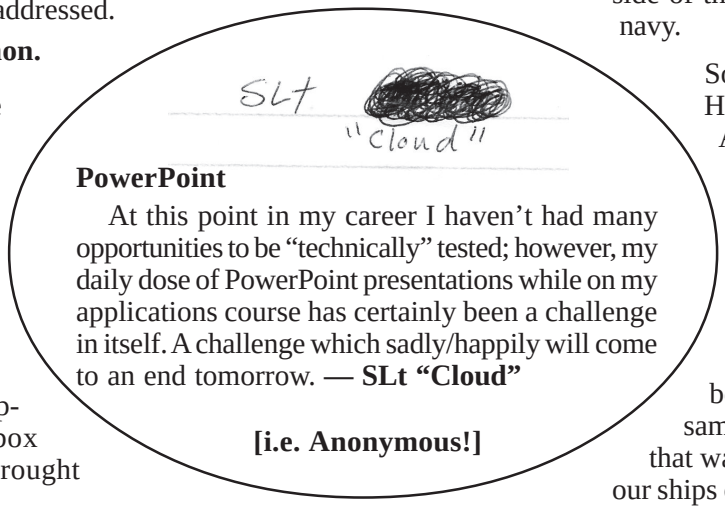
• eventually got it working

• episode resulted in a brown envelope to "*Esprit de Corps*"

• persuaded Capt(N) Sutherland to write a rebuttal that was published.

— Cdr Darren Rich

[**Editor's Note —** In his February, 1999 *MEJ* article, "HMCS *Huron* Gearbox Failure and Repair," Darren wrote: This was, without a doubt, one of the most technically challenging repair and investigation efforts undertaken by the Canadian navy since the superheater header scare of the early 1980s and the turboblower mystery of 1987-88 [see "The Trouble with Turboblowers," *Maritime Engineering Journal*, Jan./April, 1990)]. Discussing the *Huron* incident later, Mr. Jost [MAAG's FSR] said that while MAAG had made similar in-situ repairs for smaller warships in the Far East, this was the first time they had attempted in-situ repairs of this magnitude."]



PowerPoint

At this point in my career I haven't had many opportunities to be "technically" tested; however, my daily dose of PowerPoint presentations while on my applications course has certainly been a challenge in itself. A challenge which sadly/happily will come to an end tomorrow. **— SLt "Cloud"**

[i.e. Anonymous!]

Balancing Duties

As Sensors and Weapons officer for the SNFL (Standing Naval Force Atlantic) fleet while balancing these duties with that of CSEO of the flagship. **— Cdr G.E. Bannister**

Three Challenges

1. Conducting/monitoring DWP (docking work period) work at HSL (Halifax Shipyard Ltd.).

2. Discover a crack on a fuel tank, taking appropriate measures to mitigate the risk of the crack while deployed, and come back to home port with the exact fuel status required to conduct repairs promptly.

3. While deployed on humanitarian relief mission, explore options to produce fresh water while at anchor for extended periods of time. Contacted FTO (Fleet Technical Officer), DA (Design Authority), etc., to determine capability of RODs (reverse-osmosis desalination) system and implement mitigating measures.

— Anon.

Attitude

Incredibly cold day of December. I just came back from Quebec City on vacation where I had been told how useless the navy/military was. A pretty sad week seen from my side of things as I was part of that navy.

So that day was the return in Halifax of HMCS *Toronto*. As I was standing on NB jetty, looking at all those people who did not think that our navy was useless, I suddenly forgot all about the comments from Quebec as I saw the ship appearing in the harbour and was filled with the same pride as everybody else that was there. There was one of our ships coming back home.

— Lt(N) David Roberge, CFNES

***Protecteur* Post Refit**

Assisting in getting *Protecteur*, at 37 years young, put back together post-refit to the point that she's capable of sailing to the Gulf and around the world. **— Lt(N) Mooney**

Satellite Communications

The most challenging — and funny — was perhaps ensuring satellite communications were consistently available during a six-month deployment in the Med. Amongst these, was making sure the darn satellite TV was available for the crew and the Commodore at all times. The real challenge was coming with valid explanation as to why SAT TV was not available...Oh what fun.

— LCdr Chouinard

Most memorable naval technical challenge

Satellite Connectivity

As an NCM communications tech I installed several INMARSAT systems prior to NERA-B becoming mainstream.

MARLANT thought the INMARSATs were not capable of connecting to the Internet at any data speed and were weighing their options. Our ship advised MARLANT that we had been doing e-mail on NATO and were unaware of all the problems with other ships.

I created an SOP and faxed it to several ships, took many calls at home via INMARSAT from ships deployed and briefed MARLANT staff in Halifax.

It was a great feeling to accomplish a fleet-wide goal through shared teamwork across platforms.

— Lt(N) Terry Moore*, CFNES

[*An MS NET(C) at the time.]

Combat Systems Engineering Applications Course

Surviving the NCSEAC Naval Combat Systems Engineering Applications Course. While not necessarily technical it certainly is a required hurdle.

— Anon.

The 2049 Tech Console

Sitting down at the 2049 console watching the star flashing about 15 times an hour. It was pretty demanding and challenging. During that time, I felt like I was an integral part of the Canadian navy.

— SLt Irvine

Urgent Recertification of RHIB Davit in a US Port

While as the HoD in *St John's*, we were on deployment to conduct the first operational acceptance of the ESSM (Evolved SeaSparrow Missile).

We were in consort with *Iroquois* and *Halifax*. *St John's* had not only been designated as a firing ship, but was also the recovery vessel (range could not provide), data collection [ship] for the entire fleet, and target launching platform for *Iroquois*.

In order to proceed on the range we needed to have at least two methods of recovering targets. One was the RHIB, the other Zodiac. On our transit to Norfolk for an eight-hour port visit the RHIB davit failed while launching the boat.

My job as CSE was to get recertification of the RHIB davit. We were arriving at 10:00 Friday of a long weekend and leaving about 18:00. Weather prediction was not good so window on range was finite.

Trying to certify a Canadian crane, in a US port with no time for an FTA/FMF TAV (Fleet Technical Authority / Fleet Maintenance Facility technical assistance visit) was a challenge. However with the help of the FTO who was embarked in *Iroquois*, excellent support from FTA; and the tremendous work of the Maritime Systems, Combat Systems and Supply departments, we achieved the mission and miraculously got the davit certified.

While there are many more details, suffice it to say, that what was initially thought impossible was accomplished.

— LCdr Dave Benoit, DCmdt CFNES

Challenging Tech Experience

Bringing a three-ship force to technical readiness for a multiple missile firing in 1999 was a definite challenge. I was the new SSO Combat Systems in FTA and was suddenly responsible for certifying the ships ready to fire. This was my first missilex prep. Each of the ships had varying degrees of technical issues. Through good teamwork, hard work and the dedication of ships' techs, we were successful.

A piece of one of the BQM targets that was destroyed was donated to FMF *Cape Scott* by CCFL (Commander Canadian Fleet Atlantic) as a token of appreciation for the effort that went into getting the ships ready.

— Anon.

Introduction of the New Class of Submarines

As a Lt(N) MSEO in *Okanagan* 1988-1990, we had just begun to experience the questioning of documentation of submarine valves and our system of configuration management. It was a crash course in working with NEU(A) and SRU(A). Significantly, the DA (design authority) in NDHQ was not part of the story. Which leads me to my point...

In 2001 I was posted to DGMEPM as DMCM SUBS as a freshly minted Cdr. The challenge was the introduction of the new class of submarines, except with diminishing technical support from the "builder," and the installation of a Canadian DA in NDHQ with substantial configuration management. It was a crash course in working with the coast, DMSS, overseas builder, and the MoD(UK). Same idea as the late '80s, but a much more complex challenge at a relatively senior level.

My work between 2001-2004, this was the most significant technical challenge that I have faced to date.

— Cdr R.J. Hovey, Cmdt CFNES

(We hope you have been enjoying reading these stories and musings as much as we enjoyed bringing them to you. Turn the page for the final eight.)

Most memorable naval technical challenge

My most interesting technical challenge

Without doubt, it was my three years as detachment commander for the submarine project in the UK.

Working with a less than specific contract, backed by an enthusiastic crew and a design authority on a steep learning curve every day presented challenges.

These mainly arose from a clash of the English language, as Canadian and British authorities wrestled with the true meaning of terms and conditions.

Both parties had the same goal — safe and operational *Victoria*-class (*Upholder*) submarines — but approached the task from different angles.

We persevered, and thanks to the superb and steadfast support of a cast of talented, diligent and experienced MARE officers, NCMs, and civilian LCMMs, we were able to deliver a pretty darn solid vessel!

— Capt(N) Mike Williamson

Training And Development

Not necessarily a technical challenge, as I am still quite junior in my career. That being said, the biggest and most rewarding challenge that I have had so far is the training and development of future naval engineers, and all of the rewards associated in developing the future technical leaders of our navy.

— Lt(N) Bathurst

Passing

Passing the MSE Phase 6 Board.

— Anon.

In the Gulf 1991

As a Junior Officer, I deployed on HMCS *Protecteur* for the liberation of Kuwait.

The months leading to the deployment were challenging as we were the *Preserver* crew getting ready to deploy and take over our sister unit *Protecteur*.

Lots, lots of memories of how a crew comes together.

— R. Tremblay

Getting a Non-technical Posting

My greatest technical challenge was to finally get posted to a post that was non-technical. Upon promotion to Cdr, I was posted to ADM(Pol) as the director CAN-US defence relations — without a lick of an idea of how I was to perform this task. Well, after settling in, 2 full days after my return from Staff College in Paris, I was to be acting Director for Western Hemisphere Policy! Well, what worked for me in my comfort zone technical world, worked again in a true political outside world. Trust, people skills and teamwork pulled what was, for me, a truly stressful event.

The training, exposure and developed "common sense" acquired as an NTO proved absolutely beneficial to employment in any capacity.

— Cdr P. Deschênes

Pride And Motivation

Biggest challenge for trainee: Finding a HoD or Senior NCO who genuinely cares about their training and mentoring.

Keeping up one's pride and motivation despite lack of political support (in the past and at present), i.e., fuel for ships, lack of recruiting success, helicopter, etc.

Pride felt after ship returning from Gulf after 9/11. — **Anon.**

You can't go to sea with only one diesel!

My most interesting story is really just the most recent story, and it has to do with the "Cadoozling" exercise at the MARPAC Technical Seminar. A good friend of mine wrote an excellent story about struggling to get his ship to sea with temperamental diesel engines and a high profile visit of NATO general officers. His story was selected as the winner, though I don't think many people thought through the implications of the story.

You see, there were crusty old marine engineering officers in the crowd, and one of them said, "Wait a minute...you can't go to sea with only one diesel!" And this started an interesting few days of questions, anxiety and general churn related to the safety of vessels at sea.

Now it was temporarily embarrassing for my friend, but most of the engineers in the fleet learned from the experience and my friend still ended up winning a fine book and his picture in the *MARE Journal*.

— LCdr Dan Horan

Working this mechanical pencil!

Working this mechanical pencil ranks in the top 10. I have no experiences as of yet that are of a technical nature. Peace. I have been "training" for about two years.

— Anon.

Bravo zulu...and thank you!

Materiel Acquisition and Support Information System —First Frigate Rollout of the MASIS "Deployed Solution"

Article by LCdr Simon Paré, CP02 Chris Tucker and Janelle Mansfield

The implementation of National Defence's leading edge Materiel Acquisition and Support Information System has taken a significant step forward. Last September, the *Halifax*-class frigate HMCS *Toronto* received the MASIS "deployed solution" to replace the ship's Consolidated Maintenance Information System (Ship) — CMIS-S. The introduction of MASIS provides shipboard maintenance and supply personnel a single integrated and more complete view of the ship's maintenance activities.

HMCS *Toronto*. *(Combat Camera photo 2008-9013 by Sgt. Kevin MacAulay)*

MASIS was first rolled out to the navy's central and coastal organizations in 2003, and six years later more than 2,000 naval MASIS users are working with the information system. At National Defence headquarters in the National Capital Region, lifecycle materiel managers, supply managers, procurement officers and other staff in the maritime equipment program management division (DGMEPM) are using MASIS in their day-to-day business. Business planning, project management, cost planning and engineering change management are some of the key activities being handled by DGMEPM staff through MASIS.

On the coasts, the formations — Maritime Forces Atlantic and Pacific — are putting MASIS to work on operational processes such as materiel fitness reports and tiered readiness programs. The fleet maintenance facilities, FMF *Cape Breton* in Esquimalt, BC, and FMF *Cape Scott* in Halifax, NS, are heavy users of MASIS for work planning, scheduling and work execution. Canada's *Victoria*-class submarines use the information system in the key area of submarine materiel certification.

For the rollout to the frigate, a deployed MASIS HP DL385 server was integrated with the onboard ShipLAN local area network and accessed via a MASIS graphical user interface on the ship's computer workstations. At sea and alongside, the deployed server will normally be connected via satellite or secure land line to the central MASIS server at CFB Borden, ON. Whenever the deployed server is disconnected, it will continue to operate as a standalone system, maintaining the full maintenance management capability of the ship. The central and deployed servers are designed to synchronize once connection has been restored.

A key design point in the MASIS deployed solution is the concept of data ownership. Because the architectural landscape includes multiple servers with common data, it is imperative that only one of the servers on ship or in Borden have edit access or change authority for any given piece of data at any given time. This concept applies to master data objects such as Equipment Master Records (EMRs) and equipment functional locations, as well as to transactional data such as notifications and work orders.

As this is a new system for the *Halifax* class, the ship's maintainers, maintenance supervisors and supply technicians received MASIS (deployed) training prior to the sys-

Fig. 1. The MASIS HP DL385 deployed server destined for the *Halifax*-class frigates. *(Image courtesy PMO MASIS)*

Fig. 2. When connected by satellite or other secure line, a ship's onboard MASIS server communicates continuously with the main server at Canadian Forces Base Borden in Ontario. When disconnected, the ship's deployed server operates as a fully capable standalone system until such time as the ship is able to reconnect and synchronize with the central server. *(Combat Camera photo 2008-17 by Sgt. Kevin MacAulay)*

tem's launch. Following implementation, PMO MASIS provided three weeks of on-board expert support to assist ship's staff through the transition. At the end of the three-week support period ship's staff would access the already established MASIS user support process to address any MASIS related problems.

MASIS (deployed) — benefits

The MASIS central system currently receives information from CMIS-S through interfaces. Once the MASIS deployed solution is completely implemented, it will allow the entire naval technical community to operate from the same system and enable end-to-end maintenance processes between the formations and deployed units. Ship's staff will therefore have increased visibility to the work being completed by the fleet maintenance facilities on their behalf.

MASIS (deployed) will allow ship's staff to assess, in real-time, the availability of maintenance spares and permit them to reserve spare parts as required. Equipment will be given serial numbers so that MASIS can maintain specific equipment maintenance history and provide increased visibility, reporting and tracking capability in a number of areas. For example, it will become much easier to assess the costs associated with the maintenance process and transfer of equipment.

Similar to CMIS-S, the MASIS deployed solution will be used to record onboard maintenance activities. One noteworthy change is the way MASIS allows preventive maintenance to be scheduled. Currently, CMIS schedules preventive maintenance using calendar based tracking which can be misleading if the equipment is not used regularly. This can result in a higher level of maintenance than is required, translating into increased demands on staff time and higher maintenance costs. With MASIS, preventive maintenance can be scheduled either by calendar, or on a counter based system that tracks total equipment running time and notifies ship's staff when it is time to conduct specific maintenance.

Innovative functionality

The MASIS deployed solution includes two key processes — an equipment transfer function and a work-in-progress inventory. Both are designed to provide additional integration and visibility of maintenance activities.

Equipment Transfer: equipment dismantle and install

In MASIS, the physical structure of the ship is represented by an electronic technical structure consisting of functional locations and equipment master records. This technical structure must be accurately maintained to ensure the maintenance history of the ship and its constituent parts is properly captured. In the course of conducting maintenance, any actual equipment that is physically removed from the ship must be transactionally "dismantled" from the ship's technical structure. Likewise, any equipment that is physically added to the ship must be transactionally installed into the ship's electronic technical structure. CMIS-S currently uses S3A and S3B maintenance action forms (MAFs) for these transactions, but in MASIS (deployed) they are known as IE4Ns.

The MASIS IE4N transactions directly update the ship's technical structure. Similar to CMIS-S, the MASIS deployed solution has been customized such that for a given equipment registration number (ERN) and its location within the ship structure, a dismantlement must take place before an installation can be made. This ensures, from a data perspective, that all relevant information is captured and stored as required, and that IE4N transactions are only used for their intended purpose of repair-by-replacement activities. Engineering changes require a different transaction.

Work-in-progress (WIP) inventory of maintenance spares

The ship-based WIP "inventory solution" transfers the complete management and reporting of maintenance spare parts from the Canadian Forces Supply System deployed with the ship to MASIS (deployed). The MASIS application thereby becomes the source system for all maintenance, supply and financial reporting of maintenance spares, while still maintaining some integration with CFSS.

The work-in-progress inventory provides added functionality to shipboard maintenance activities by allowing integration with other MASIS activity modules such as plant maintenance and finance. WIP inventory also offers additional visibility and information to the user. Ship's staff will have a better, more accurate view of the inventory of various ship's maintenance spares, while MASIS itself can automatically determine maintenance spare requirements and re-order as necessary.

The first phase of the WIP inventory solution was included in the rollout of the MASIS deployed solution in the first *Halifax*-class frigate, HMCS *Toronto*, in September. Full implementation of WIP inventory for that ship took place over the winter.

What's next?

PMO MASIS, along with implementation partner IBM Canada, is continuing its progress toward successful delivery of the MASIS deployed solution to the navy's surface and submarine fleets, as well as to the army and air force. The project recently completed a series of workshops for current and future users of the system. A significant technical upgrade made to the Materiel Acquisition and Support Information System in July 2008 provided the required functionality to house new capability such as the navy deployed solution described here, along with the capability to support the planning and conduct of operations. With these implementations, MASIS is on its way to achieving the goal set by the department to have an integrated information management system with up-to-date data that supports both military operations and corporate processes.

LCdr Simon Paré led the PMO MASIS User Relationship Management team focusing on training, business transition and performance management. He transferred to PMO Arctic/Offshore Patrol Ship (AOP)S in Ottawa last September.

***CP02 Chris Tucker is a marine electrical technician involved with solution delivery and training for PMO MASIS. He previously served as chief electrician with HMCS* Algonquin.**

Janelle Mansfield is a member of Team IBM (MASIS). She works in the area of business transition, focusing her efforts on collaborating with navy stakeholders to ensure successful implementation of MASIS initiatives.

(With files from Team IBM members Jeff Strachan and Michele Ho.)

Submissions to the *Journal*

The *Journal* welcomes **unclassified** submissions in English or French. To avoid duplication of effort and ensure suitability of subject matter, contributors are asked to first contact the **Production Editor, Maritime Engineering Journal, DMSS, National Defence H.Q., Ottawa, Ont., K1A 0K2, Tel. (613) 831-4932**. Letters are always welcome, but only signed correspondence will be considered for publication.

Configuration Management

Scrimshaw or scroll saw — Is this your Ship?

Article and photos by CPO2 (ret.) Grant Heddon
(with Brian McCullough)

In previous articles we have shown pictures of spaces that have undergone many unsafe and unauthorized modifications, most in the pursuit of creature comforts. The West Coast article in the Spring/Summer 2008 issue explained in detail why making unauthorized changes is not only dangerous to people, but also creates extra cost whenever approved changes are about to be implemented.

The photos this time highlight the work that some very talented people put into their mess to improve their comfort while away on deployment. Presumably, the "comfort" is actually meant for those playing the video games, not for the people trying to sleep. Let me tell you, I would be one cranky sailor if some messdeck "guitar hero" were keeping me awake. And which sailor, I wonder, gave up his locker so they could install the all-important fridge and TV? Is he planning to stow his gear under the new bench seat?

Unfortunately, what jumps out immediately is the increase in the fire load created in this space due to the materials that have been used. The wood, the varnish, the seat cushion material — all good smoky fire fodder — and do you even want to see the electrical hook-ups hidden behind the equipment cabinet?

The set-up also raises concerns for emergency damage control access to ship's structure. Unlike the

Much effort went into creating this comfortable bench seat and "entertainment centre" in this ship's messdeck, creature comforts for those long deployments. Unfortunately, all of it contravenes naval regulations for configuration management and fire safety. While the materials present an obvious added fire load, the set-up also raises concerns for emergency access to ship's structure. The addition of video gaming equipment may be a mixed blessing for off-watch personnel trying to sleep.

The bench seat stowage

sailors who live in this space, the mermaid painted on the ship's side appears to have instant access to an endless supply of cool water and breathable air should the worst happen.

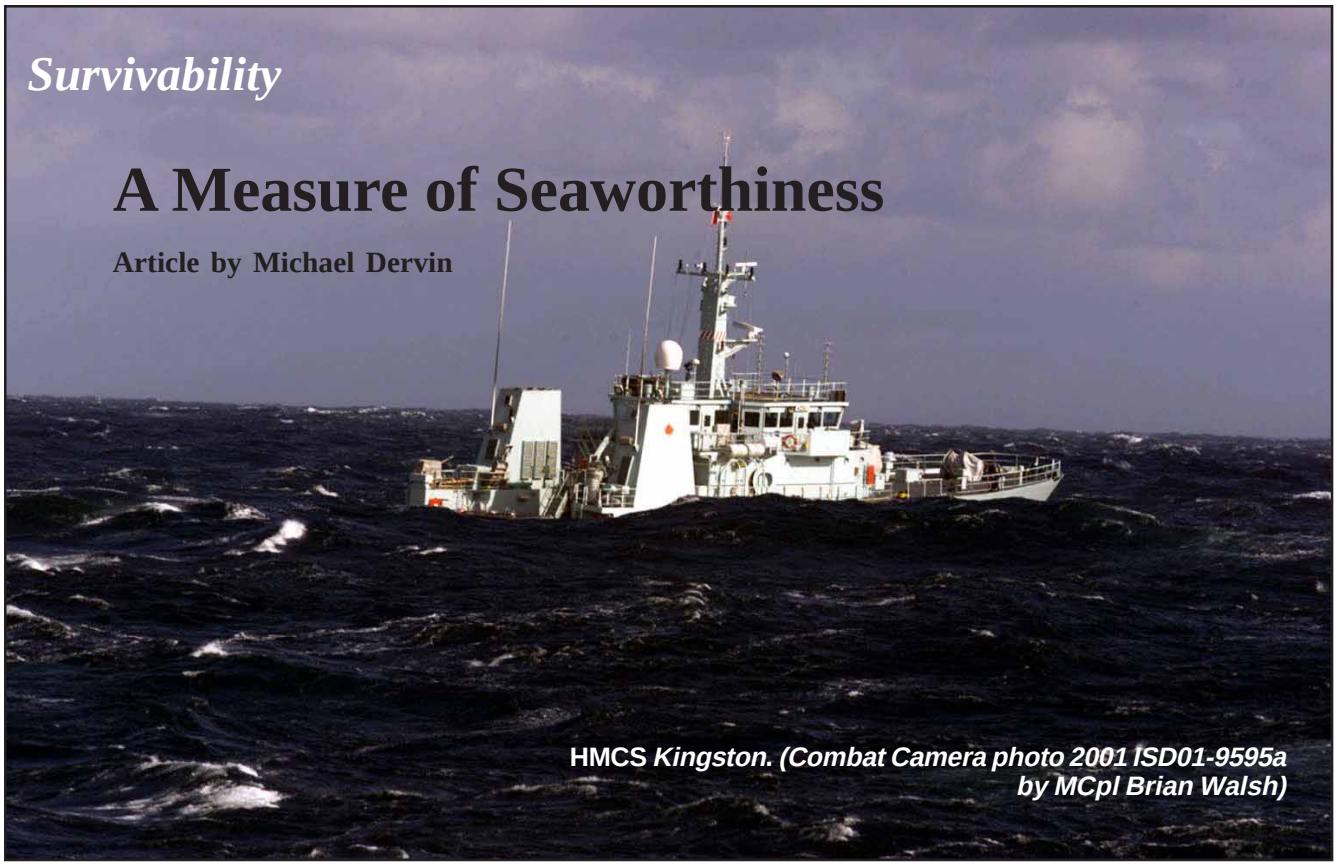
You really have to wonder who in authority allowed these materials to be installed on board this ship in this way. I suppose we'll just have to take it on faith that the materials were purchased privately and manufactured and installed outside of work hours. After all, there isn't a sailor in the fleet who thinks the navy has enough material resources or hours in a day to complete the work that absolutely needs to be done.

No one expects our crews to work around the clock when they are at sea, and off-watch projects are a good way to unwind. But where the seafarers of old were once encouraged to engage in a bit of fancy embroidery work or detailed scrimshaw on a whale's tooth to occupy their precious short time below, it is a much different story today. At least in our navy, the no-less-skilled sailors of the Rona generation have traded in the traditional needle and pocket knife for power drill and scroll saw to construct their visions on a much grander scale. That this all happens to be completely against regulation pales in comparison to the extent to which we now accept people making modifications like these without challenging their right to do so.

Grant Heddon is the former Staff Officer, Maritime Forces Atlantic Fleet Technical Authority in Halifax.

A Measure of Seaworthiness

Article by Michael Dervin



HMCS *Kingston. (Combat Camera photo 2001 ISD01-9595a by MCpl Brian Walsh)*

Most of us have our own understanding of what seaworthiness means, but rarely do we share a common definition. Depending on the context, it could mean that a ship handles well in heavy seas, or that it has good stability, or that it is structurally sound. Certainly not the ideal situation if you happen to be the one responsible for specifying (or interpreting) requirements, which deal with various aspects of seaworthiness. As with anything, a shared understanding of the ground rules and definitions means everything.

Generic terms such as *operate*, *withstand* and *survive* are used regularly in ship specifications. We all have a gut feeling as to what they mean, but what exactly is being specified and how can it possibly be verified? Without formal definition of the terms, misunderstanding, failure and frustration are inevitable.

The author first introduced a system of definitions pertaining to seaworthiness at a *Kingston*-class high-seas capability meeting on Sept. 25, 2001. The purpose of the meeting was to kick off a project to determine the limitations and risks associated with heavy seas operations and transits by *Kingston*-class maritime coastal defence vessels. The "Seaworthiness Scale" put forward at that meeting allowed participants to put generic terms into a common context. While the author is first to admit it is still imprecise, at least when we were discussing requirements like, "The ship shall withstand sea state X," we could refer to the Seaworthiness Scale to better quantify what was being asked.

In July 2007 a slightly evolved version of the Seaworthiness Scale (*Table 1*) was published in the NATO allied naval engineering publication, "Controllability and Safety in a Seaway." At the time, the author was a member of the NATO Naval Armaments Group (Maritime Capability Group 6) specialist team dealing with seaway mobility The following is a slightly edited extract from that publication, ANEP-79, Edition 1.

The Seaworthiness Scale

The Seaworthiness Scale as proposed by team member Mike Dervin (DND, Canada) is essentially a set of criteria that could be used by ship owners, designers, engineers, performance specification writers, and operators to categorize and quantify the desired or achieved capacity of a ship, all its systems and crew to function in adverse sea state environments.

The scale considers the ability of the crew to effectively operate the ship in different seaways, the ship's stability reserve and structure resilience to sustain degrees of direct or indirect damage and system/equipment malfunction up to and including survival scenarios. The damage

may or may not be the result of warfare action.

The scale ranges from 1 to 10, with 1 indicating unfettered operability and 10 being total loss of the ship. The scale is applicable to any type of seagoing ship and is independent of the sea environment. As such, an aircraft carrier and a small fishing boat could have the same rating, but in very different sea states. Furthermore, a particular ship would have different ratings for different environments — for example, a rating of 1 in sea state 2, and a rating of 5 in sea state 7. For the scale to be meaningful, a rating value must be linked with a specific environment of wind and waves.

Suitable rating values would depend on the type of service the ship would see and the acceptable level of risk the owner is willing to endure. The ship's performance still needs to be evaluated through simulation, model tests or sea trials, and where hard criteria do not exist the evaluation may be somewhat subjective. Nevertheless, in the context of a ship's capability or limitations in, or resilience to a seaway environment — in other words, the "seaworthiness" of the ship — the scale provides a common point of reference to often used terms like *operate*, *withstand* and *survive*. Previously, such terms have been used without formal definition, resulting in inconsistencies in the understanding of the ship's required or observed performance.

The Seaworthiness Scale

10	**Capsize**	**Sunk or sinking is inevitable and imminent**
9	**Survive (c)**	**Salvageable**
8	**Survive (b)**	**Sustained major structural damage and some compartments flooded, but able to return to port under own power.**
7	**Survive (a)**	**Structural and equipment damage; some ingress of water, but manageable.**
6	**Withstand (c)**	**Likelihood of damage that may lead to flooding; difficult or unable to maintain or change heading; unable to make headway.**
5	**Withstand (b)**	**Compelled to change speed and/or heading, minor structural or equipment damage possible, personnel injury probable.**
4	**Withstand (a)**	**Without sustaining damage, but possible risk of personnel injury.**
3	**Operate (c)**	**Basic ship functions are not degraded. However, primary mission tasks are limited. Ship may have to hold or change heading and/or change speed to minimise mission impact.**
2	**Operate (b)**	**Only certain shipboard tasks limited for some conditions/scenarios.**
1	**Operate (a)**	**Mission and shipboard tasks unimpeded by sea conditions.**

Table 1: Seaworthiness Scale defining overall ship performance for a given environment. ***(From ANEP-79, Edition 1, July 2007, Controllability and Safety in a Seaway.)***

Conclusion

The concept of using a scale to define in quantitative terms the difficulty in performing a mission or conducting a task is not new. The Cooper-Harper rating scale used by test pilots since the late 1960s to evaluate the handling qualities of an aircraft is similar to the Seaworthiness Scale. Although both scales are largely subjective, and that my be their biggest downfall, their great advantage is that without complex instrumentation, data collection and analysis, one can rapidly get an impression of the capability of a platform and how well all of its systems (including the humans) are functioning together. Technology will no doubt one day replace the human sensor and remove the subjectivity of the human evaluator, but it will still be necessary to consolidate all the data into human terms and answer the question; "Is the ship seaworthy?"

Michael Dervin is the naval architecture manager for the Canadian Surface Combatant Project. He is the former DGMEPM hydrodynamics specialist engineer.

Book Review

Betrayed

Reviewed by Captain(N) Hugues Létourneau

Betrayed — Scandal, Politics and Canadian Naval Leadership
by Richard O. Mayne
UBC Press © 2006
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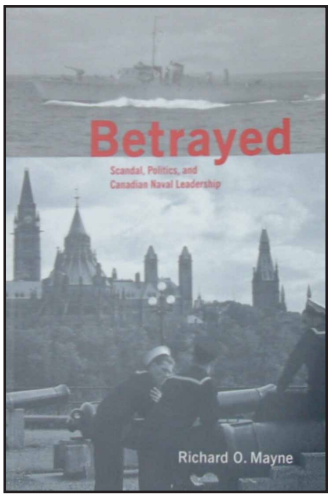
The 1,500-member naval reserve I joined in 1970 was far, far removed from the 80,000-strong Royal Canadian Naval Volunteer Reserve of the Second World War. While today few reservists have political influence through civilian connections, the number of those who did was much higher during the war due to the sheer size of the reserve and the context of the times. Still, I had no idea that some of my fellow reservists had forced the navy's top man — Vice Admiral Percy W. Nelles, the Chief of the Naval Staff — out of his job.

Betrayed — Scandal, Politics and Canadian Naval Leadership by naval historian Richard Mayne tells the story of two groups of naval reserve officers whose behind-the-scenes manoeuvring ultimately led to Nelles' removal. The first group was a number of disgruntled RCNVR officers led by LCdr Andrew MacLean, of the Toronto publishing family of the same name, who had close ties to the opposition Conservatives. MacLean, painted by Mayne as a man of enormous hubris, was convinced that the RCN regular force mistreated and looked down on reservists, considering them second-class amateurs. That some regulars had these feelings is undeniable, but they were and are a minority — the history of the navy has consistently shown more co-operation than confrontation between its regular and reserve components. MacLean, however, would write directly (and frequently) to Angus L. Macdonald, Minister of National Defence for Naval Services, and because of MacLean's political influence the minister listened. As a result, MacLean caused considerable grief to Macdonald as well as to Nelles — at least until both the minister and the navy got fed up with MacLean and eased him out in 1943.

Such disloyalty to the chain of command was bad enough. Far more



serious was the perception among some elements of the RCNVR that our ships were under-equipped compared to those of the Royal Navy. Many reserve "sharp-enders" resented this because it was mostly true, but the British were struggling to keep their own ships current and could not afford to give the RCN a high priority. What was *not* correct, apparently, was the impression that Naval Service Headquarters in Ottawa neither knew nor cared.

The RCN in 1943 was in the midst of a fifty-fold expansion and doing everything it could to produce and maintain enough ships to fight the U-boats. Despite this, as historian Mayne clearly demonstrates, headquarters worked long and hard to enlist the support of the minister to address the equipment gap. By late 1944 that gap would close, yet a number of seagoing officers (many of whom were based in Londonderry and were supported by Royal Navy Commodore (D) G.W.G. Simpson) made representations to Macdonald's executive assistant, John Joseph Connolly. They convinced him — and through him the minister — that a serious crisis was brewing in the navy. There wasn't one, and yet Macdonald would end up accusing Nelles of incompetence. Nelles fought back, but in a battle with one's political master being right is not always enough. The admiral was removed from his functions in January 1944.

This meticulously well-researched book reads like a good novel. Author Richard Mayne, who works at DND's Directorate of History and Heritage, is part of a new generation of naval historians who are doing much to research some of the lesser known aspects of our historical record. The stand-up of modern Canadian naval history as an ongoing concern is relatively recent, and *Betrayed — Scandal, Politics and Canadian Naval Leadership* is a first-rate effort on this front.

Capt(N) Hugues Létourneau lives in Québec City, and is Regional Advisor (Eastern Region) and Director of Strategic Communications for the Naval Reserve.

National Défense
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SPRING 2009

News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

CANDIB Update: An Interview with Vice-Admiral Robert Stephens

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CNTHA News is the unofficial newsletter of the Canadian Naval Technical History Association. Please address all correspondence to the publisher, attention Michael Whitby, Chief of the Naval Team, Directorate of History and Heritage, NDHQ Ottawa, K1A 0K2. Tel. (613) 998-7045, fax 990-8579. Views expressed are those of the writers and do not necessarily reflect official DND opinion or policy. The editor reserves the right to edit or reject any editorial material.

The Canadian Naval Defence Industrial Base (CANDIB) project continues to add papers and interview transcripts to DND's Directorate of History and Heritage archive for use by historians, students and researchers. The CANDIB project, which is being conducted on behalf of the Canadian Naval Technical History Association, is an important endeavour as many aspects of Canada's naval industrial story were not adequately documented back in the day. Curiously, historical record-keeping seems to be becoming increasingly problematic in today's connected workplace.

In April we completed our 16th oral interview in our series focusing on people who have been involved with the industrial aspects of naval procurement. CANDIB interviewed Vice Admiral Bob Stephens about his involvement with several ship and submarine projects during his career. The full interview is available through the Directorate of History and Heritage, but here is what VAdm Stephens had to say about design investigation and testing of the *St. Laurent* (205) class destroyers:

"In the 1951-1954 period we put together NEDIT [Naval Engineering Design Investigation Team] and NETE [Naval Engineering Test Establishment]. We knew that the Yarrows Admiralty Research Department [Y-ARD] had done a lot of good work in the British navy, particularly as we were moving to much higher steam pressures and steam temperatures. These were new things and we recognized that we needed something similar. We were very fortunate. George Raper was very much involved with Y-ARD and he was one of their brightest engineers. We managed to talk the British Admiralty into lending us Raper, and he came over and put together NEDIT. NEDIT was headed up by RN officers originally, and Canadians later on as we got more experienced. That was the idea of NEDIT — we didn't think we had the design capabilities in naval headquarters. It was better to leave this to a separate establishment. NEDIT weren't only doing new designs, they were looking at problems in designs, particularly to deal with noise and vibration, sound and propellers, which developed into a fine art...and we probably knew more than the UK.

NETE was established at the same time as NEDIT since we needed somewhere to do testing. We didn't know how to do shock testing, so we had to have shock machines. We wanted to make sure that the performance of the feed pumps was up to scratch and although the contractors had to do this, when they had problems

HMCS *St. Laurent*

we would do tests at NETE. We did every kind of testing imaginable. Similar to NEDIT we had a naval officer in charge of NETE, but all the other staff were civilians from Peacock Brothers Ltd., Montreal. We purposely put it in that location because NEDIT was there and we thought NEDIT and NETE could work together in a nice, tidy package."

A nice little window on the NEDIT/NETE story for sure. VAdm Stephens also recounted this anecdote:

"John Chauvin was the naval overseer in Montreal and he discovered what we were doing on the auxiliary boilers. The auxiliary boilers in the 205-class destroyers were like a miniature Y-100 boiler, with drums and everything. He thought this was crazy and he found this boiler in some big laundry in Montreal which was a straight-through coil boiler where you put water in one end and it came out hot the other. So we decided on that. We often went to the manufacturer in Chicago to do the tests and often found that it didn't meet the specs. They got so fed up with us that they used to call them 'boilers for the frigging frigates.'"

CANDIB continues to reach out to new members to help record Canada's naval industrial history. Investigate our website (www.cntha.ca) and feel free to attend our meetings or contact one of our members. We'd love to hear from you.

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The CNTHA Collection at Directorate of History and Heritage, Ottawa

Thanks in part to the contributions from the Canadian Naval History Association and in particular, the Canadian Naval Defence Industrial Base (CANDIB) committee, the Directorate of History and Heritage (DHH) has organized and catalogued a growing collection of material related to our navy's technical history. This collection is titled the Canadian Naval Technical History Association Collection (93/110) and contains material on various system development projects and procurement programs. Of particular note is the CANDIB oral history project that consists of transcripts of interviews with those involved in some of the navy's most significant shipbuilding projects, including the DDH-280 and Candian Patrol Frigate projects. The collection is available to CF/DND personnel as well as the general public through the reference room at DHH at Holly Lane in Ottawa. For hours of operation and to consult this collection, please contact Mr. Warren Sinclair at (613) 998-7060.

— Lt(N) Jason Delaney, Naval Historian, DHH 2-2-7.