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Feature Article

Waterfront Management: The Key to Maximizing Service Delivery

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An innovative Waterfront Management program will integrate service delivery at Canada's naval dockyards.
Photo by Brian McCullough

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COMMODORE'S CORNER

End of an era – The legacy of Canada's *Iroquois*-class Tribal destroyers

By Commodore Simon Page, OMM, CD
Director General Maritime Equipment Program Management

Photo by Brian McCullough

Last of her kind: The Tribal-class destroyer *Athabaskan* rests in the naval dockyard in Halifax not long after her decommissioning in March. As if it has been erased by the fog, the ship's pennant number 282, worn so proudly for 45 years, no longer shows.

As we waved farewell to HMCS *Athabaskan* on her final, gracious sailpast in Halifax Harbour on March 10, one could only marvel at what she and her three sister ships had accomplished since they were commissioned into the Royal Canadian Navy nearly half a century earlier. During their long service to Canada, these "Sisters of the Space Age," including the already paid off ships *Iroquois*, *Huron* and *Algonquin*, supported a full spectrum of naval domestic and expeditionary operations, often as NATO command platforms on deployment to the Standing Naval Force Atlantic, and to the more recent Standing NATO Response Force Maritime Group. As a former Combat Systems Engineering Officer on board HMCS *Athabaskan* (DDH/DDG-282) I admit to being slightly biased, but these four destroyers stood out as leaders in paving the way for some truly outstanding Canadian innovation in naval technology.

Constructed at Marine Industries Ltd (Sorel, QC) and Davie Shipbuilding (Lauzon, QC) in the years following Canada's 1967 centennial celebration, the ships featured a DDH-280 design that incorporated a number of ground-breaking and successful features. Unknown to many people, for instance, is that when HMCS *Iroquois* was commissioned in July 1972 she became the first destroyer in the world to operate an all-gas turbine propulsion system, and the first to have complete control of the propulsion plant from the bridge. The "combined gas or gas" (COGOG) propulsion arrangement not only provided the required top speeds, but also enabled considerable reduction in vibration and noise. A lower stern profile designed through the use of elliptical shapes optimized the performance of the hull-mounted sonar. This was significant because the DDH-280 *Iroquois*-class destroyer design was also the first anywhere to include operation of *two*

anti-submarine warfare (ASW) helicopters – and large Sea King aircraft at that – an engineering feat that made the most of the ship's new noise-reduction measures.

From a combat systems aspect, the modern Tribals were the first warships of any navy to host and operate a federated digital command and control system (CCS-280) and an integrated interior communications system. The *Iroquois*-class destroyers were also the first ships of the RCN to install missile system technology, which was integrated with the CCS-280 system. The missile system, part of an integrated surface and air weapon system, was a unique Canadian industry design that included retractable launch arms on both sides of the missile platform housing. Integrated ASW signal processing was performed by a completely new data system that also integrated to CCS-280, providing consolidated target information to the weapon systems. Overall, this offered a highly advanced design which, as Rear-Admiral R.W. Timbrell, Commander Maritime Command, said at the time of HMCS *Iroquois*' commissioning, "… is the renewed evidence of Canada's determination to maintain a standard of continuous improvement in Canadian Naval Technology."

The Tribal-class Refit and Update Modernization Program (TRUMP) that began in the late 1980s and carried through to the refits and completion in the 1990s taught us important lessons about innovation, implementing ideas, and effectively managing large modernization projects. The ambitious endeavour created a complete work package to convert the four destroyers from their original ASW design to a DDG anti-air warfare (AAW) role. The core components of the refits contained new weaponry, electronics, command and control, propulsion, and superstructure. Of note during this modernization and upgrade effort was the installation of three new weapon systems, including a Phalanx close-in weapon system, and new gas turbines.

Photo by Cpl Anthony Laviolette, 12 Wing Imaging Services

The DDH-280 destroyers were pioneers of many Canadian naval innovations, including a design that incorporated the operation of not one, but two large anti-submarine helicopters. The venerable birds escorted *Athabaskan* on her final sailpast on March 10.

Photo by DND

The Tribal-class Update and Modernization Program of the mid-1990s replaced the distinctive V-mounted "bunny ear" funnels with a single uptake, and mounted a 76-mm gun in place of the 5"54-calibre gun and Sea Sparrow missile housing on the fo'c'sle.

Arguably, this effort was a precursor to the successful Halifax-Class Modernization-Frigate Life Extension (HCM-FELEX) project that is currently approaching full operational capability. Such engineering feats generate tangible lessons in terms of technology insertion, system integration, and manufacturing innovations, but in a more discreet way also provide some excellent examples of perseverance and audacity, both key values in today's business of program management. I am further convinced that all of these efforts will assist other projects surrounding current and upcoming RCN assets, as technological continuous improvement remains at the heart of the naval engineering community's focus.

The DDH/DDG-280s served Canada in an exceptional manner throughout five decades of operational service. The stories of their design, commissioning, modernization, service, and eventual paying-off are filled with ideas of innovation and examples of initiative. This rich and worthy legacy can remind all of us of the values and dedication of effort that remain crucial to the delivery of naval assets today.

EDITOR'S NOTE

London Calling

Sadly, this will be the last time I write as Senior Editor of this magnificent journal. The joy and satisfaction I found in participating in the editions we produced over the past two years were pleasantly unexpected. It was an honour working with tremendous individuals who are all dedicated to bringing forward the stories and news of the Royal Canadian Navy's technical activity for a wide audience. It is an aspect of the role of Chief of Staff I will forever treasure.

As COS MEPM, I was especially proud to be the Branch Advisor for the RCN's naval engineering occupations. The dedication, skill, and profound competence of our people in uniform have been phenomenal in delivering excellence at sea, while at the same time energizing the institution, and innovating the ways in which we perform our tasks. The junior sailors are our future, and with the skilled guidance of the chiefs and petty officers, and the leadership of the officers, their contribution to the technical excellence of the Navy will continue to be immense.

As I prepare to move on to National Security Studies at the Royal College of Defence Studies in London, it is with the knowledge that the branch is well-positioned for success. In this regard, we owe much to our Branch Head and Chief Engineer, Commodore Simon Page, for his stewardship, compassion, sincerity, vision, and leadership. The branch is in significantly better shape because of his efforts.

Of course, our broader naval engineering and technical community encompasses more than just those of us in uniform. We belong to a defence team that includes public service colleagues and industry partners whose devotion to Canada and support for the RCN can be measured in every operational success we enjoy. Through them we find both stability in our institution, and the flexibility to evolve as required to make things possible. It is a grand collaboration, and together we write the incredible technical journey of the RCN that should make all Canadians proud of our efforts every single day.

Photo by Brian McCullough

I will end my time as Chief of Staff for MEPM by saying thank you to all of you, including the families at home, who do your part to keep the Royal Canadian Navy at the vanguard of excellence. It has been a pleasure working alongside you. I wish you all fair winds and following seas.

Yours aye,

*— **Captain David Benoit, RCN, Senior Editor***
Maritime Engineering 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. Contact information may be found on page 1. Letters are always welcome, but only signed correspondence will be considered for publication.

LETTER TO THE EDITOR

Re: Anchored in the Future

As I read RAdm John Newton's article, *Anchored in the Future* [MEJ No. 83] I winced because it reminded me of an incident early in 1944 when I was taking my new entry seamen's training at HMCS *Cornwallis* on board the training ship HMCS *Hamilton*, an old ex-USN four-stacker. I did not realize I had one foot inside a bight in the anchor chain when our class was taking "Anchors Away" training, and just before the order was given to let go the anchor, I was physically knocked aside by the officer of the deck watch. If he had not been alert I would have been badly mangled as the anchor chain rumbled out.

The experience made me very careful with our deck crew when later, as the navigating officer of the minesweeper HMCS *Sarnia* (bottom right) on convoy duty during the war, we too had to drop anchor in strange harbours. RAdm Newton's article made me realize what a tremendous responsibility the whole navy has in preparing for the new fleet that is being created.

RAdm Newton's comments also took me back to a particular night in 2014 when my wife, Hyacinthe Wade, and I were head table guests at the Battle of the Atlantic (BOA) Gala Dinner in Halifax. I recall that RAdm Newton very humorously welcomed the officers of HMCS *Toronto* who had just returned from a long drug interception job in the Persian Gulf.

Up Spirits, Afternoon Watchmen to Dinner!

— Lou Howard, MID, RCNVR

Photo by Brian McCullough

[Lou Howard, now 93, was Mentioned in Dispatches (MID) for his actions to rescue survivors and save life when *Sarnia*'s sister ship, the Bangor-class minesweeper HMCS *Esquimalt* – the last Canadian warship lost to enemy action during the Second World War – was torpedoed and sunk off Halifax on April 16, 1945. Should you ever meet him, look for the tiny bronze oak leaf mounted on the ribbon of his 1939-1945 war medal, and maybe give him a salute. – Editor]

FORUM

UPDATE: Equipment Health Monitoring with IPMS

By Booth A. Stares, MSc, PEng

Further to Lt(N) Eric Bertrand's article in the Summer 2016 issue of the *Journal* (MEJ 80: "Equipment Health Monitoring with IPMS"), inquiries regarding integrated platform management system data for *Halifax*-class ships can be made via email to ipms.data@nete.dnd.ca

The time required to process requests will depend on the quantity of data required, or complexity of the request. For financial reasons, large, complex, or recurring requests (i.e. ongoing monthly reporting) might require authorization from DNPS 3-6-3 before being actioned. Requests submitted by non-DND employees will need to be authorized by DNPS 3-6-3.

Parameters to include with a request are:

Description of Desired Signals/Data

If known, provide the IPMS signal names, and/or signal identification. Otherwise, system name(s), a description of the desired signal(s) (e.g. inlet lube oil pressure, port/starboard knots, etc.), or data type (pressure, temperature, operating state, etc.) would be required. A list of IPMS signals can be provided via request to the above-noted email address.

Ship(s)

Specify for which ships the data is required (also see availability of data below).

Date Range(s)

Specify a date range for the requested data. Be sure to consider the points noted below, and the availability of data when stating desired date ranges. If looking for data from a specific event but unsure of the date, describe the parameters surrounding the event (e.g. the request is for two days of data that occurred sometime in a six-month period).

Sampling Rate

Some analogue signals record as frequently as every 0.05 seconds when the system is operating (digital signals record when a state change occurs). Although all available records can be easily extracted, doing so can result in unmanageably large data files especially if required for long time periods. For example, data can be filtered at rates of one minute or less if all records are not required.

Output Format

If not otherwise specified, data will be provided in CSV (comma separated values) format that can be easily viewed and manipulated in Microsoft Excel. Data will be issued to the requester via email when possible (i.e. file size less than 5 MB). Otherwise, it will be burned to a CD and mailed or delivered. If a graphical representation or special manipulation of the data is required, please provide a brief description of the desired output (e.g. calculations, filtering, plots, table format, etc.). Customized reports can be created in instances where the same signals and outputs will be required on a recurring basis.

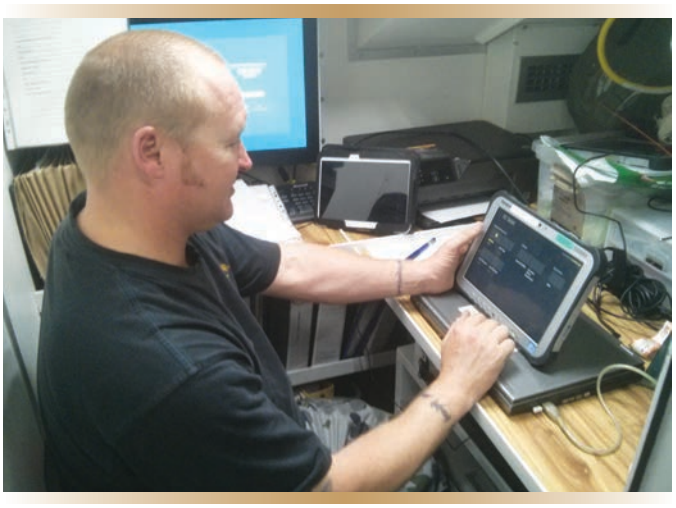
IPMS data is extracted monthly by L-3 field service representatives for ships in port. Data may not be available for all IPMS-equipped ships at all times due to ongoing deployments – data from deployed ships is only extracted when they return to port – or if there are issues with the IPMS equipment health monitoring software on board. A list of available data for each ship will be provided upon request.

Booth A. Stares is the Naval Engineering Test Establishment engineer for control systems embedded within the Directorate of Naval Platform Systems at National Defence Headquarters, Ottawa.

FORUM

Embracing Technology (and the KISS Principle)

By LCdr Patrick Larose



Photos by LCdr Patrick Larose

The new maintenance tablet received a warm welcome aboard HMAS *Rankin* (SSG 78).

During a recent posting to Australia, I had the opportunity to help develop, test, and deploy a maintenance computer tablet for submarine crews – a first for the Royal Australian Navy (RAN). When everything was said and done, we had managed to field one of the best portable maintenance solutions currently available in the world. Although we didn't set out to reach such a lofty benchmark with this initiative, I think the basis from where we started is what allowed us to create such a great product.

One of the recommendations that came from the Commonwealth of Australia's Coles Report into the sustainability of the *Collins*-class submarines was to develop portable technology solutions for the sailors. The thinking was that sailors should be working with their core skills, not sitting at a terminal tediously filling out maintenance information on a Friday afternoon before going home. But this wasn't just a morale improvement issue. By giving submarine crews a product that would help them maintain the equipment and record the maintenance effortlessly and intuitively, they could be counted on to keep better maintenance records. The RAN would therefore have a much better picture of the technical status of its submarines, which would be helpful in planning work periods, reducing risk, and controlling the scope of projects. The initiative would pay for itself quite quickly.

While this might seem to be a relatively simple undertaking, most of the tablet solutions on the market were either complicated, or were pared-down versions of full maintenance systems. Our team decided on a new direction: Use existing hardware, a known software platform, and easy-to-use software code supported by a large knowledge base to create an app for the sailors. Apps by their very nature are simple to use, and no training is required. Recording the onboard maintenance would be a near-seamless part of the app's exit procedure.

We did run into a few issues. On our first try we based the software on Android, which couldn't be used as it wasn't yet certified. The app was then rewritten for Windows, which made things slightly harder because the app community for Windows is much smaller than that for Android or Apple. We also ran into some initial space and power issues for the tablets, and had to sacrifice wireless synching capability due to the significant hurdles required to certify such a product for submarines. We eventually worked out a hard-docking system to charge the tablets and synch them to the maintenance server, and the result was a huge success.

The amazement of the maintainers, who weren't expecting this type of product from an organization that traditionally lags behind where software is concerned, was fascinating to observe. As personnel came on watch, the supervisors

could assign specific maintenance to individual maintainers who would simply collect their tablet and proceed with the indicated tasks. Using the tablets, the maintainers could now easily display maintenance information and system drawings right next to the equipment they were working on. Once logged on, the tablet would indicate which maintenance the equipment required, and display all of the steps, tools, and spare parts necessary to complete the routine. When finished, the maintainers would simply tap the "maintenance complete" button, indicate the parts that were used, and how many hours it took to complete the job, and the app would close that maintenance item off in the system.

One of the biggest obstacles to the deployment was that the organization wasn't ready for it. Policies here and there mandated paper logs, or monthly SITREP messages, all of which became obsolete the instant we fielded our product. The process of maturing the organization, and reassessing how and why we were now doing certain things differently, was in many ways much more difficult then developing the software and deploying the tablets.

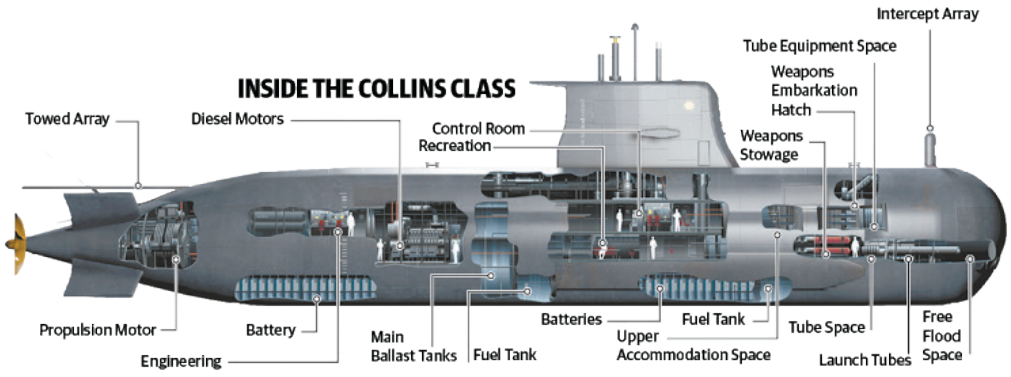
Once fielded, though, the Australian Army and the rest of the Royal Australian Navy showed a lot of interest in our product. As I was leaving Australia, v3.0 of our product was being rolled out to all operational submarines. The surface fleet was developing something similar, and we met with them to help them conceptualize their idea, and to explain the benchmark established by our team: If a sailor needs to tap the screen more than seven times to complete a routine, the app isn't simple enough.

This type of technology is immensely powerful, and yet in the Navy we only see it being used in limited areas. Need a bar code scanner, a camera, a drawing editing tool? There's an app for that. Need to take vibration analysis readings, need a thermometer, a light sensor, a boroscope? There's a USB version of it. We now live in a world where we can build sophisticated apps using the existing knowledge base and current technologies in new and interesting ways, but we need to reset our expectations for what is possible, and make the most of today's technology.

Just a few years ago "portable" maintenance recording meant lugging an expensive, bulky machine through the spaces. Today, most people are used to having considerable computing power available at their fingertips through their smart phones. Considering that all of our technical information could be delivered to our sailors in the palm of their hand in an easy-to-use and familiar PDF format, we have a tool that sailors entering the Navy today fully expect to have.

A maintenance computer tablet app such as that developed for the RAN could be a simple, yet highly effective system for monitoring, recording, troubleshooting, and maintaining systems on board Royal Canadian Navy submarines and surface ships. It could streamline many outdated processes, increase maintenance efficiency throughout the fleet, and play to the strengths of the new generations of sailors joining our ranks.

LCdr Larose is the DNPS 4-3 engineer with the Submarine Manoeuvring and Control Systems section of the Directorate of Naval Platform Systems in Ottawa.



Cutaway view of a Royal Australian Navy *Collins*-class submarine.

FEATURE ARTICLE

Waterfront Management: The Key to Maximizing Service Delivery

By Cdr Andrew Forbes (FMF Cape Scott Operations Manager), Cdr Ryan Solomon (FMF Cape Breton Operations Manager), and LCdr Andrew Sargeant (Waterfront Management Program Lead)

Photo by Brian McCullough

Technical service delivery within the Royal Canadian Navy (RCN) continues to expand beyond the traditional levels of effort provided by the Fleet Maintenance Facilities (FMF) by leveraging contractor support to a much greater degree in the engineering and maintenance of our major warships and submarines.

Although this augmentation of resources will provide more horsepower, achieving the maximum potential of the executable effort will be dependent on the strength of our coordination capabilities. The maintenance planning and execution within our naval dockyards is recognized as dynamic, complex, and wide-ranging; contract terms and conditions, regulatory requirements, equipment repair priorities, and fluctuating operational schedules are but a few important aspects of that work. The solution to address this challenge will come in the form of a robust Waterfront Management program.

Industry working within the dockyards is certainly not new, as contractors are the principal support to our minor war vessels and auxiliaries. We also regularly host field service representatives from original equipment manufacturers (OEM), or use small companies to cover off expertise and capability gaps such as radiography. However, in the past we've relied heavily on the FMFs to provide most, if not all, of our second-line maintenance on our larger warships. Both FMF Cape Breton in Esquimalt, and FMF Cape Scott in Halifax have years of experience working within the dockyards, and have developed processes and expertise that allow the organization to adapt to changing operational priorities. This is a key enabler for the RCN in meeting Government of Canada commitments.

Within the next two to five years, the RCN will accept the Arctic/Offshore Patrol Ships (AOPS) and Joint Support Ship (JSS) into the fleets. As the AOPS and JSS In-Service Support (AJISS) maintenance model is introduced ahead of these capabilities, the volume of work by contractors will increase and will certainly test any of the already established work practices.

This proposed level of service delivery integration on our major warships will combine the public service and private industry simultaneously in the provision of engi-

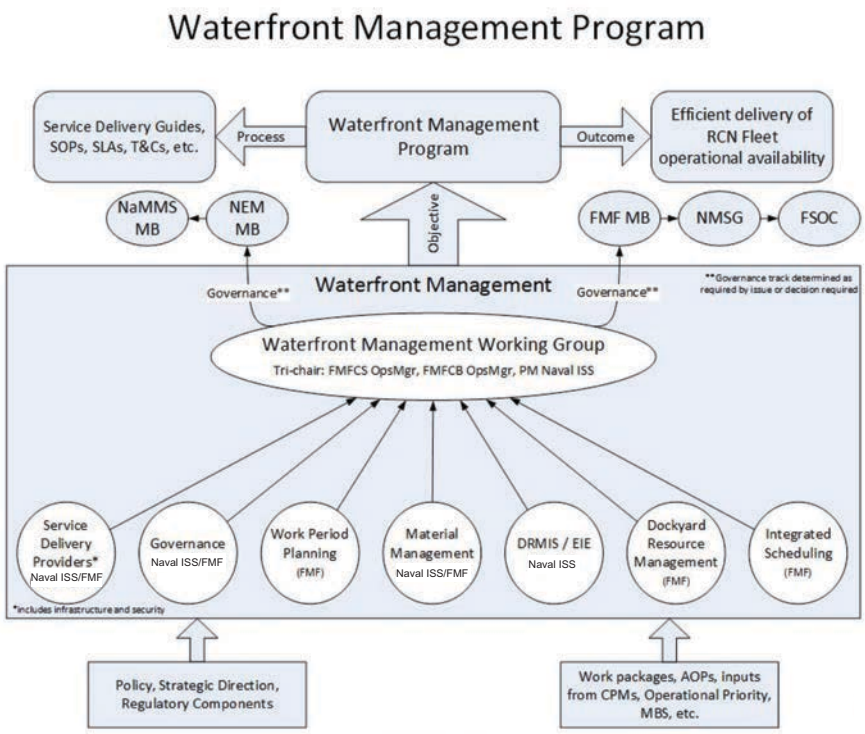


Figure 1. The Structure for the Waterfront Management Working Group, with supporting inputs, sub-working groups, governance and outputs.

neering and maintenance within the dockyards – a unique approach among modern navies. The methodology has been carefully designed to incorporate lessons learned by other navies, many of which are solely dependent on the use of contractors. Private industries will focus mainly on low-risk, generic-type corrective and preventive maintenance, with the FMFs maintaining the full spectrum of their present capability, but with a reshaped focus to ensure that the high-risk, mission-critical capabilities are given priority.

This volume of shared work – and the ability to execute it seamlessly in our naval dockyards – is a major challenge. Numerous factors must be considered as we fine-tune our processes to enable concurrent work by contractors and the FMFs. The efforts to conduct this analysis will be a combined venture between the FMF operations departments and the Naval In-Service Support leads, including the AJISS Project Office within the Maritime Equipment Program Management (MEPM) division. Together these teams will tri-chair the Waterfront Management Working Group, now established in Naval Governance reporting up to the FMF and the Naval Engineering and Management

Glossary

SOPs – Standard Operating Procedures

SLAs – Service Level Agreements

T&Cs – Terms and Conditions

NaMMs MB – Naval Materiel Management System Management Board

NEM MB – Naval Engineering and Maintenance Management Board

FMF MB – Fleet Maintenance Facility Management Board

NMSG – Naval Materiel Steering Group

FSOC– Fleet Sustainment Oversight Committee

PM Naval ISS – Project Manager Naval In-Service Support

DRMIS – Defence Resource Management Information System

EIE – Electronic Information Exchange

AOPs – Annual Operating Plans

CPMs – Class Program Managers

MBS – Materiel Baseline Standard

(NEM) boards. Various sub-working groups will tackle particular subject areas, and funnel their results up to the main working group for alignment. Everything will be guided by DGMEPM and Commander RCN strategic directives. Figure 1 captures this arrangement in a single diagram, showing the proposed interlinking structure.

The Waterfront

The day-to-day coastal coordination of service delivery operations within the dockyards is a complex undertaking at the best of times. Fluctuating operational schedules (changing priorities and new work), limited workforce capacity (often spread out across several platforms), scarce and shared support assets (cranes, barges, vehicles, etc.), and the many constraints inherent to conducting work on ships and submarines (safety, RADHAZ, hot work, jetty movements, space de-confliction, etc.) all contribute to the coordination challenge. At present this is considering only the management of DND resources. The problem space becomes even more multifaceted with the introduction of a larger amount of In-Service Support Contract (ISSC) work. Relationships and processes will need to be established that will consider ISSC standard practices, while ensuring we can abide by the local constraints to still deliver an effective, schedule-focused program.

The primary task of Waterfront Management is to build upon our current framework to develop processes for coordinating all of the NEM activities conducted within the dockyards. This framework will need to include integrated and reliable schedules that provide ISSCs the means to effectively conduct their work in accordance with their contracts, but also allow for flexibility in work de-confliction, sharing resources, and changing priorities. The end result will involve not only the basic planning tools such as Gantt charts and Defence Resource Management Information System (DRMIS) data, but also governance to ensure stakeholders have open, collaborative lines of communication supported by an organizational design that will ensure the right people are locally enabled to be responsive to the coordination efforts.

Regardless of who is doing the work, the direction is to not duplicate support resources. Traditionally, the management of these resources – which include fixed and mobile cranes, floating cranes, barges and lighters, fueling barges, lay-down areas, jetties, jetty services, vehicles and forklifts, and special tools and equipment (load banks, etc.) – has had flexibility in how they are controlled and contained within

The primary task of Waterfront Management is to build upon our current framework to develop processes for coordinating all of the NEM activities conducted within the dockyards.

DND lines. ISSCs working within the dockyards, however, will need to draw on these resources to conduct their own work. This becomes a complicated problem when conflicting formation priorities impact ISSC tasks, thereby increasing the ISSC's schedule risk, which further challenges the performance-based contracting framework. The RCN must retain its flexibility to deliver on missions for Canada, so there may be occasions that will challenge contractors. The key element will be a framework of solid relationships between and among all stakeholders to develop flexible plans and resolve conflicts the best way possible to achieve priorities and minimize impact to operational and contractual requirements. With this in mind, a key component of Waterfront Management involves the analysis of dockyard

NEM resources to determine how we use them now, whether they are adequate for the demand, and how the planning for integrating ISSCs into the resource-sharing process will unfold.

The key challenge with this change is how the FMFs and contractors will work efficiently within our dockyards. Much of this depends on contractual terms and conditions that support the Waterfront Management processes that will enable effective and efficient service delivery. For example, if an ISSC needs a workspace or storage area within the dockyard, this needs to balance with all of the other requests, and must involve the FMFs and Regional Property Operations. We will also need to be cognizant that the developed contract terms and conditions do not rely on critical aspects of support beyond the NEM's organizational control, such as parking. We cannot sign the dockyards up for a requirement they cannot support. From a tactical standpoint, the establishment of contract management-focused sections within the FMF operations departments to manage and advise on the financial and contractual implications of work being executed in the dockyards will be important to ensuring schedule flexibility, resource sharing, and de-confliction efforts, while minimizing added costs to contracts. Having separate and stand-alone offices to oversee contractors outside the FMF chain of command will only add chaos to an already challenging and dynamic environment.

The management of information regarding job and project planning, and material status, is another key area for consideration. With regard to coordinating and de-conflicting the NEM activities in the dockyard, the FMF operations departments need to be able to see the work orders, job descriptions, and schedules of ISSCs. Furthermore, in order to track and maintain operational and regulatory requirements, the material status of equipment must be tracked and managed regardless of who conducts the maintenance. Waterfront Management is also in the process of investigating the information management requirements that will enable effective and efficient service delivery within the dockyards. Questions remain about what type of data is required, where it needs to reside, and so on.

These new strategic partnerships form a service delivery hybrid model that significantly increases the potential resources we have to maintain our current and future fleet. As any engineer would agree, more completed maintenance is never a bad thing, and should increase the operational readiness of the RCN. To enable the model, the Waterfront Management program will need to be well-established to help guide the coordination of work, and shape how we develop contracts in the future. This article really only scratches the surface of all the considerations necessary. The complete picture will take the collective effort of the naval engineering and maintenance expertise on the coasts – as well as the MEPM stakeholders in Ottawa – to present a common, professional approach on behalf of Canada.

FEATURE ARTICLE

NETE Spreads its Wings: A Facility Modernization Success Story

By Cdr Erik Tremblay and Serge Lamirande

NETE's main shop floor is the centrepiece of a modern engineering test and evaluation facility that is capable of handling the Navy's wide range of technical requirements relating to equipment and system performance. (NETE photo)

In 2017, the Naval Engineering Test Establishment (NETE) will have been serving the Royal Canadian Navy (RCN) for 64 years. This year also marks the completion of a significant facility upgrade and modernization project that was started in 2010. This important milestone was celebrated at a ceremony held on July 4, 2017, during which Patrick Finn, Assistant Deputy Minister (Materiel) in the Department of National Defence (DND), officially reopened the facility, including the completely rejuvenated East and West wings.

When NETE was founded in 1953, it was organized along a very unique Government Owned/Contractor Operated (GOCO) model, probably the first in-service support contract of its kind in the Canadian Armed Forces. NETE's mandate, which has remained unchanged since 1953, is: "To provide independent test and evaluation (T&E) services, with the aim of protecting the interest of the Royal Canadian Navy."

In the Spring 2009 edition of *CNTHA News*, the newsletter of the Canadian Naval Technical History Association, former senior naval engineer Vice-Admiral Robert Stephens, RCN (Ret.), told the CNTHA in an interview that NETE and the Naval Engineering Design Investigation Team (NEDIT) were established at the same time and co-located to leverage from each other during a period of new shipbuilding for the *St. Laurent*-class (DDE-205) destroyer escorts. NETE was founded primarily to test the steam turbines, pumps, and valves for the new DDEs.

"We needed somewhere to do testing," VAdm Stephens said. "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 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."

VAdm Stephens' vision, in terms of the need for independent verification and validation (IV&V) remains true today. Correcting faults and shortcomings in equipment and systems introduced during the design phase, or during manufacturing, can significantly increase the overall costs of a project, and lead to major delays.

The Director General Maritime Equipment Program Management (DGMEPM) has always faced unique challenges compared to the Air and Land branches since the Navy deals with never before built warship designs. Once these complex platforms are introduced to the fleet, the original equipment manufacturers do not necessarily stay around for 40 years waiting for a service call. As a DGMEPM requirement for new engineering test capability arises for validating replacement equipment, or for conducting technical investigations relating to equipment failures, DGMEPM will often seek NETE's support to find innovative solutions, or to provide independent analysis and recommendations on engineering issues.

When the *Iroquois*-class Tribals entered service in the 1970s, NETE began testing gas turbine engines, and also developed the Equipment Health Monitoring program.

Photos by Brian McCullough

The facility's enhanced welding and machine shops are equipped to manufacture and set up the unique test rigs needed for shock and vibration testing, environmental testing, pressure testing, or whatever else is required.

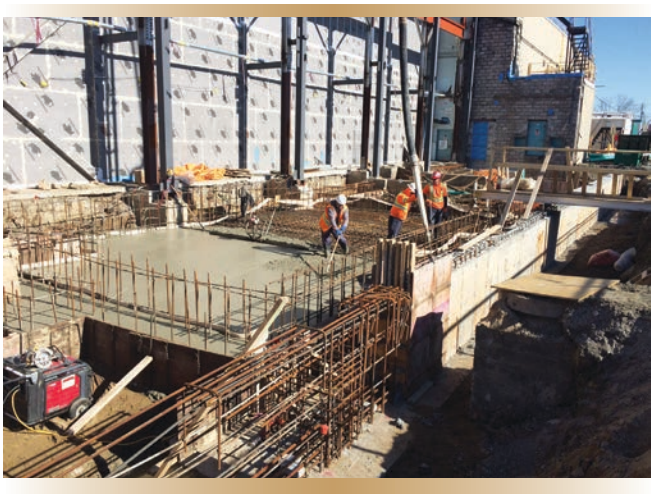


Photo by NETE

Testing and evaluation work continued throughout the 18-month NETE construction and modernization project. An integrated project team approach successfully ensured that both contractor and NETE security and safety protocols were observed.

With the introduction of the *Halifax*-class ships and their radically advanced sensors, weapons, and communication suites in the late 1980s and early 1990s, NETE improved its capability to support the RCN with the Naval Information System (NavIS), combat system operational test and evaluation (OT&E), and diesel generator testing. As the RCN renewed its submarine fleet with the *Victoria* class in the early 2000s, NETE introduced the ability to test escape and rescue components, as well as to provide investigation services on various other submarine systems. This is also when NETE extended its OT&E capabilities to include modeling and simulation.

As NETE's capabilities grew with each introduction of a new class of ships or submarines, and several new and ambitious shipbuilding projects were successively stood-up over the last few years, it became obvious that the existing facility could no longer support the required growth expected in the future. Hence, a major modernization and upgrade project was launched in 2010, aimed at addressing a number of shortfalls, including insufficient computer networking lab and server rooms, overcrowded workshops, and building code deficiencies.

The NETE Modernization and Upgrade Project has been a complex seven-year endeavour. Construction started in October 2015, and the building was officially accepted by DND in April 2017. The Modified Design Build approach chosen by ADM (Infrastructure & Environment) was being

used for the first time by Defence Construction Canada (DCC), a challenge in itself. But the complexity of the project was further increased by the prime directive to keep NETE operations going throughout the entire construction. This "renovating the kitchen while cooking" situation required a number of measures to be put in place, from the erection of hoarding walls between the wings and the shop floor, to the integration of contractor security and safety practices with those of NETE.

This 18-month construction/modernization was one of the most challenging projects that ADM(IE) and DCC personnel said they had encountered in their careers. It could not have succeeded so well without the impressive integrated project team mindset adopted, as everyone worked diligently to balance the needs of NETE operations with the requirement to keep the construction costs and schedule on track.

Today, NETE is a state-of-the art test and evaluation (T&E) facility, providing valuable advice and risk reduction measures to countless projects within the Naval Engineering and Maintenance framework of the RCN. The GOCO model, including the use of embedded contractors under a long-term performance-incentivized contract within a user-pay construct, has proven very effective. Many benefits of this approach include the ability to deliver tailored one-off solutions, responsiveness, corporate memory retention, continuity in projects, and streamlined bureaucratic processes. Independent T&E is essential to the RCN because:

- operating "untested" warships carries significant risks;
- it reduces program risks for both the RCN and the service provider (contractor);
- it improves efficiency and reduces costs by uncovering issues prior to the procurement and/or installation of a system for multiple ships;
- the use of simulation tools has proven to be a versatile and cost-effective method to achieve project objectives within the current trend of shrinking project resources; and
- in the end, it contributes directly to mission assurance and the safety of sailors at sea.

The RCN is on the brink of another significant fleet renewal phase. Despite the recent Defence Policy Review announcement calling for increased defence spending, the RCN is about to face the same predicament as it did in

Photo by Brian McCullough

It took 49 km of communications cabling to complete the upgraded server room that allows NETE to test and validate the Navy's shipboard local area network and crypto systems.

Photo by NETE

The diesel engine test cell provides support for the safe and reliable operation of critical equipment for the fleet.

1953 when NETE was first created: How to deliver substantially more sea power without a commensurate increase in its uniformed and civilian naval engineering workforce.

Fortunately, the facility upgrade and modernization project just completed provides the enabler for the RCN to meet the considerable T&E challenges that lie ahead, with the introduction of multiple new classes of ships within the next decade. And with the breadth and depth of expertise developed over the years, it is clear that NETE has become a centre of excellence in naval T&E – recognized as such both internally and within NATO. There is no doubt that NETE stands ready to help ensure naval equipment is fit for function, safe, and "up to scratch" for operations now and well into the future.

Cdr Erik Tremblay is Commanding Officer of NETE. Serge Lamirande is NETE Site Manager.

Upgraded NETE Capabilities

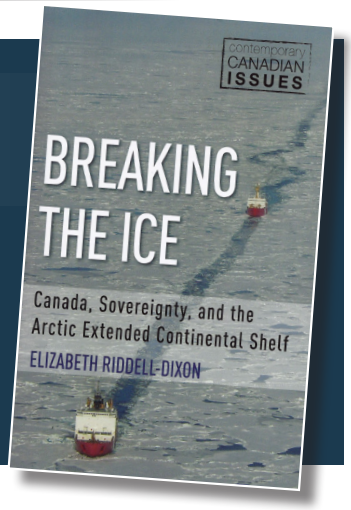
- A new information and communication systems laboratory, enabling the integration and validation of standard network operating systems and shipboard local area networks;
- Up-to-date shielded room, enabling the integration of secret local area networks and crypto systems;
- New multi-purpose combat system test area, enabling various technical investigations;
- Modernistic environmental test area, enabling solid and waste water testing, oily water separators, garbage reduction systems, and reverse osmosis desalination units;
- Enhanced workshops and additional work areas on the main shop floor, enabling better work flow between the machine shop, welding shops, and various test areas; and
- Additional office spaces.

Photo by Cpl Myki Poirier-Joyal, Imagery Section St-Jean Garrison

NETE Facilities Manager Mike Davies, DGMEPM Cmdre Simon Page, NETE CO Cdr Erik Tremblay, ADM (MAT) Patrick Finn, DCC Construction Coordinator Jean-François Simard, NETE Site Manager Serge Lamirande, and ADM (IE) Project Manager André Sirois.

BOOK REVIEW

Breaking The Ice: Canada, Sovereignty, and the Arctic Extended Continental Shelf



Reviewed by Tom Douglas – Associate Editor *Maritime Engineering Journal*

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344 Pages; illus; preface; prologue; list of interviewees; notes; bibliography; index

There's good news and bad news in this study of Canada's ongoing efforts to protect its sovereignty as Arctic nations vie for their fair share of the vast resources lying under the seabed in the northern reaches of the globe.

Fortunately, the good news outweighs the bad, due to the continued efforts of scientists and legal experts tasked with preparing Canada's Arctic Submission for the international Commission on the Limits of the Continental Shelf, and the extensive collaboration with Canada's Arctic neighbours – Denmark, Norway, the Russian Federation and the United States.

The good news and bad are interconnected according to the book's author, Elizabeth Riddell-Dixon, Professor Emerita in the Department of Political Science at Western University and a Distinguished Senior Fellow with the Bill Graham Centre for Contemporary International History, University of Toronto.

The author points out that while Canada has the second-largest continental shelf, exceeded only by that of the Russian Federation, the cost of extracting the oil and gas, and mineral resources within the seabed increases exponentially the farther into the Arctic waters it becomes necessary to go to retrieve them. Adding to the problem is that it is also an expensive proposition to undertake all the studies and reports necessary to keep Canada in the game as far as exercising its sovereignty over the land beneath its northern waters. Once again, this negative reality is offset by the fact that Canadian scientists and legal experts to date have been supremely suited to the task. Another bit of good fortune is that the other countries laying claim to what they consider their fair share of the goodies have been willing to work together in exploring the region and sharing their findings, due in part to the hefty price tag for these undertakings.

A photographic example of this international cooperation is depicted on the cover of the book where the Canadian Coast Guard Ship *Louis S. St-Laurent* and the United States Coast Guard Ship *Healy* are shown during an icebreaking operation.

Breaking The Ice focuses on a new frontier – Canada's effort to stay on a level playing field during ongoing negotiations under the United Nations Convention on the Law of the Sea (UNCLOS) aimed at determining the rights of the pertinent nations to extend the 200-mile limit of their continental shelf. The final survey to map Canada's Arctic Extended Continental Shelf (ECS) was completed in the autumn of 2016. The author points out that it will take several years to analyze the data, interpret the material gathered in terms of the provisions outlined in UNCLOS, and draft Canada's proposal regarding its Arctic ECS.

The federal government has indicated it expects to present its proposal to the Commission on the Limits of the Continental Shelf in 2018.

In her preface, the author suggests that the book's title has a double meaning in that it "...evokes images of icebreakers carving through thick Arctic ice... and of scientific teams drilling through metres of ice to lower their research equipment into frigid waters. It also has symbolic significance: conjuring mental images of telling a story previously untold that needs to be revealed."

She succeeds admirably in both these efforts.

News Briefs

Great collaboration on the *Kingston* class

Photo by Mona Ghiz – Public Affairs / Maritime Forces Atlantic

In April, the Commander of Maritime Forces Atlantic, RAdm John Newton, recognized the collaborative efforts of Royal Canadian Navy and SNC-Lavalin engineers in finding solutions that keep Canada's *Kingston*-class ships on mission at home and abroad.

Pictured are (L to R): RAdm Newton, Joe Pike – SNC-Lavalin, Marcel Hacquebard – SNC-Lavalin, Cdr Danny Croucher – DMEPM (MWVA), LCdr Frank Patsula – *Kingston* Class Manager, Colin Tancock – SNC-Lavalin, Dave Rossiter – SNC-Lavalin, LCdr Steven Morrell – AWGTO, Mike DeGiano (Don Brenton's Fire Protection), and Capt(N) C.T. Skjerpen – Commander Fifth Maritime Operations Group.
Not present: Gilles Labrie – DNPS 6-2-4, and Ken Pretty – MWVA 2-4-2.

Air Warfare Engineering Coin

Two Ottawa-based Naval Technical Officers in the Directorate of Naval Combat Systems were awarded Air Warfare Engineering coins in recognition of their exceptional service to the Directorate of Technical Airworthiness and Engineering Support (DTAES). The presentations were made in February on the occasion of the unit's 10th anniversary by DTAES 8 Air Warfare Engineering Manager Patrice Belanger (left) and DTAES Director André Pelchat to **LCdr Chris MacMullin** (centre left) and **LCdr Marc Lanouette**, thus according them "honorary member" status with DTAES 8. Bravo Zulu to both officers.

Photos by Bobie Wosowich

News Briefs (continued)

Last Pull for UNTD "Old Oars"

The "Old Oars" group of University Naval Training Divisions (UNTD) alumni gathered at HMCS *Bytown* Naval Officers Mess in Ottawa for the last time on May 31 to pay their respects to former UNTD shipmate, MP and Senator **Bill Rompkey** who crossed the bar on March 21, and to say farewell to one another. With the members of the group chaired by **Peter Milsom** getting on in years, this would be their last official function.

"Senat'oar" Bill Rompkey in 2015

Peter "Pete'oar" Milsom with "Doct'oar" Grant Thompson

Photos by Brian McCullough

News Briefs (continued)

Liverpool Breakup

Story and photos by Brian McCullough

It has been some years since I've done a pierhead jump, but when Liverpool, NS lobster fisherman **Jim Fraelic** kindly offered to run me across the harbour to see what was left of the old Tribal-class destroyers *Iroquois* and *Algonquin*, and the supply ship *Protecteur*, I didn't hesitate for a moment.

The ships were at the site of the old Bowater Mersey paper mill, being broken apart for scrap by R.J. MacIsaac Ltd. of Antigonish, NS. As we headed out aboard the *Mary Jane I*, named after Jim's grandmother, the former Bowater electrician warned me that there wasn't much left to see of the 24,000-ton tanker *Protecteur*, hidden from view on the far side of the dock sheds.

He wasn't kidding. Seeing the two destroyers in quite recognizable condition on the near side of the dock made the contrast even more shocking. Having served as a bridge watchkeeping officer aboard *Protecteur*'s sister ship HMCS *Preserver* back in the 1970s, I was at a loss for words as I snapped images of the chewed-up hulk that was hauled up out of the water. It was Jim who voiced what I was thinking:

"It's kind of sad in a way to see a ship like that," he said.

Amen to that.

The decommissioned Navy destroyers *Algonquin* (outboard) and *Iroquois* were still recognizable when these photos were taken in April. *Mary Jane I* owner Jim Fraelic stands with the last of *Protecteur* in the background. There wasn't much left of the huge ship one year after arriving in Liverpool, NS to be broken up for scrap.

News Briefs (continued)

DGMEPM Mentorship Program

At age 92, **Alex "Polly" Polowin** is the last man standing from the crew of the wartime Tribal-class destroyer HMCS *Huron* (G24). In March, the Navy veteran, a recipient of the French Legion of Honour (Chevalier), shared the story of his wartime service with a small group of officers and senior non-commissioned members at the *Bytown* Mess in Ottawa.

He delighted everyone with his description of the "new car smell" after joining *Huron* as an 18-year-old when the ship commissioned at the Vickers-Armstrongs yard in Newcastle-upon-Tyne in 1943, and with an impromptu harmonica solo to close things off.

He said of his time on board ship, "It was like family. There was a lot of joking and laughing on board. We loved a good story."

But he had a more sombre message as he described the fear and lack of sleep as they escorted the convoys of merchant ships from Scapa Flow to northern Russia on the perilous Murmansk run, battling both the harsh weather conditions and the determined units of the German navy. Being closed up at the guns for long hours was tough he said, but he found it calming whenever the captain would recite The Naval Prayer for the crew.

Photos by Brian McCullough

"It had a profound effect on you," he said. "You felt you were being taken care of by a higher power."

Read more of Alex Polowin's story in his own words as he told it to The Memory Project at: http://www.thememoryproject.com/stories/2192:alex-polowin/

AWARDS

2016 NAVAL TECHNICAL OFFICER AWARDS

Naval Association of Canada Shield

NTO Award photos by Lt(N) Fergus Lavelle

SLt Jean Boudreau
Highest standing, professional achievement and officer-like qualities during Naval Engineering Indoctrination
(With Cmdre Mike Cooper, RCN (Ret.))

Mexican Navy Award

NTO Award photos by Lt(N) Fergus Lavelle

SLt Bertrand Lambert
Top student, Naval Combat Systems Engineering Applications Course *(With Mexican Naval Attaché – Capitán de Navío José Manuel Ramírez Villalobos)*

L-3 MAPPS – Saunders Memorial Award

NTO Award photos by Lt(N) Fergus Lavelle

SLt David Palmer
Top student, Marine Systems Engineering Applications Course *(With Cmdre Simon Page)*

Weir Canada Award

NTO Award photos by Lt(N) Fergus Lavelle

SLt Ankit Kothyari
Top Marine Systems Engineering Phase VI candidate
(With Serge Lamirande)

AWARDS

Royal Military College of Canada Carruthers Naval Technical Officer Sword

Photo by J.E. Scott Howells

NCdt Thomas Song
For academic achievement and exemplary performance
(With Capt(N) Jim Carruthers, RCN (Ret.))

Appreciation for long-standing support to the Navy

Photo by Lt(N) Fergus Lavelle

The team from the *Maritime Engineering Journal,* represented by Brian McCullough, left, had a little surprise for **Cmdre Mike Cooper, RCN (Ret.)**, after the publication of our Looking Back feature on him in our last issue. Following the NTO Awards presentations in Halifax on April 27, the Chief Engineer of the RCN, Cmdre Simon Page (DGMEPM), right, expressed his appreciation to Mike for his long-standing support to the Navy, and presented him with a framed copy of the article.

CNTHA

News

Canadian Naval Technical History Association

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Memorandum of Understanding and Cooperation

By Don Wilson, CNTHA Webmaster

We are very pleased to note that Canada's 150th anniversary year may also be remembered as the 20th anniversary of the establishment of the Canadian Naval Technical History Association. Twenty years into our mandate, the CNTHA continues to support the Department of National Defence's own Directorate of History and Heritage (DHH) through the collection of interviews, documents, and items that "serve to preserve" Canada's naval technical history for future generations.

The CNTHA has always shared a strong relationship with the head of the technical branch of the Royal Canadian Navy – the Director General Maritime Equipment Program Management – who kindly offers us space within the *Maritime Engineering Journal*, itself celebrating 35 years of publication this year. In June, CNTHA Chairman Pat Barnhouse and Commodore Simon Page (DGMEPM) signed a Memorandum of Understanding and Cooperation that aligns our two organizations significantly better toward achieving the common goal of preserving a record of Canada's naval technical heritage.

The memorandum is based on the premise that the CNTHA can do its work better within a culture that understands the value of making the story of the RCN's technical history accessible to everyone, and that DGMEPM can support this work through better awareness and coordination between the current naval engineering enterprise and the CNTHA. As former CNTHA Chairman Mike Saker wrote in 2002:

> From the outset (in 1997), the CNTHA was very fortunate in securing the endorsement of the Director General Maritime Equipment Program Management. This was highly desirable, considering that DGMEPM and DHH share a professional interest in the CNTHA's goal of "*Preserving Canada's Naval Technical Heritage.*" The greatest benefit of sharing an audience with the *Maritime Engineering Journal* is that we are getting our message out to the engineering, technical and logistics support personnel, both military and civilian, who are managing the technical resources of the navy *right now*. This is crucial because these are the very people upon whom we are depending to document and preserve the continuing, "living" record of Canada's naval technical history.

The memorandum signals an exciting new spirit of cooperation that paves the way for much greater interaction that is productive for all concerned – historians everywhere, our serving naval personnel and Public Service employees, our industry partners, and the curious student who simply wants to know if our navy ever had a hydrofoil. What better birthday gift to offer Canadians during our national sesquicentennial year?

Happy birthday, Canada!

Welcome new member!

Historian **Dr. Chris Madsen** has joined our ranks at the CNTHA. Chris is Professor of Naval History and Military Law at the Canadian Forces College in Toronto, and president of the Canadian Nautical Research Society until August. His research interests are naval logistics and procurement, shipbuilding, labour on industrial waterfronts (Pacific Coast focus), and courts martial. We are very pleased to welcome Chris, as he has much to contribute to our technical history initiatives.

Canada