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CANADA'S NAVAL TECHNICAL FORUM

Summer 2002

IN THE "MODE!"

How the Maritime Open Data Environment is helping the navy manage its materiel support information

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Canada

Roughers: Warships Fight the Sea

Photo by Lt. Cdr. P.K. Carnie, RCNC

Looking aft from the quarterdeck of HMS *Campbeltown* in a moderate sea state, mid-Atlantic

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Maritime Engineering Journal

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Director General
Maritime Equipment Program Management
Commodore J.R. Sylvester, CD

The *Journal* is available on the DGMEPM website located on the DND DIN intranet at http://admmat.dwan.dnd.ca/dgmepm/dgmepm/publications

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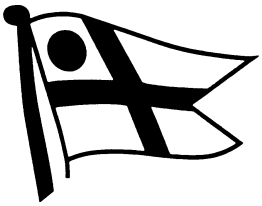

Commodore's Corner

Configuration Management — as Important as Ever

By Commodore J.R. Sylvester, CD
Director General Maritime Equipment Program Management

Operation Apollo has put to the test many of our material support processes. One such area is configuration management (CM) and its associated engineering change (EC) process. As stated in the Naval Maintenance Management System, "CM is that element of systems engineering, logistic support, and life cycle management which is applied to Naval systems and equipment including software to identify their physical and functional characteristics and to control changes to those characteristics."

Change control is exercised through the EC policy and procedures. Given the numerous mission fits required for Operation Apollo and the short timelines to implement these requirements, the operational imperative can result in the temptation to get the work done and worry about the paperwork later. I am also well aware that once a capability has been given to a ship there is a natural resistance to give up that capability once the mission is over. It is clear that strict adherence to CM principles has never been more important.

Every member of the material support community depends on there being an accurate record of the exact, authorized configuration of each ship. Without that, their ability to exercise due diligence in supporting the ships can be severely jeopardized. As the material authority, DGMEPM is responsible for ensuring that the fleet, by design, is materially safe given best practices. And since decisions are made based on our collective knowledge of a ship's *authorized* configuration, unauthorized changes could make some of these decisions invalid. Knowing the exact configuration of a ship also ensures that other requirements of material support such as sparing, documentation, maintenance support and training will be in place to meet operational commitments.

This is not to say that engineering changes are not encouraged; indeed, good EC proposals are welcome from anyone. But given our limited resources, the reality is that not all ECs can be implemented…even if they are good ideas. The EC process provides a critical review of all proposed engineering changes and ensures that only those that are cost-effective and/or essential are implemented. I must emphasize that all ECs, including temporary ECs ("mission fits") will follow the EC process without exception. The EC process does allow for the streamlined handling of urgent temporary ECs, but every step of the EC process is still completed.

You should also be aware that the engineering change process is not just about engineering, but is in practice three separate subprocesses or pillars, any one of which can stop an EC proposal. The **requirements** process ensures that the EC is a valid requirement, is

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Maritime Engineering Journal Objectives

• 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.

compatible with class plans and is worthy of further resource expenditure. The requirements authority, DMRS, approves the requirement for the EC.

The **material** process ensures that an impact analysis is completed and includes an assessment of technical feasibility/impact, safety considerations, implementation and in-service cost estimates, and an assurance that the implementation schedule is achievable. DGMEPM is responsible for granting material approval.

Finally, the **funding** process seeks approval to fund the engineering change, and once granted ensures that all resources required to implement the EC are available. The funding authority will vary depending on the type and nature of the engineering change. All three approvals, which are based on supporting analysis, are required before an EC can be implemented.

I have a responsibility to ensure that an accurate configuration baseline of a ship and/or system is maintained and that ECs have been implemented as planned. While configuration audits are conducted periodically, I rely more fundamentally on the professionalism and discipline of the naval community to ensure that discrepancies are reported and corrective action is taken. It must be remembered that the consequence of not maintaining a ship to an authorized configuration could be an unsafe condition resulting in an accident, or worse, an injury.

I believe the current EC process is well suited to maintaining the integrity of the configuration management of our ships, even with the demanding requirements of Operation Apollo. If there are instances where equipment changes were implemented prior to receiving full approval, it is critical that they now be properly documented. In addition, temporary ECs must either be terminated, or sent up for proper approval to become permanent. It is everyone's responsibility to ensure that configuration management is maintained within the fleet.

Branch Adviser Commentary

MARE Restructuring... ...the road ahead

Article by Capt(N) M.K. Eldridge, MARE Branch Adviser

The Past

As most people are aware, the Chief of the Maritime Staff directed the restructuring of the MARE Branch, based on a MARE Council recommendation to him, and subsequent discussion at Naval Board. A MARE restructuring working group worked with ADM HR Mil staff to examine a range of future structure options, and the result was a recommendation to transition to a structure of three specialties which would align with operational requirements, departmental strategy for material acquisition and support, and effective human resources management. This was formally communicated to the branch by briefs and in an earlier communiqué.

The Present

Accordingly, three new occupational specifications have been drafted: Marine Systems Engineer, Naval Combat Systems Engineer, and Naval Engineer (the terminal military occupation – MOC – for commanders and captains). Qualification Specifications Plan (QSP) boards will complete the occupational specialty specifications (OSS) for Naval Architecture and Naval Constructor, and define the requisite training adjustments for the new military occupations. QSP boards for both the new feeder MOCs, and the Naval Architect and Naval Constructor occupational specialty qualifications will commence in due course.

The previous PML has been divided among the three new MOCs, with MSE and NCSE roughly equal at approximately 240 offi-

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cers, and the Naval Engineer PML showing 54 officers. This will be the basis for future MOC management. The 2002 Lt(N) promotion boards have already been directed to compile separate MS and NCS promotion lists. We should see promotions by specialty in 2003, in parallel with the anticipated official implementation date of January 2003.

The Future

The navy capability planning guidance acknowledges the requirement for a study of the feasibility, and timeline for the implementation, of a single (generic) MARE MOC, the results of which are deliverable by next January. Having now embarked on this study, I am aware of increasing agitation within the branch over fears a decision may be made without due study. I emphasize that the deliverable is a study of the feasibility. The basic principles under which I am progressing are:

• Don't go fast if you don't know where you are going.

• Don't make decisions without the supporting facts and broad-based discussion.

In view of the many interlocking factors that govern the implementation, it is highly unlikely any alternative future vision will see reality before 2010.

Article and Letter Submissions to the *Journal*

The *Journal* welcomes **unclassified,** illustrated submissions, in English or French. To avoid duplication of effort and to ensure suitability of subject matter, prospective contributors are strongly advised to contact **The Editor, Maritime Engineering Journal, DMSS, National Defence Headquarters, Ottawa, Ontario, K1A 0K2, Tel. (819) 997-9355**, before submitting material. Final selection of articles for publication is made by the *Journal*'s editorial committee.

Letters of any length are always welcome, but only signed correspondence will be considered for publication.

As a rule of thumb, major article submissions should not exceed about 1,800 words and should include photos or illustrations. Shorter articles are most welcome. The preferred format is MS Word, with the author's name, title, address, e-mail address if available, and telephone number on the first page.

Please submit photos and illustrations as separate pieces of artwork, or as individual *high-resolution*, uncompressed electronic files. Remember to include complete caption information. We encourage you to send large electronic files on 100mb Zip disks or CD-ROMs, and to contact us in advance if your illustrations have been prepared in a less common file format.

If you would like to change the number of copies of the *Journal* we ship to your unit or institution, please fax us your up-to-date requirements so that we can continue to provide you and your staff with the best possible service. Faxes may be sent to: **The Editor, Maritime Engineering Journal, DMSS (819) 994-8709.**

MARE 2020 — Models for the Future of the Maritime Engineering Occupation

Article by:

Cdr P. Finn, P. Eng, OMM, CD, Commandant, Canadian Forces Naval Engineering School Halifax
LCdr Simon Page, CD, Officer Training Division Commander, CFNES
LCdr Randy Comeau, CD, Damage Control Training Division Commander, CFNES

During a MARE Town Hall meeting held in Halifax in November 2000, the Branch Adviser announced the Naval Board's decision to proceed with proposed modifications to the MARE 44 MOC, the occupational description for the MARE officer branch. The modifications, which were derived from the 1995 MARE occupational analysis, will eventually reconfigure the branch into a three-element pyramid of Marine Systems Engineers (MSEs), Naval Combat Systems Engineers (NCSEs), and all engineering branch commanders and captains.

The rationale for this is evident in the findings of the 1995 OA, which reported in part that the relationship between the various tasks, skills and knowledge sets required of MARE officers

> clearly depicted two major MARE officer groupings — Marine Systems Engineering and Combat Systems Engineering. The jobs performed by the Naval Architects and Naval Constructors were not independently performed but rather were found to be subsets of the larger Marine Systems Engineering group. This finding in itself suggested a significant disconnect between the current occupational structure for MARE and the job performance requirements of its officers. Furthermore, the analysis did not identify a common entry level job for the occupation upon which recruiting, selection, training, and initial employment can be based. The absence of such a job is also a serious deficiency in the current occupational structure.[1]

Although the OA defined a structure with two MOCs, a third occupation was added for all naval engineering commanders and captains in recognition of their management focus in those ranks.

While the pending change to create these three MOCs does not meet with universal approval, it is generally understood and accepted by the MARE community. But there is more to it than that. The Branch Adviser also said that the Naval Board had concluded this was to be an interim step toward implementing a single naval engineering officer occupation, in place of multiple occupations or suboccupations. The vision of how such an engineering officer would be trained and employed was not articulated by the Branch Adviser and was to be the topic of further study. Not surprisingly, the "single engineering" concept has been the subject of much debate among MARE officers in MARLANT, many of whom are concerned the idea may be moving forward too quickly and without consultation.

Two Perspectives

The genesis of the model for a single engineer classification is unclear. Proponents discuss the blurring of technology, simple demographics, the complexity and cost of recruiting and training engineers for various specialities, and crew sizes of future ships. They also state that the existing structure and training are focused almost purely on the Head of Department position, when in fact most of a MARE officer's career is spent in shore jobs where there is significant overlap in the employment of Combat Systems and Marine Systems officers.

Opponents of the model fear we may be moving too fast, without having sufficiently studied the matter. They contend that the complexity of technology today makes it more difficult than ever for one person to understand all of the necessary technical detail behind a modern warship. Some would even argue that we have already diluted our technical competency by eliminating the requirement for officers to obtain qualification tickets.

Both sides of this often emotional discussion have valid points; however, the structure of the MARE occupation of the future must not be based on emotion. If the occupation is to function effectively in the environment of the day, it must be designed to meet the often competing demands of the technology, training and personnel of the Canadian navy.

Technology

There is no question that some aspects of technology are blurring.

The control systems and man-machine interfaces of various combat and marine systems are de facto one and the same. Certainly in the context of the *Halifax* class the displays selected for the IMCS and CCS are identical and were selected to ensure economies of scale in spare parts and maintenance. However, the similarities in combat and marine systems largely end with the control components. Prime movers and other propulsion-related systems remain rooted in the traditional mechanical engineering technologies, while the combat systems are predominantly anchored in the electrical and electronic domain. This delineation remains the trend in modern naval warfare. Although there may be innovative designs being tested, the short to medium term will continue to see warships with gas turbine, diesel, or steam propulsion (conventional or nuclear), and fitted with radars, sonars, radios, missiles and guns. In other words, all the traditional engineering disciplines from fluid dynamics to circuit analysis will remain germane to a shipboard engineer for decades to come. That reality certainly reflects the civilian environment: individual engineering functions have not been replaced by a single systems engineer.

This is not to say that one individual could not develop the expertise required to provide the necessary engineering officer technical oversight for all systems on board a warship. It would involve extensive training to gain the necessary exposure, but one could design a model predicated loosely on a combination of the current combat and marine systems training to create such an officer. The result would be a significant lengthening of the MARE training, which is already the longest officer training profile in the Canadian Forces. Alternatively, oversight of all onboard systems could be achieved by shifting more responsibility to the senior non-commissioned members, but this would first require an analysis of the technical NCM occupations to ensure they possess the necessary skills and knowledge.

Personnel

When debating the future structure of the MARE MOC, one must consider the availability of personnel to fill positions. The aging of Canada's population will outpace the population growth in the coming decades as the baby boomers approach retirement, and by 2020 there could be a significant shortage in the Canadian labour market[2]. This means that engineers and other highly skilled professionals will be free to pick and choose their places of employment with no worries about job security.

The Canadian Forces generally, and the MARE occupation specifically, will have to deal with that reality by becoming an employer of choice. Not only will we have to offer interesting and diverse employment, but the transitory nature of employees will mean that junior officers must not remain in the training pipeline for extended periods. Locking junior engineers into the training system for several years may only result in their serving a relatively short career in the navy with no opportunity to actually do a job.

Compounding the demographic impact on the supply of people will be the navy's ability to provide suitable remuneration. Given that today's defence spending has a purchasing power roughly equivalent to that of the mid-1970s[3], it is doubtful we will be able to increase compensation packages significantly in the coming years. The ongoing need to invest in equipment will certainly create pressure to reduce our personnel costs. The only way to remain competitive in hiring young engineers may be to reduce our overall numbers, and compensate them as necessary. That reduction would create a requirement for more generalist officers who could serve in a multitude of operational roles across the Canadian Forces.

Training

What makes the Maritime Engineering profession unique from most other non-military engineering jobs in Canada is that we are trained to operate in a hostile environment that requires the ability to make snap decisions that can have life or death implications. Having to lead a department at action stations is the most difficult job a Maritime Engineer can be called upon to undertake. It is also the job that makes us part of naval operations and necessitates the wearing of a uniform. That aspect of our profession can only be acquired through training at sea. The complexity of the Head of Department position is such that we must maintain the emphasis on training at sea. The move to tiered readiness has impinged on that training by reducing sea time for engineers under training. Even though they may be posted to a ship, many officers get only minimal time at sea and often do not gain hands-on experience across the entire spectrum of engineering duties. The qualification of department heads should be tied to a minimum amount of actual time at sea (vice time on board) to ensure their competency is not eroded. But bunk space is already limited in the fleet, and will become even more critical when the next generation of ships with their smaller crew sizes take their place in the line. Insisting on more sea time will likely reduce the number of officers who qualify.

The MARE occupation currently provides virtually all MOC training early in an officer's career. This training focuses on the Head of Department job, when in fact this is only one of many functions that all Maritime Engineers are expected to fulfill. If the demographics are now pointing to a need for more versatile en-

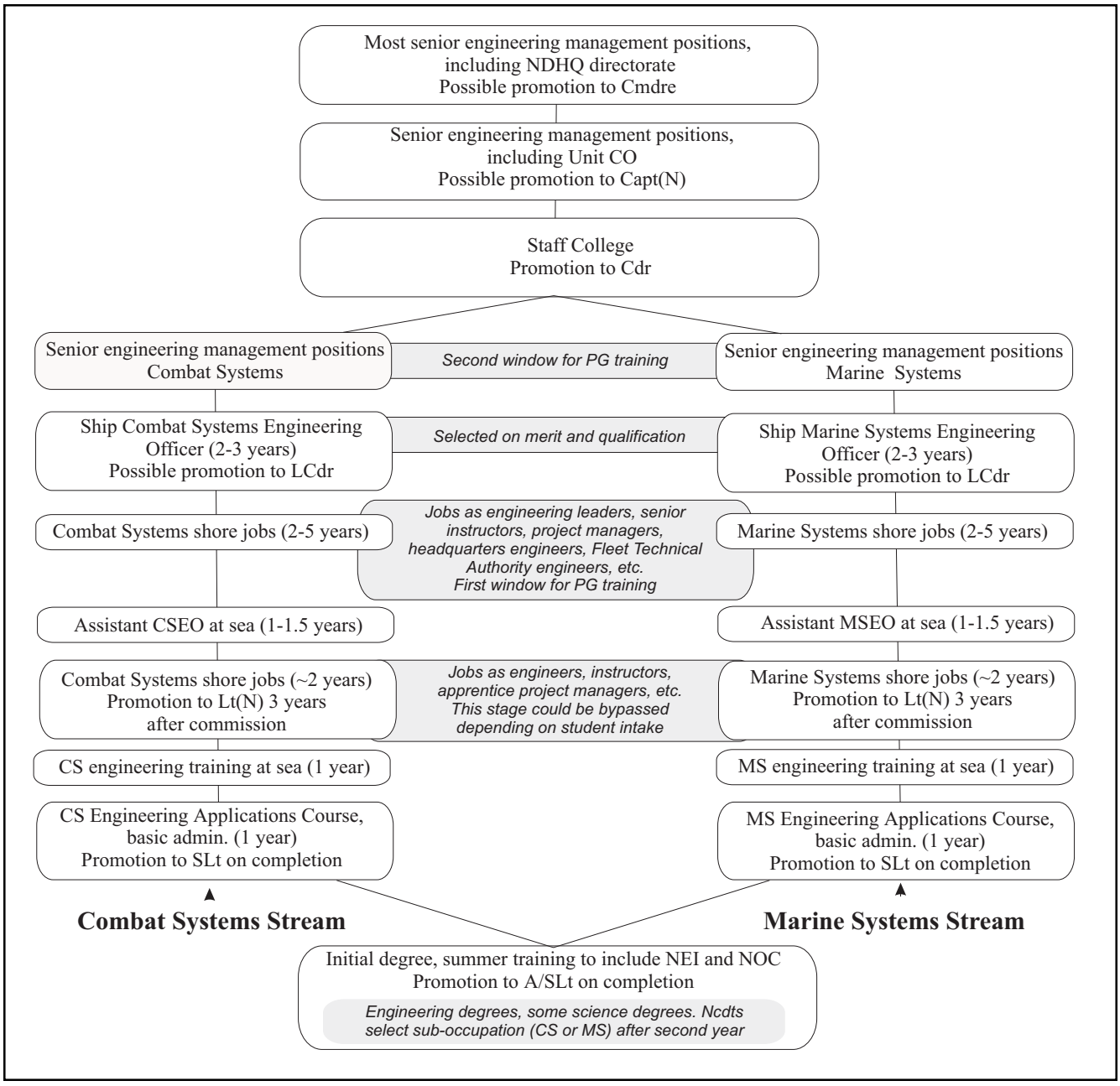

Figure 1. Status Quo

gineering officers, MARE training will have to begin providing greater emphasis on resource and project management. And what is more, this training will have to be delivered "just in time."

The Town Hall debate to date highlights the difficulty planners face in setting the training requirements for our Maritime Engineers of the future. Where a study of the complexity of new technology seems to conclude that MARE officers will require more in-depth technical training, the demographic pressures and employment profiles appear to demand either less training, or training that is more distributed across an officer's career.

MARE Occupation Models

The discussion shifted to designing models for the MOC that could effectively deal with the key factors that will affect the MARE occupation in the years to come. Several models were constructed, which after further analysis were determined to be variations of three basic structures:

- Status Quo
- Single MOC, dual Occupation Specialty Specification
- Single Engineer Concept

Status Quo (Fig. 1)

The status quo is the model resulting from the occupational analysis

completed in 1995 and implemented in 2002. Given that the new structure had not been implemented at the time of writing this paper, it is difficult to speak authoritatively on all the pros and cons of the approach. Having said that, the structure is not a dramatic departure from the historical MARE MOC and was undertaken primarily to deal with human resource management issues vice employment of personnel within the MOC.

The status quo certainly deals with the technology spectrum by developing two distinct groups of officers: one with technical expertise in the combat systems field and another with expertise in marine systems. Although this approach has served us well on board ship, it does not necessarily provide the breadth of resource management experience required for subsequent employment in projects and other staff positions. The model would be enhanced by the addition of post-HoD (head of department) training to fill the gap. Creating a mid-grade staff course would provide the requisite training "just in time" to the officers who choose to stay beyond their initial terms of service.

The status quo is certainly a model that simplifies the human resource management aspect of the MOC. Personnel are recruited for combat systems employment, and surpluses and shortages can be identified well in advance. The structure has generally locked people into a given area of technology and makes it more difficult to provide a broad spectrum of employment opportunities. That aspect has historically been a dissatisfier for officers who aspire to senior leadership positions in the navy and in the Canadian Forces.

Single MOC, Dual OSS (Fig. 2)

The model of one MOC with separate occupational speciality specifications (OSS) for Combat Systems and Marine Systems would broadly mirror the existing MARS (Maritime Surface and Subsurface) MOC approach. MARS officers receive initial training, which culminates in their Level II Certificate of Competency. Subsequent employment is predicated on "just in time" training prior to an officer assuming new responsibilities. From navigator to above-water warfare director, to deck officer, to combat officer, specialty training is provided only after an officer has been selected for employment. This approach provides flexibility and a variety of employment opportunities, which allows the MARS community to tailor careers to suit the desires of individual officers as much as possible.

Using the same approach, MARE officers would complete their engineering or science degree, then receive initial training to cover the

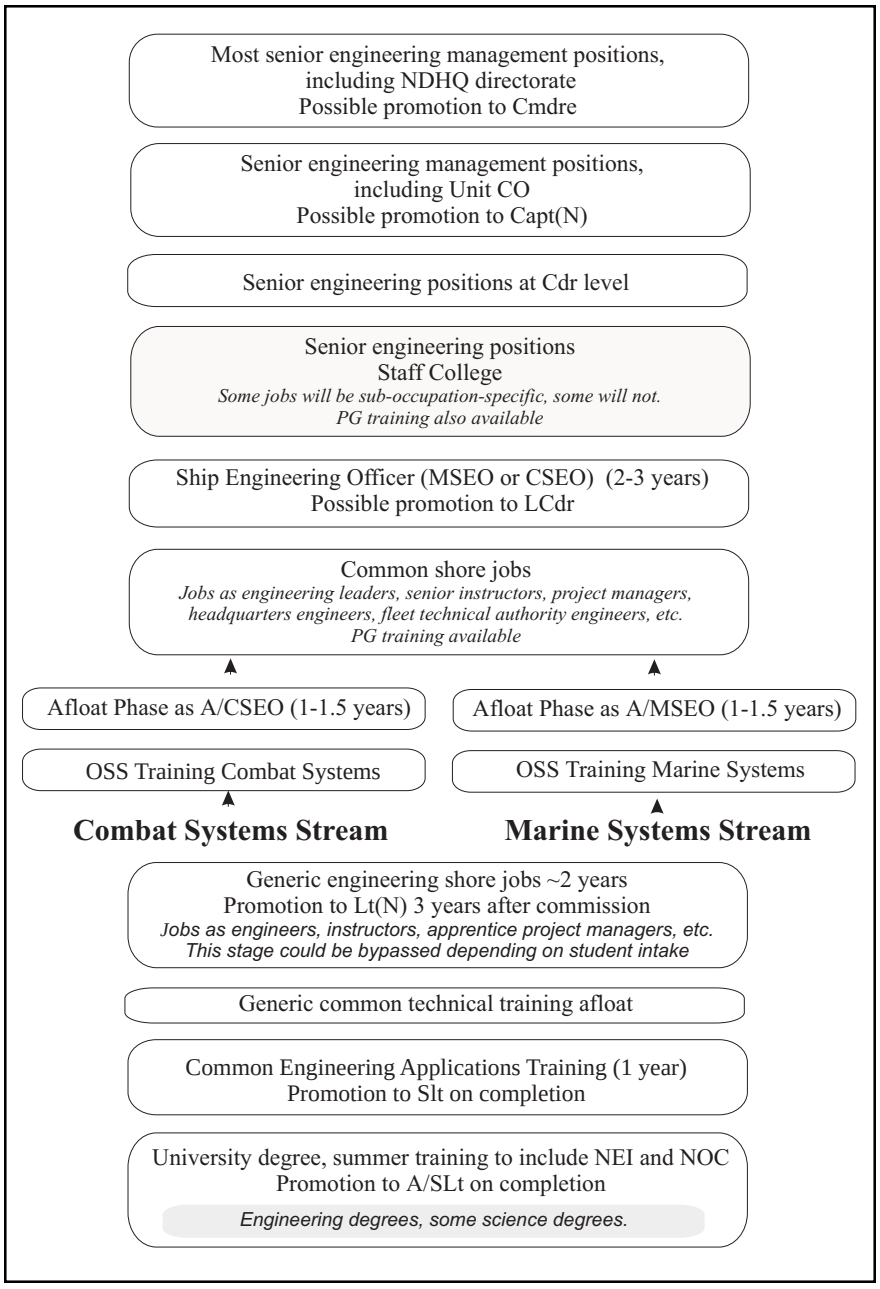

Figure 2. Single MOC, Dual OSS

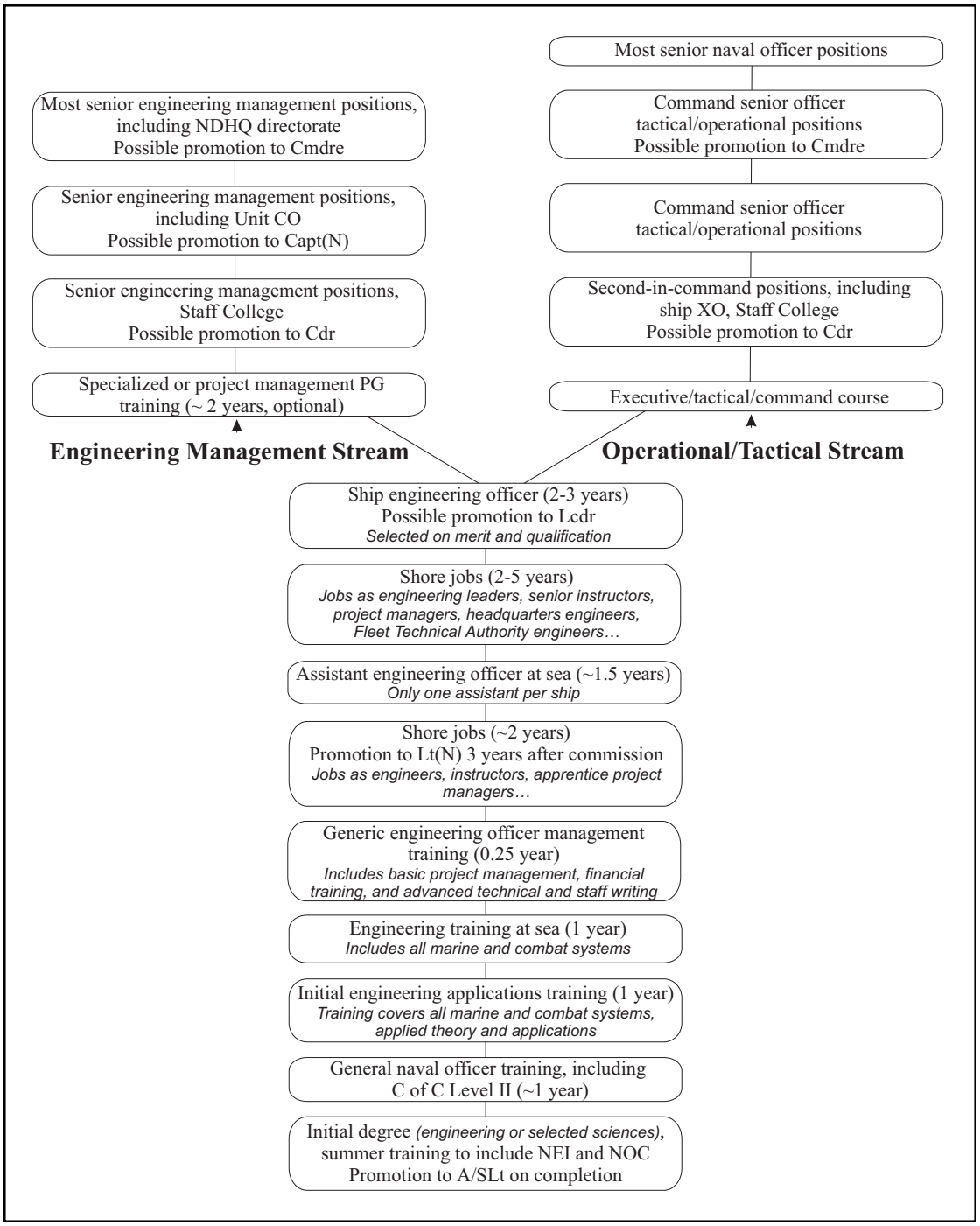

Figure 3. Single Engineer Concept

entire spectrum of shipboard technology. They would be subsequently employed in an engineering function ashore. Once selected for employment as Combat Systems or Marine Systems engineers, they would receive the requisite training and be employed on board ship in that capacity. An officer could later be selected to go back to sea in the other field of engineering, and would again receive the necessary training prior to proceeding to the new assignment.

This model would provide MARE officers with a broad exposure to shipboard technology and would also provide the detailed level of training department heads need to perform proficiently in their specific area of responsibility at sea. The model also provides flexibility for individuals to seek a broad spectrum of employment in engineering, but complicates the human resource management by delaying selection of specialty training. A post-HoD staff course would still be required to provide training for senior staff positions ashore.

Although this model provides more flexibility for employment than the status quo, it does not optimize employment opportunities and would still see MARE officers largely limited to jobs in the engineering field.

Single Engineer Concept (Fig. 3)

The single engineer model is the most significant departure from the existing occupational structure and would offer the greatest variety of employment. In fact, the model would create a de facto naval officer branch where individuals with the appropriate skills could move from executive to technical positions with relative ease. To facilitate that movement, the Level II Certificate of Competency would be required for MARE officers to ensure they pos-

sess a basic foundation in naval operations. From a human resource management perspective this model is adaptable and would permit the movement of personnel to deal with shortages.

The single engineer approach would reduce the level of detailed technical knowledge acquired at the junior officer level because of the requirement to obtain a Certificate of Competency. However, properly focused application training and subsequent training at sea would ensure that MARE officers possess the knowledge and skills they need to perform as a head of department. Since officers' reliance on the technical ability of the non-commissioned members (NCM) would likely increase, the skills and knowledge of the technical NCM occupations would have to be reviewed.

The greatest strength of this concept is the variety of employment opportunities it would present. If Canada does undergo a labour shortage as described earlier, the engineering profession could be especially hard hit. Therefore, we must be able to provide the greatest variety of employment opportunities to attract people to the navy. This structure would allow those officers who would choose to continue down the path of a more technical career to do so. On the other hand, officers wishing to join the executive path and become more involved in the overall running of the navy would be free to do so.

Discussion

Each of the models in some way deals with the critical factors affecting the future structure of the MARE branch. The status quo appears to provide the greatest technical expertise for shipboard employment, yet does not provide optimum opportunity for post-HOD employment. The second model (single MOC, dual OSS) provides more latitude, but remains principally focused on the technical employment of MARE officers. The third provides the greatest opportunity for a wide spectrum of employment, but potentially reduces the time spent acquiring detailed technical knowledge.

Any model that is eventually adopted must be designed to ensure that MARE officers are trained to fulfill their assigned duties at sea. A number of post-command senior MARS officers were asked what it was they wanted in an engineering department head, and in every case they said they wanted an officer who possessed the leadership and management skills to lead a department — in other words, a naval officer with a technical penchant. Any of the three models presented here could fulfill those requirements.

Conclusion

When we decided to write this paper we had neither a clear picture of the future of the MARE occupation nor consensus on our views. However, the process of writing necessitated a great deal of discussion which proved to be very useful in highlighting several points. First, that developing a model for the MARE occupation in 2020 is far more complex than first anticipated, given the requirement to satisfy a number of conflicting factors. Second, that there are in fact a number of models that could meet the navy's needs for engineering officers in the future. And third, that before any further changes can be made to the occupation, a detailed study must be completed that should include an occupational analysis as well as a better understanding of what the fleet will be in 2020.

This paper focuses exclusively on the MARE occupation; however, many of the pressures and issues facing the officers in the Maritime Engineering branch also affect the non-commissioned members. As a result, changes made to the knowledge base and technical expertise of the officers must be balanced by commensurate changes to the NCM occupations to ensure the branch fulfills the navy's naval engineering requirements.

The discussion and debate that surrounded the writing of this paper were both healthy and educational. It is the authors' hope that this paper can be the catalyst for discussion across the MARE occupation.

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MODE:
How the Maritime Open Data Environment is Helping the Navy Manage its Materiel Support Information

Article by LCdr (ret.) Brendan Nolan

Time was when the delivery of a technical data package (such as it was) for a ship was associated with large trucks, lots of boxes, strong backs and long hours of work. In 2001 DGMEPM took delivery of the first of the technical data for the *Victoria*-class submarines. The delivery comprised approximately 3000 publications, 8000 drawings and 750 structured Equipment Record Numbers — all of it contained on 60 CD-ROM disks. The *Victoria* class desk at National Defence Headquarters was sufficiently confident in the information to release it for immediate dissemination on the Defence Wide Area Network (DWAN).

The success of this effort had its roots six years earlier. In 1995 the Policy & Information Management section of the Directorate of Maritime Management and Support (DMMS 6) began examining the problem of managing materiel support information in the age of desktop computer technology. The accepted strategy in those early days focused on the use of short-lived software application programs that would inevitably be subjected to endless updates with no offer of backward compatibility. Considering the comparatively long life of a warship, this was clearly an undesirable route for the navy. After two years of looking at application-centred approaches, we concluded that the available commercial products represented neither good value for our money, nor adequate progression from the status quo.

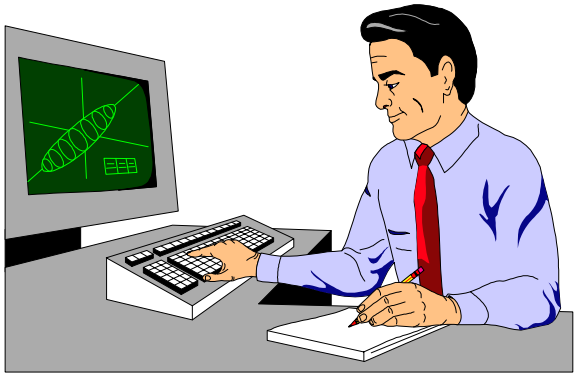
We shifted our attention to the raw data itself, concentrating on a way to manage the *essence* of our information assets in an application-independent form. In 1997 we built a prototype Operational Data Store which could hold the navy's materiel support information and provide an environment in which we could manage it. From this work it became apparent that the concept of managing data as information objects outside of a process application was viable.

During late 1998 and early 1999 the wider concept of the Maritime Open Data Environment (MODE) began to be formalized, and at its heart was a growing Operational Data Store of materiel support information in accessible SQL/ODBC data bases and Standard Generalized Markup Language (SGML). Today, information managers in DGMEPM continue to work with the navy's materiel managers to expand and exploit the benefits of the Maritime Open Data Environment.

The Open Data Environment

An open data environment is not a new concept; neither is it peculiar to DGMEPM. Charles Goldfarb, one of the original founders and thinkers behind SGML is a proponent of open information management[(1)] where all data must be manageable by any program, not just the program that created it.

It could be argued that the Internet is a good example of an (essentially) unregulated open data environment. The private sector is an ad hoc, heterogeneous, unregulated (in the IT sense) environment. The anarchy that characterizes this environment is also the strength that forces better solutions to market on an almost daily basis, but the gymnastics required to keep pace with this scope of change are significant. If ADM(Mat) cannot keep up, the Department of National Defence will pay an unnecessary premium on procurement and support costs which must affect the effectiveness of the Canadian Forces. In fact, the Maritime Open Data Environment has



been evolving in DGMEPM over the past 17 years. It is only recently with the build of the Operational Data Store that we have developed confidence in our ability to manage and sustain such an environment, recognizing its full benefit in managing Canada's naval materiel support information.

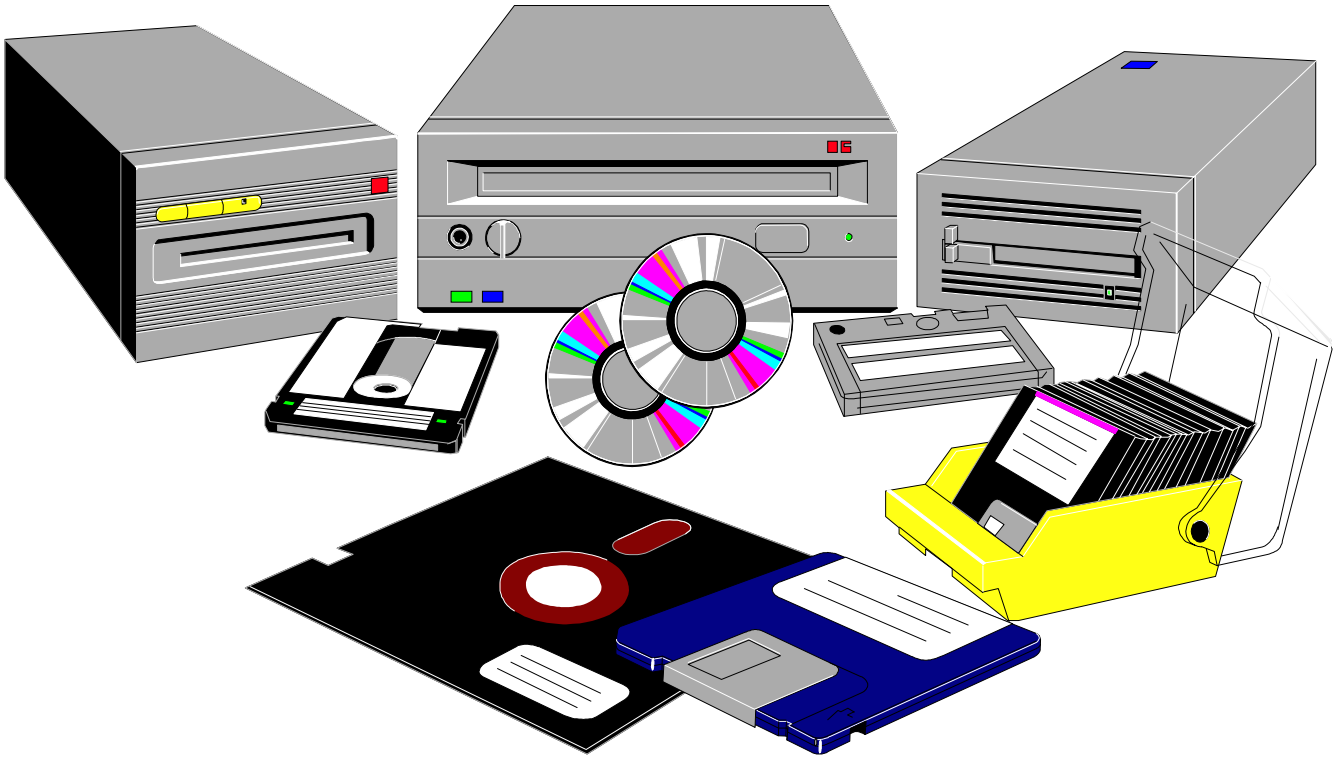
The Maritime Open Data Environment exists to allow managers to use their information assets in whatever form they require to meet a particular business requirement. MODE seeks to leverage the infrastructure of the DWAN and apply minimal constraints on managers (to avoid uninformed degradation of the information asset), while meeting our collective responsibility as stewards of the public record and managers of the public purse.

MODE centres on the easy manipulation of key data, text images and other "information objects" that DND requires to manage its naval systems throughout their life cycles. MODE provides an overall information system architecture for preserving essential life-cycle materiel management data on naval systems in a format that may be used and reused by many different applications for whatever purpose a maintenance manager, senior manager, operator or design agent requires.

MODE is application-independent since the database remains accessible by successive generations of business technology software. "MODE aware" application programs are still necessary, however, for they are the interface by which users access the environment to import and process the raw data in MODE's Operational Data Store. Industry will not need to know the specifics of our work environment, nor we theirs beyond what is required by our duties as quality assurance representatives on the contract. All we really need know is the interface requirement. With our datacentric view of the environment, we were able to construct a simple application based in Microsoft *Access*™ that provides the interface to anyone who has a requirement to work with us.

In short, the Maritime Open Data Environment provides an organizational, technological and managerial framework for storing the important information we use to manage ships throughout their life cycle. By making that framework and data accessible through a variety of different software application programs, managers can choose the IT tools that best suit their particular requirements for the job at hand. MODE is neither a silver bullet nor a free lunch — it requires some elbow grease to organize yourself, but once that is done the annual membership fee is the lowest in town.

How is the Maritime Open Data Environment going to affect your work at sea and ashore? Most people will not notice any immediate change. One of the constraints placed on us in 1995 by our director general RAdm Gibson was that any IT improvements advanced by DMMS 6 were not to drive a business change. Rather, the requirement to change or enable business would drive the requirement to change deployed technology. There was no new money, so whatever we did had to be financed from within. Over the past five or six years we have been fortunate to work with materiel managers who are experiencing IM problems that need to be solved before they can improve their work



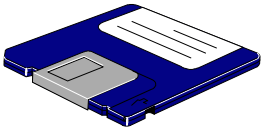
practices. These managers have funded our work as part of their support costs and the overall cost of doing business, so the infrastructure is naturally evolving and improving. DGMEPM now has the capability to quickly and easily exchange large volumes of electronic data with any organization, thus removing a considerable amount of the drudge work associated with managing technical data packages.

Operational Data Store

As mentioned, the heart of the Maritime Open Data Environment is the Operational Data Store, which contains the catalogue of business information objects and defines the key relationships between these objects as defined by the functional managers. Information objects can be as small as a paragraph or as large as a set of books, and may comprise graphics, text, data records, video and audio materiel in any order and quantity. The key here is consideration of what constitutes useful information. A topic is essentially the minimum standalone module (object) of useful information that may be used and reused in multiple documents (i.e., larger information objects).

For those who like metaphorical comparisons, the Operational Data Store is a set of information trees which self-prune as the business object set changes. The boughs of the tree can be adjusted to expand or reduce the core data requirement for any object, with minimal impact on in-service applications. Since the ODS does not manage any business process, changes can be made to the core data efficiently and economically, by leveraging the power of current desktop office automation tools while we wait for the application management processes to respond to the change.

The Operational Data Store will be a key element of our migration to MASIS, the ADM(Mat) Materiel Acquisition and Support Information System designed to support all materiel acquisition and support activities for Canadian Forces for the foreseeable future. In essence it has not cost anything we would not have spent on some other activity preparing for MASIS, but in this case we will end up with a utility to manage other activities. The critical architecture is now in place.



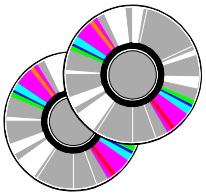
Because the Operational Data Store does not exercise management control over the information within it, the content can be easily and inexpensively adjusted to meet changing requirements. Just as open data standards such as SGML and XML separate content from presentation, the ODS separates our baseline information requirement from technology, in other words separating the IT from the IM. This means:

• There is a physical representation of the organization's information baseline that can be monitored to measure growth, change, costs and other physical management functions. Information management becomes a reality, not a by-product of technological "progress." Input to and output from the ODS provides the litmus test of the information system's "openness."

• Adoption of a particular format is not a technology decision. A manager can have reasonable latitude in selecting the best-value decision.

• There is a functioning back-out option should the information system prove unsatisfactory.

• There is reasonable assurance that the products of the system can be supported over the long haul in a free market economy.

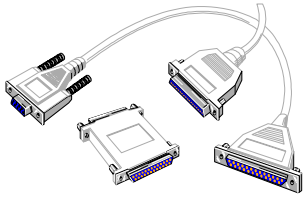


• Information technology can be implemented independently of information management.

• The producers of the information have information systems optimized to their daily work requirement.

• The consumers of information have a "one-stop shopping" repository.

The "here today, gone tomorrow" nature of information technology ensures that many complete IT and product life cycles will be completed during the life cycle of one warship. Materiel managers in DGMEPM must therefore make an assessment about accepting the current commercially available information, or paying a premium on procurement to obtain more suitable information formats that will be less expensive to maintain throughout the expected life of the equipment. Such decisions, which need to take into account the relative cost of the system and the associated information package, are clearly the domain of the materiel managers and not the IT managers. The Maritime Open Data Environment supports the materiel managers with a flexible technological response to dynamic market conditions.



MODE provides a durable solution to IM asset management because MODE was not designed to use a web or any other technology. By focusing on the information requirement, and not the technological bells and whistles, we are able to separate data from application, content from presentation, and IM from IT. As a consequence, we are well positioned to take advantage of any developing technology early and on a large scale when it makes sense to do so.

The technical document management process that is currently measured in months will be measured in

days, meaning the fleet should start to see improvements in the accuracy and timeliness of technical information available to the technicians and engineers, something that has been severely criticized in recent years. With the coming deployment of SHIPLAN, the automated update of onboard technical data should also become a reality. The Maritime Open Data Environment offers the potential to accelerate this evolution; specifically:

• The material support technical data available to users will be more accurate, more timely, more consistent and more useful because information search and recovery will be facilitated.

• Materiel managers will be able to generate effective electronic technical manuals that provide interactive diagnostic support to the user/maintainer. Using current techniques, these manuals are relatively expensive and support-intensive to maintain, but adopting MODE practices will ensure they can be developed inexpensively and without a crippling support burden.

• For our senior managers and leaders, adopting MODE practices will facilitate information profile management and the manipulation of consistent, accurate information which will improve the consistency of answers to strategic questions.

• Project managers of major Crown IT projects like the Materiel Acquisition and Support Information System (MASIS) will find better quality data and uncomplicated data migration requirements that will enable their applications to be more effective, more capable and quicker.

• IT/IM and knowledge managers can focus on managing the infrastructure without being the target of criticism for business matters that are clearly beyond their control.

• Over the next five to ten years we should see a safer work environment, and improved system reliability and availability.

The increasing presence of tools in the market place that will support MODE, along with the growing adoption of web technology as the IT tool of choice for the commercial sector are solid indicators that our direction is good. In addition, it should be noted that the US Air Force seems to see similar benefits in such an approach.[2]

In short, MODE is a child of the Mother of Invention. It is a progressive approach to managing information system architecture that facilitates the business-driven evolution of the integrated electronic work environment and communication infrastructure. In so doing it leverages previous investments in IM infrastructure to the extent that it makes sense and empowers managers to provide timely and accurate information services as efficiently and economically as possible to their target client or customer community, colleagues and business partners.

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1. Goldfarb, Charles F. and Paul Prescod. "The Charles F. Goldfarb Series on Open Information Management," *The XML Handbook*. Prentice Hall PTR, 1998.
2. Courtney, Lieutenant Colonel John. "AF Logistics Integration: In Plain English," *Logistic Spectrum*, Vol. 35, Issue 3, July-September 2001.

LCdr Nolan is the former DMMS 6 Division Chief Information Officer. He is now a civilian, working as Information Systems Manager in the Directorate of Materiel Group Information Management.

Guidelines for Writers

As a rule of thumb, major article submissions should not exceed about 1,800 words and should include photos or illustrations. Shorter articles are most welcome. The preferred format is MS Word, with the author's name, title, address, e-mail address if available, and telephone number on the first page.

Please submit photos and illustrations as separate pieces of artwork, or as individual *high-resolution*, uncompressed electronic files. Remember to include complete caption information. We encourage you to send large electronic files on 100mb Zip disks or CD-ROMs, and to contact us in advance if your illustrations have been prepared in a less common file format.

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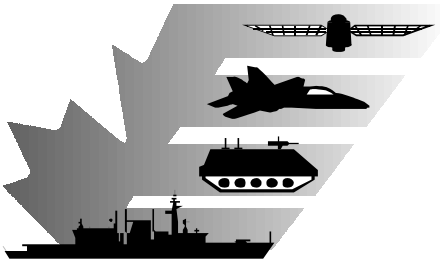


MASIS: Naval Rollout of the Materiel Acquisition and Support Information System

Article by LS Isabel Estan

MASIS is under way! January 14, 2002 marked the kick-off of the design phase for the naval rollout of MASIS, the Department of National Defence's integrated Materiel Acquisition and Support Information System. The long-anticipated system will track military equipment throughout the entire life cycle, from requirement specification and procurement, through in-service management of repairs and maintenance, to final retirement.

The design phase is now in full swing as teams configure individual business processes using integrated SAP R/3 system software. Interfaces, data conversion programs and customized reports are also being designed, developed and tested in preparation for integration testing during the implementation phase of MASIS scheduled to begin later this year.

Integrated Materiel Management

MASIS derived from a 1994 initiative to amalgamate an unsustainable number of legacy "stovepipe" engineering and maintenance systems across the Department of National Defence. As a capital project MASIS will provide an integrated departmental life-cycle management information system for DND equipment, phasing out such familiar systems as:

- Yorvik
- CMIS Mk II
- OASIS
- CMIS/S and
- Workman

The MASIS Project organization includes a team of contractors from IBM and a team of DND/CF personnel charged with overseeing their performance. The fundamental aim of the project is to bundle various sources of information within one integrated source – which is where the SAP R/3 software comes into play. SAP R/3 is known in the industry as an enterprise resource planning tool; in other words, a system of closely linked application modules that can replace existing systems on a corporate basis. It is this that makes MASIS feasible, using the following application modules:

- Business Warehouse (strategic and performance measurement reports)
- Document Management (management, storage and use of corporate documents and technical data)
- Finance and Control (business planning, budget/project management)
- Materiel Management (service/materiel procurement, materiel receipt, quality management and invoice verification)
- Plant Maintenance (engineering life-cycle management, weapon maintenance)
- Omega Project Systems (inventory/technical/fleet data management, and logistics support analysis)
- Project Systems (project management)
- Quality Management (inspections)
- Environment Health and Safety (life-cycle management of hazardous or restricted materiel)
- Workforce Management (human resources)

Maritime MASIS Rollout

While MASIS will eventually be implemented sequentially in phased rollouts across all three environments, the navy is first up. DGMEPM and CMS jointly determined that MASIS will fulfill vital service needs, and agreed there were significant advantages to having the navy undertake the first full environmental rollout. The Maritime MASIS Acceptance Project (MMAP) was thus formed to co-ordinate the support of the user community and to ensure the navy receives the best possible solution from MASIS. The project was also charged with configuring MASIS with an eye toward future requirements, permitting the navy (as well as other environments) to take advantage of evolving functionality in SAP R/3.

The active implementation of MASIS throughout the naval community is referred to as the Maritime MASIS Environmental Rollout (MMER). The rollout, which will touch virtually all organizations concerned with ship maintenance, has been phased to systematically achieve the complete implementation of MASIS throughout the navy according to the following schedule:

Analysis Phase
(Completed Sept. 10 – Dec. 17, 2001)

Work processes, business rules and data structures that will later govern the conduct of materiel acquisition and support business were defined through a series of workshops conducted in Ottawa. Personnel were divided between a core team of full-time participants and an extended team of part-time partici-

pants. The formations and DGMEPM each contributed up to 12 core members and 20 extended team members, with CMS contributing an additional four core members and 16 extended team members.

Design Phase (Jan. – Sept. 2002)

The MASIS Team IBM programmers have configured the software to reflect the estimated 800 business scripts arising from the analysis phase. MARCOM participation during this phase has been significantly lower, with a reduced core team charged with co-ordinating local review and testing of scripts produced by Team IBM.

Integration Testing / Implementation Phase (Sept. 2002 – April 2003)

Following the design phase, Team IBM will begin integrating the various individually developed components, leading to the final system testing of MASIS. A MASIS training team will concurrently develop task specific user training. MARCOM's participation will remain similar to its design phase involvement, but the fleet schools will be required to commit a small cadre of instructors to the training development effort to conduct the knowledge transfer from Team IBM.

During implementation, all users, including virtually all of the materiel acquisition and support community in MARCOM, will be provided with task specific training. For most people the training will be three to five days in length, but anyone using more complex functionality may have to complete up to 15 days of training. Initial training serials will be conducted entirely by Team IBM instructors, with fleet school observers in attendance. The training lead will shift progressively to the military instructors such that the final serials will be instructed entirely by DND. Training within each formation will be conducted during a six-week window prior to "Go Live," which will occur in DGMEPM and on the lead coast (FMF plus one ship) in February 2003, followed by the other coast in April 2003 (again, FMF plus one ship).

Extended Rollout Phase

Finally, during the extended rollout phase, MASIS will be implemented on a schedule of one ship per month per coast (subject to operational schedules), with individual rollouts involving roughly three weeks of user training for the ship's company. During this period, rollouts will also be scheduled for small materiel acquisition and support units such as the fleet schools, Queen's Harbour Masters, fleet diving units, and naval reserve divisions.

MASIS — A New Way of Doing Business

MASIS will have a direct impact on the stakeholders involved in every aspect of materiel acquisition and support. For life-cycle materiel managers, buyers, stores staff, technicians and others, such day-to-day activities as identifying and locating spares, preparing work orders, planning and executing repairs, managing resources, or managing the configuration of weapons platforms will all be supported by MASIS. As it stands now, personnel across DND are performing this work using a variety of home-grown systems that are unable to communicate with one another. Materiel management information thus becomes compartmentalized within a particular system, minimizing the ability of anyone to obtain a complete and accurate representation of the availability of equipment or personnel.

MASIS will provide this information within a single, integrated system

For More Information

For more information about MASIS, the Maritime MASIS Acceptance Project, or the Maritime MASIS Environmental Rollout, please visit the following websites:

MASIS — http://admmat.dwan.dnd.ca/org/dgmcbm/masis/masis.htm

MMAP — http://navy.dwan.dnd.ca/DMSCR/MMAP/index_e.htm

You may also direct your specific enquiries to:

- Cdr Don Flemming, MMAP Project Manager, (819) 994-8866
- LCdr Brian Corse, MMAP Deputy Project Manager, (819) 994-8383
- Cdr William MacDonald, MARPAC Project Manager, (250) 363-4796
- LCdr Brad Anguish, MARLANT Project Manager, (902) 427-0550 ext. 3045

where maintainers can more readily view maintenance schedules, see the required tasks and parts, and order their materiel. Planners will be able to look at the maintenance history of a piece of equipment, determine the future maintenance requirements, and anticipate the availability of spares and trained personnel. MASIS will link engineering and maintenance information from the front line to individual units, headquarters, other government departments and industry. As a result, the materiel acquisition and support community will have timely access to reliable data to support current and future operational tasks and missions. The visibility of information between the environments will be minimal at the tactical level, but will increase toward the operational (e.g. formation headquarters) and strategic (NDHQ) levels.

The MASIS implementation within the Maritime environment will definitely bring changes to how the navy conducts its materiel activities. While it may take time for certain user groups to see the full benefits of implementation, the overall benefit to the navy and the department will be immediate and significant. MASIS will provide the means by which we can conduct our day-to-day materiel activities more effectively on a corporate basis.

A combined transition management team including personnel from MASIS and the Maritime Acceptance Project has been created to communicate the details of the rollout of MASIS to users at all levels. The goal of the transition management team is to ease the effects of the changeover to MASIS by providing users with a high degree of awareness prior to "Go Live."

LS Estan is the former CMS Communications Co-ordinator for the Maritime MASIS Acceptance Project in Ottawa.

Seminar Report

The 2002 MARLANT Technical Seminar – What's Going On!

Article by LCdr Wayne Rockwell, FMF *Cape Scott*

A lot has been going on in the technical community, and this was highlighted during last spring's East Coast technical seminar. The seminar was conducted over two forenoons, the 5th and 6th of June.

The first day was dedicated to reviewing the technical challenges and accomplishments of Operation Apollo. Task Group Technical Officer Cdr Andy Smith facilitated a forum presentation which included viewpoints from people serving in Op Apollo-deployed ships, and individuals serving in supporting shore agencies. The extraordinary effort and cooperation required of all agencies to allow the task force to sail in 11 days was immediately apparent. Lessons learned were noted and concerns were raised as to the sustainability of continuing to meet all demands. RAdm MacLean concluded the first day by outlining his campaign plan and discussing the challenges he saw for the technical community.

Capt(N) Kevin Laing and Cdr Bob Edwards opened the second day with a look to the future. They gave complimentary briefs on "Leadmark" and "Technology and Maritime Security." The briefs were very informative and allowed reflection not only on where we are, but where we will have to go. Lt(N) Assad Bouayed followed with an excellent brief on the challenges of employment as a naval project manager in Ottawa. This brief was especially well received by the junior officers in the crowd. The last presentation of the day was given by Lt(N) Brian May. His brief on his experience while conducting human intelligence operations in Bosnia illustrated the varied and challenging employment available to MARE officers.

All in all, the seminar met the goal of letting us all know "What is going on," and gave us insight to some of the unique and valuable contributions we provide. For more information on some of the briefs that were presented, visit the FMF *Cape Scott* corporate management website at: http://halifax.mil.ca/fmf/businessmgt/index.html

Awards

2001 MARE Award Presentations

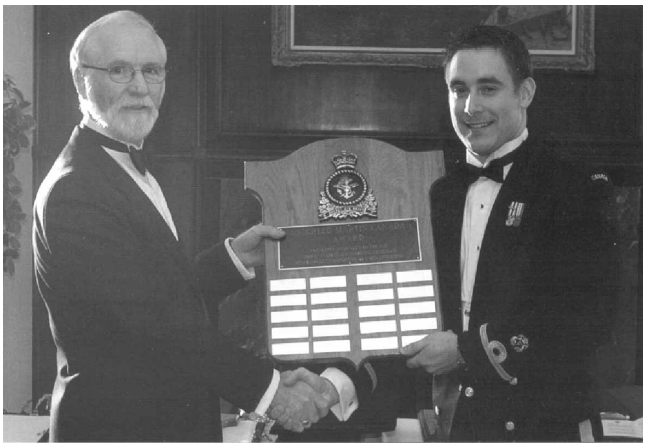
Photos by Cpl Michel Durand,
CFB Halifax *Formation Imaging Services*

With the completion of each training year, a MARE Awards Board is convened to identify officers who have distinguished themselves from their peers in the pursuit of engineering excellence and leadership. The April 25, 2002 East Coast MARE mess dinner provided the occasion for the presentation of most of these prestigious awards.

MacDonald DettwilerAward

The MacDonald Dettwiler Award is presented to the best overall MARE officer having completed the Head of Department qualification in the previous training year. The award was presented to Lt(N) Kit Hancock by Walter Johnson of MacDonald Dettwiler Canada. Runners-up included Lt(N) Solomon, Lt(N) Work, and Lt(N) Thibault.

Lockheed Martin Award



The Lockheed Martin Award is presented to the best overall CSE candidate having received the 44C qualification during the previous training year. John Meehan, on behalf of Lockheed Martin Canada, presented the award to SLt Troy Kelly. Runners-up were Lt(N) Lemoine, Lt(N) Semenuk and Lt(N) Horan.

CAE Award

The CAE Award is presented to the candidate who displays a high level of engineering excellence, academic standing and officer-like qualities on the MARE 44B Applications Course. Wendy Allerton, CAE Inc., presented this year's award to SLt Denis Pellichero.

Mexican Navy Award

The Mexican Navy Award was presented to SLt Denis Pellichero by Rear-Admiral J. Montero, Naval Attaché.

Naval Officer's Association of Canada Award

The NOAC Award is presented to the candidate displaying the highest standing of professional achievement and officer-like qualities on completion of the 44A qualification. This year's award was presented by Commodore (ret'd) Mike Cooper to SLt Cameron MacDonald.

Peacock Award

The Peacock Award is presented to the best overall MSE who received the 44B qualification during the previous training year. Al Kennedy, Peacock Inc., presented the award to Lt(N) Jean-Francois Seguin. Runners-up were Lt(N) Coates, Lt(N) Harwood and Lt(N) Semeniuk.

Mack Lynch Memorial Award

The Mack Lynch Memorial Award is presented annually to the Marine Systems or Combat Systems engineering candidate who in the opinion of his peers and instructors best exemplifies the qualities of a naval engineering officer. Jennifer Lynch, sponsor of the award, presented the award to Lt(N) Travis Blanchett.

Northrop Grumman Award

The Northrop Grumman Award is presented annually to the best overall Combat System Engineering graduate to complete the MARE 44C Applications Course. Capt(N) Eldridge presented the award to Lt(N) Travis Blanchet on behalf of Northrop Grumman.

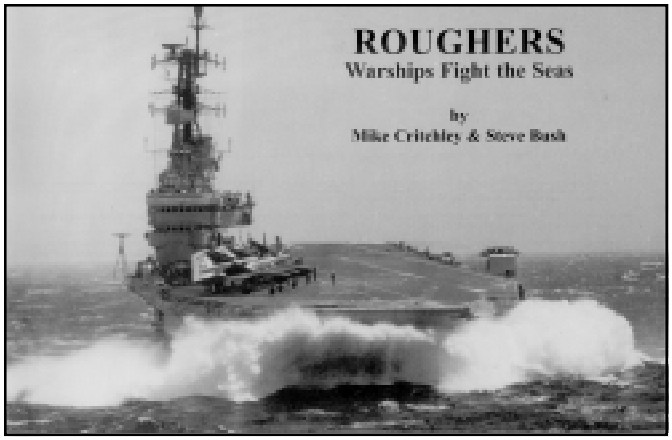
Bravo Zulu!

Book Review

Roughers

Critchley & Bush (Eds.), Maritime Books, Liskeard, UK, 2001
ISBN 0-90-777184-X

Review by Lt. Cdr. P.K. Carnie RCNC (DMSS 2-2)



HMS *Ark Royal* battles Hurricane Ivy in the Indian Ocean, March 1966. (Mike Critchley Collection)

This book of photographs will astonish the landlubber, or the observer who has only seen naval ships on the drawing board. Contrary to many implicit assumptions, ships do experience large waves at sea, and generally survive even after rolling to large heel angles.

The photographs for *Roughers* were taken in the worst of such seas, occurring from the 1930s to the present day. Canada's own maritime coastal defence vessel even makes a showing, and many readers will recognize the seascapes and ships of the North Atlantic.

Images range from "R" class battleships labouring at maintaining station, to a destroyer displaying her antifouling in the Southern Ocean, to the Joint Maritime Course off Scotland. On the last page, a photo of a submarine (of course) is used to illustrate the tranquil sea.

Roughers serves to remind us about the conditions our ships, their crews and equipment have to face from time to time. I consider this book required reading for any navy staff who have not been to sea in more than five years!

Lt. Cdr. Carnie, of the Royal Corps of Naval Constructors, works in DMSS 2-2.

Share Your Photos!

The *Maritime Engineering Journal* is always on the lookout for good quality photos (with captions) to use as stand-alone items or as illustrations for articles appearing in the magazine. Photos of people at work are of special interest. Please keep us in mind as an outlet for your photographic efforts. Photo Co-ordinator Harvey Johnson can be reached at (819) 994-8835.

National Defence
Défense nationale

SUMMER 2002

News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

Inside this issue:

CNTHA News **Est. 1997**

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Newsletter Editing and Production Services, Layout and Design
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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.

CNTHA Celebrates Five Years "in Business"

It's hard to believe that our first newsletter was published in March 1997. In one sense, we have been very successful: most people associated with the naval community are aware of our existence and our mandate. This clearly was one of our objectives in establishing the newsletter five years ago. Also, through this publicity our collection of written material has grown, although perhaps not as much as we might have hoped. We still could use more personal reminiscences and views of those who have participated in this fascinating business. Most of us are too humble to believe that we can contribute, but our stories may be fascinating to others. Give it a try.

I have been greatly encouraged by some very determined organization and work that flowed from our committee meeting last November, when Rolfe Monteith inspired a small team to tackle the industrial side of our naval heritage. Headed by Don Jones, a keen group consisting of Doug Hearnshaw, Colin Brown, Jim Williams, Gord Moyer and Rolfe himself, has been mapping out a large-scale "seascape" of the industrial story, against which information can be gathered and sorted. Not surprisingly, it looks a lot like a summary of our ship programs and the equipment developments that accompanied them. The group is now looking for means to make people who were on the industrial side aware of our project so that they may contribute to it. If you or someone you know might be able to help, please put them in touch with Don and his group.

Our newsletter and its excellent companion, the *Maritime Engineering Journal*, are free to those who have an interest in our endeavour. If you know of any former colleagues or industry people who wish to receive the newsletter, please have them contact us and we'll be glad to add them to our distribution list.

— RAdm (ret.) Mike Saker, Chairman CNTHA

Technology and the Tribal Class Update and Modernization Project

Article by Cdr Tony Cond

It became apparent by the late 1970s that the Canadian naval fleet would need considerably better area air-defence capability to deal with the threat of long-range Soviet cruise missiles and aircraft. It was also clear that the Canadian fleet would have to operate over a much wider area of the globe. This meant that better shipboard command, control and communication facilities would be required to support Canadian task groups on long deployment.

DDH-280 *Iroquois* before the TRUMP refit

To achieve these badly needed improvements the navy embarked on the Tribal Class Update and Modernization Project (TRUMP). Between 1987 and 1995 the four DDH-280s were outfitted with a capable array of improved weapon and fire-control systems. In addition to the major improvements to the combat systems, the ships also benefitted from a new cruise engine and gearbox, hull strengthening and a water displacement fuel system. Perhaps the most obvious change was the loss of the distinctive twin "bunny ear" funnels as part of the superstructure modifications for ship signature reduction. At the end of the day, the *Iroquois*-class ships could be expected to equal or surpass any similar sized allied ship in terms of air-defence firepower, flexibility and survivability.

TRUMP was an impressive overhaul, with benefits that went far beyond the *Iroquois* class. The combination of the technological advances associated with the TRUMP modifications and the manner in which the prime contractor, Litton Systems Canada Ltd., subcontracted portions of the work served to develop a wide base of Canadian industrial expertise in modern warship engineering support. Nowhere was this more groundbreaking than in the specialized area of integrated naval electronics.

Leading the way were four TRUMP fits that still warrant special attention today — the CANEWS electronic warfare system, and a trio of systems for shipboard integrated communications, processing & display, and machinery control. All four of these systems were conceived and formulated by Canadian naval engineers and developed by Canadian industry.

The *Shipboard Integrated Communication System* (SHINCOM) first produced by Leigh Instruments, then SPAR and finally DRS Technologies, provided greater performance and flexibility to all ship's communication networks. It used advanced digital technology and microprocessor controlled terminals to give a user-friendly, fully integrated, combat survivable system solution for the ship's tactical, interior, exterior and secure communication circuits. Today,

Tribal Class Update and Modernization Project

Scope of work:

- Platform design from concept through detail design.
- Naval architecture and structural design.
- Engineering design of auxiliary systems and outfit and furnishing.
- Integration into the ship of the combat system.
- Detailed design and preparation of strip-out and production drawings.
- Procurement, set-to-work and test and trials of the ship.
- Implementation of the work into the ship.

TRUMP Engineering Deliverables

- 14,075 new and revised drawings.
- 2,275 SDRL reports.
- 251 equipment/subsystems.
- 668 line item spares.
- More than 1,225,000 person-hours of engineering.

the newest version of SHINCOM (not yet fitted) is based on commercial off-the-shelf technology, and will use a central software base to provide redundant switching, "dual-homed" terminals and interoperability for joint operations to ensure continuous communications into the next decade.

The *Shipboard Integrated Processing and Display System* (SHINPADS) updated the CCS-280 command and control system with a distributed and fully integrated system. The software was supplied by Sperry Computer Systems of Winnipeg, while the tactical display equipment was supplied by Computing Devices Company of Ottawa. SHINPADS remains the backbone of the CPF combat system, integrating all sensors and weapons.

***Iroquois* after her TRUMP refit**

The *Shipboard Integrated Machinery Control System* (SHINMACS) replaced the old pneumatic and hybrid analogue/digital system with a distributed digital system developed by CAE Limited. The system permitted a wide variety of machinery to be controlled from specially designed computer displays, thereby facilitating better maintenance, equipment health monitoring and crew training.

The *Canadian Electronic Warfare System* (CANEWS) provided long-range detection, classification, and tracking of electromagnetic emissions. The CANEWS project, which resulted in one of the most capable EW suites in the world, was made possible by extensive research and development carried out by several DND agencies. This technology has since been transferred to industry for development and production. In fact, both CANEWS and SHINMACS became successful candidates for export sales, the benefits of which continue not only to serve Canada's marine technology development, but to satisfy international naval design requirements as well.

The trend in naval technical innovation so prevalent during the DDH-280 and TRUMP programs continues to be a major factor in the success of our naval fleet. Now, as then, behind every technical advance were the people who steadfastly gave their best for the navy — the military personnel serving in the navy's technical branch, the civilian marine engineers employed in the defence department, and the large body of retired naval engineers and technicians who continue to contribute productively to Canada's defence through second careers in the public service and the marine and electronics industries. The considerable investment which the navy makes to train and develop its engineers is thus rarely lost on retirement as people's valuable engineering expertise becomes part of the strength of Canada's small, but capable naval defence industrial base.

Cdr Cond is a project director with the Directorate of Science and Technology Maritime in Ottawa. This article is excerpted from his paper, "A Century of Canadian Marine Technology Development," prepared for his Bachelor of Military Arts and Science program at RMC.

Naval Architectural Challenges

- trim and stability
- hull girder strength
- new VLS system
- new IR suppression
- new cruise engine
- new machinery control system
- new WDFS system
- modified gearbox
- new fire-detection system
- new smoke evacuation system
- new CIWS
- new main gun
- new 1000-kW electrical power generator

Water Displaced Fuel System

• 78% of the ship's 650 tonnes of fuel converted to a water displaced configuration.

• Tank boundaries of these fuel chains heavily reinforced to withstand higher operating pressures.

• Internal structure modified to ensure optimal flow of both fuel and water throughout the tanks.

• Extensive stripping system installed to prevent water from damaging the ship's machinery, and fuel from polluting the water surrounding the ship.

The Canadian Naval Defence Industrial Base Project

In November 2001 a Canadian Naval Defence Industrial Base (CANDIB) Project, under the chairmanship of Rolfe Monteith, was set up as a subgroup of the CNTHA. Present members of the project team are: Don Jones (vice-chairman), Colin Brown, Gord Moyer, Douglas Hearnshaw (Society of Naval Architects and Marine Engineers), and Jim Williams (former president of MIL Systems).

The mission statement for the project is: "to describe the development of the Canadian industrial base as it evolved in support of warship construction and naval equipment programs between 1930 and 2000, and to record the relationship between the military requirement and the industrial response during that period."

The project team is interested in contacting people who may have served in any capacity associated with naval shipbuilding and/or equipment design and manufacture. This would include senior managers in DND, contract managers in Defence Design Production (Department of Supply and Services) or DND, shipyard and equipment firm project managers, principal naval overseer staffs, DND systems and desk officers, DND and civilian R&D project teams, etc.

If you are interested in participating in this information gathering process, please contact Colin Brown <colinr.brown@sympatico.ca>, with a copy to Douglas Hearnshaw <dhearnshaw@trytel.com>, or by mail to C.R. Brown, 470 Hillcrest Ave., Ottawa, ON, K2A 2M7. We need to know your name and address, whether you were with the RCN, DND or a company (please include the company's name), your rank and/or position on retirement, projects in which you were involved, and when and in what capacity. Please include names of co-workers who might also be good sources of information.

This might be the last chance to obtain and record useful information on this topic. Your participation in this endeavour would be of significant value in presenting a view from the industry side. **– Mike Saker, Chairman CNTHA**

This scene is one of a series of naval theme paintings produced for Lamb's. *(Courtesy the Maritime Command Museum in Halifax.)*

About the CNTHA

The Canadian Naval Technical History Association is a volunteer organization working in support of the Directorate of History and Heritage (DHH) to preserve our country's naval technical history. Interested persons may become members of the CNTHA by contacting DHH.

A prime purpose of the CNTHA is to make its information available to researchers and others. The Collection may be viewed at the Directorate of History and Heritage, 2429 Holly Lane (near the intersection of Heron and Walkley Roads) in Ottawa.

DHH is open to the public every Tuesday and Wednesday 8:30-4:30. Staff are on hand to retrieve the information you request and to help in any way. Photocopy facilities are available on a self-serve basis. Copies of the index to the Collection may be obtained by writing to DHH.