

## Archived Content

Information identified as archived on the Web is for reference, research or record-keeping purposes. It has not been altered or updated after the date of archiving. Web pages that are archived on the Web are not subject to the Government of Canada Web Standards.

As per the [Communications Policy of the Government of Canada](#), you can request alternate formats on the "[Contact Us](#)" page.

## Information archivée dans le Web

Information archivée dans le Web à des fins de consultation, de recherche ou de tenue de documents. Cette dernière n'a aucunement été modifiée ni mise à jour depuis sa date de mise en archive. Les pages archivées dans le Web ne sont pas assujetties aux normes qui s'appliquent aux sites Web du gouvernement du Canada.

Conformément à la [Politique de communication du gouvernement du Canada](#), vous pouvez demander de recevoir cette information dans tout autre format de rechange à la page « [Contactez-nous](#) ».

CANADIAN FORCES COLLEGE / COLLÈGE DES FORCES CANADIENNES  
CSC 32 / CCEM 32

**EXERCISE NEW HORIZONS**

**CANADIAN MARITIME SECURITY:  
A CASE FOR COMPOSITE OGD-CREWED MARINE SECURITY VESSELS**

**LCdr G.B. McCue**

24 April 2006

*This paper was written by a student attending the Canadian Forces College in fulfilment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence. This paper may not be released, quoted or copied except with the express permission of the Canadian Department of National Defence.*

*La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale*

## INTRODUCTION

*“And what did our Committee discover? The Canadian navy is not defending Canada’s coasts other than assisting with surveillance...the navy has no jurisdiction over interior waters, such as the Great Lakes. The Navy prefers to do its defending on waters far away. Despite its name, the Canadian Coast Guard does not guard Canada’s coasts. Nor does it guard our interior waters. We learned that the RCMP is pretty well on its own in terms of interdicting suspicious vessels – whether they may have terrorist intent, or simply criminal intent in terms of the age-old practice of smuggling drugs, booze and people. How reliable is the RCMP at performing that role on our coasts? Judge for yourselves.”<sup>1</sup>*

Senator Kenny, the chairman of the Standing Senate Committee on National Security and Defence, wrote his article in the *Toronto Star*, 29 October 2003 to presage the inadequacies of Canada’s various Governmental Departments (OGDs) abilities to safeguard the country’s frontiers. The privilege of his office was to grant him unrestrained access to the elements of national security and marine security in particular. Senator Kenny’s candid appraisal of the state of Canada’s Marine Security was to impel the government to action in three main areas of surveillance, detection and interdiction.<sup>2</sup>

Senator Kenny’s appraisal of the Navy was accurate. In its *Leadmark* strategy plan the Navy recognized the issue of protecting national sovereignty.<sup>3</sup> However, the resulting post 9/11 attention to international security considerations resulted in the Navy concentrating its effort on an expeditionary role overseas, and not on that of domestic

---

<sup>1</sup> Senator Colin Kenny, *A Porous Coastal Defence*, The Toronto Star. 29 October 2003, internet <http://sen.parl.gc.ca/ckenny/OPED%20Tor%20Star%20Oct%2029-03.htm> accessed 7 April 2006.

<sup>2</sup> Ibid.

<sup>3</sup> Department of National Defence: *LeadMark The Naval Strategy 2020*, (Ottawa: Director of Maritime Strategy, 2001), 13.

security, or for that matter, the recently announced plans for arctic icebreaking patrols.<sup>4</sup> Consequently, Canada's Navy is stretched thinly between its requirements to uphold expeditionary capability, ongoing support to the War on Terror and its domestic sovereignty obligations.<sup>5</sup> Given these competing requirements, the Navy will need to find a balance between its expeditionary and constabulary roles.<sup>6</sup>

Today's security situation is both ominous and complex for Canada's OGDs who share with the navy responsibility for the protection of Canada's marine security. This task can be overwhelming given the enormous magnitude of Canada's coastline and ocean territory.<sup>7</sup> As a maritime nation reliant on the sea borne connectors to the global oceanic trading system, Canada must assure it access to, and use of the oceans, while also upholding its international responsibilities in protecting the very same system. Disruption to any part of the international shipping corridors will adversely impact the reliability of the whole organism. As Captain (Navy) K.E. Williams, Director of Maritime Strategy (DMarStrat) makes clear; "The evolution of the world economy through globalization

---

<sup>4</sup> CTV News, *Tories' ambitious defence plan needs more money*, internet [http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20060218/tory\\_defence\\_plan\\_060218/20060218/](http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20060218/tory_defence_plan_060218/20060218/); accessed 15 April 2006.

<sup>5</sup> Centre for Foreign Policy Studies, Dalhousie University. *The Canadian Navy and the New Security Agenda*, Proceedings of the Maritime Security and Defence Seminar, Toronto 26-27 April 2004, ed by Ann L Griffiths, (Dalhousie University Press, 2004), 31.

<sup>6</sup> Centre for Foreign Policy Studies, internet: <http://centreforforeignpolicystudies.dal.ca/pdf/spc03conferencereport.pdf>; accessed 13 March 2006.

<sup>7</sup> Canada, Report of the Standing Senate Committee on National Security and Defence, October 2003, *Canada's Coastlines: The Longest Under-Defended Borders in the World*, Volume 1, at <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/defe-e/rep-e/rep17oct03-e.htm> ; accessed 13 April 2006.

into a single conflict environment demands change.”<sup>8</sup> As such, the protection of territorial waters has become as much a security and defense priority as any operational commitment. He further states, “[t]he blurring of threats and missions demands a pan CF and Government of Canada engagement.”<sup>9</sup> In reinforcement of the warning of Senator Kenny, Capt(N) Williams also decreed that Canada’s deterrence and interdiction capability are as prominent as command and control and surveillance.

Canada does not have the luxury of going solo in pursuit of its marine security. The nation’s protection measures must be in consonance with those of its continental neighbour. As such, Canada is acutely cognizant of the import of its relationship with the US, including the potential ramifications of US homeland security imperatives and the requirement to strengthen relations between its own OGDs that share a mandate for maritime security.

The current state of affairs where no OGD can independently and readily respond to an external threat to the nation is an unsatisfactory situation. Ministerial departments including the Canadian Border Services Agency (CBSA), Department of Fisheries and Oceans (DFO), Canadian Coast Guard (CCG), Royal Canadian Mounted Police (RCMP) and the Department of National Defence (DND) divide various responsibilities for sovereignty and/or enforcement; none on its own having the requisite mix of legislative or jurisdictional authority and interdiction capability (e.g. vessel configuration and/or command and control systems) to fully support government sovereignty and security

---

<sup>8</sup> Centre for Foreign Policy Studies, Dalhousie University. *The Canadian Navy and the New Security Agenda*, Proceedings of the Maritime Security and Defence Seminar, Toronto 26-27 April 2004, ed by Ann L Griffiths, (Dalhousie University Press, 2004), 19.

<sup>9</sup> Ibid, 19.

needs.<sup>10</sup> Moreover, each department remains essentially in isolation developing plans for future fleet and equipment compositions that are in most cases unlikely to be compatible or interoperable with each other. Inapt and aging equipment only exacerbate this problem. To satisfy the need to enhance interdiction capability, the collective expertise of all departments must be refined by exploiting the synergies that are present by co-locating OGD personnel as a component crew in a shared vessel. Tactical level integration of relevant OGD services will enhance the efficacy and responsiveness of the system as a whole while best serving any need for robust interdiction capability.

The aim of this paper is to advocate for on-water harmonization of OGD capabilities, and thereby, strengthen marine interdiction and deterrence capabilities. In lieu of the individualistic focus and disorganized continuance of each department stove piping expensive and ultimately high-priced capital projects, this paper proposes the operation of a (Federal) Marine Security Vessel (MSV) fleet of purpose built craft that will meet the combined and collaborative requirements of all OGDs. Specifically, this paper will demonstrate that applicable government policy, legislation and OGD authority is in place to support the case for synchronization. Secondly, it will highlight the existing equipment and intrinsic inadequacies that encumber departmental collaboration. The final evaluation will highlight some of the operational and tactical competency improvements that a pooled capability platform will generate. Based on the analysis of the preceding factors this paper will show that the Government must build on its momentum and invest in the acquisition and operation of a common OGD vessel in order

---

<sup>10</sup> Ibid, 19.

to exploit the fiscal and operational efficiencies that best advance the realization of an effective and responsive marine deterrence and interdiction capability.

Although not specifically addressed in this paper but worthy of additional research and investigation, the general concept of this vessel is for a class standard. The civilian specification vessel (cutter), will be as large as a medium sized CCG vessel (50-75 metres), capable of interdiction speeds of 20 knots or greater and with a crew complement of 40 persons and accommodation for additional emergency response personnel.<sup>11</sup> The operators of the vessel can be a composite of any federal government fleet with respective OGD intelligence and enforcement officers making up the core of MSV capability. Each MSV would be fitted with a command and control suite that promotes effectual integrated operations.<sup>12</sup> Funding for the vessel(s) is to be borne by National Security funding, as is the case with the current shore based Marine Security Operations Centres (MSOCs).<sup>13</sup> The vessel would be armed in accordance with present DFO/RCMP protocols that include equipment with a 50 calibre machine (HMG) gun(s) if required. The most appropriate OGD or private sector technical authority would determine management of the project and subsequent life cycle considerations. In anticipation of an extended acquisition and procurement timelines, proof of concept and

---

<sup>11</sup> Canada, Report of the Standing Senate Committee on National Security and Defence, October 2003, *Canada's Coastlines: The Longest Under-Defended Borders in the World*, Volume 2, Internet <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/defe-e/rep-e/rep17vol2part3-e.htm#APPENDIX%20X> accessed 12 April 2006.

<sup>12</sup> Treasury Board, Osbaldson Report, *All the Ships that Sail – A Study of Canada's Fleets*. (Ottawa, Supply and Services Canada, 1990), 30.

<sup>13</sup> Securing an Open Society: Canada's National Security Policy Internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm) accessed 13 March 2006.

initial operating conception could be initiated through reconfiguration of existing government hull or commercial vessel.

### **Policy, Legislation and Jurisdiction**

Canada's government is pragmatic and its action plans and policy implementations readily underscore that security and safety of Canadians is a guiding principle and a paramount consideration of government.<sup>14</sup> New legislation, policies and strategies have been enacted to invigorate the security capabilities of the nation. Canada's Federal Government's (Government) genuine commitment is reflected in its cornerstone directive, the National Security Policy which prescribes that Government agencies work in unison across the spectrum of security activities to enhance the overall effectiveness of Canada's security requirements.<sup>15</sup> The influences of Globalization and trade are recognized and manifest in the linking of Canada's national security to the conflicts, politics and activities occurring around the world. Conspicuously, the application of \$7.7 billion in its December 2001 budget demonstrates the great depth of commitment that underpins a multi-year federal strategy to strengthen public safety and security.<sup>16</sup> In addition, new security agencies and committees were implemented to better manage the potential of the multitude of agencies engaging in national security. These include the December 2003, creation of the Minister of Public Safety and Emergency Preparedness (PSEPC), a department which now incorporates the fundamental activities of the former

---

<sup>14</sup> Securing an Open Society: Canada's National Security Policy, internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 13 March 2006.

<sup>15</sup> Ibid.

<sup>16</sup> Department of National Defence, *A Time for transformation, Annual Report of the Chief of Defence Staff 2002-2003*, (Ottawa: DND Chief of the Defence Staff, 2003), 4.



Solicitor-General responsibilities into a single portfolio that coordinates and reacts to security emergencies.<sup>17</sup> Also, the establishment of the Cabinet Committee on Security, Public Health and Emergencies to direct Government-wide handling of emergencies and the administration of national security and intelligence issues; and the selection of the National Security Advisor to the Prime Minister to advance co-ordination and amalgamation of security actions within OGDs.<sup>18</sup> The evidence is replete, amalgamation, synergy and effectiveness are the characteristics of our Governmental initiatives.

Government practicality and inventiveness is not only evident at the strategic level, it exists in the tactical arena with a variety of other ventures, including interdepartmental committees and working groups. One of the more significant groups associated with marine security is the Interdepartmental Marine Security Working Group (IMSWG).<sup>19</sup> Chaired by Transport Canada (TC) this group marshals the combined efforts of: the Department of Fisheries and Oceans/Canadian Coast Guard (DFO/CCG), Public Safety and Emergency Preparedness Canada (PSEPC), Canada Border Services Agency (CBSA), Royal Canadian Mounted Police (RCMP), the Department of National Defence (DND) and the Canadian Security Intelligence Service (CSIS). IMSWG is responsible to: “identify and coordinate federal Government actions...concerning public security and

---

<sup>17</sup> Securing an Open Society: Canada’s National Security Policy, internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 13 March 2006

<sup>18</sup> Ibid.

<sup>19</sup> Treasury Board of Canada Secretariat, internet [http://www.tbs-sct.gc.ca/rma/eppi-ibdrp/hrdb-rhbd/ms-sm/description\\_e.asp](http://www.tbs-sct.gc.ca/rma/eppi-ibdrp/hrdb-rhbd/ms-sm/description_e.asp) accessed 16 March 2006

anti-terrorism in the maritime realm, as well as its international marine security obligations.”<sup>20</sup>

PSEPC is the lead agency for domestic national security matters.<sup>21</sup> However, Canada lacks an overriding security plan for OGDs and they continue to retain their own mandates and jurisdiction, thereby, implementing respective national security procedures in isolation. Cooperation between OGDs is evident at the committee level but there is no supreme direction or oversight that links their capabilities together, to either respond to issues, or include the requirements of the entire security curriculum. By heightening the profile of marine security, Canada is moving in the right direction, but it needs a deliberate, lucid and adjustable plan of action that sets a course for the enduring and future security needs and capabilities of the whole nation.<sup>22</sup>

The US in responding to its own security sensitivities has been transformational in integrating key security agencies and components, while Canada in comparison, is making incremental changes to the pre-existing configuration of its departments and bureaus.<sup>23</sup>

Each OGD has specific legislative powers; information databases and intelligence records which when shared with partners can significantly enhance the overall capability

---

<sup>20</sup> Securing an Open Society: Canada’s National Security Policy, Internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 13 March 2006

<sup>21</sup> Public Safety and Emergency Preparedness Canada. Internet; [http://ww2.psepc-spcc.gc.ca/publications/news/20041008-2\\_e.asp#NSCM](http://ww2.psepc-spcc.gc.ca/publications/news/20041008-2_e.asp#NSCM); accessed 15 March 2006.

<sup>22</sup> Centre for Foreign Policy Studies, internet: <http://centreforforeignpolicystudies.dal.ca/pdf/spc03conferencereport.pdf>; accessed 13 March 2006.

<sup>23</sup> Ibid.

of Government security and domain awareness.<sup>24</sup> Their broad powers and responsibilities are:

DND – Governed by the *National Defence Act* (NDA), it is charged with defence of Canada and to provide support to Canadian OGDs in such key areas as, drug interdiction, fisheries protection, environmental protection, search and rescue, disaster relief. After 9/11, the focus of the Navy has been increasingly directed toward countering maritime-borne terrorism. DND is responsible for establishing MSOCs in MARPAC and MARLANT with responsibility for ocean surveillance and production of the Recognized Maritime Picture (RMP).<sup>25</sup>

RCMP – Hold legislative powers to enforce any act of Parliament; RCMP operations include programs involving border integrity, drugs, organized and financial crime and international policing. Its overall mandate is the safety and security of Canadians and its institutions, domestically and globally, through intelligence-based prevention, detection, investigation and law enforcement measures taken against terrorists, organized criminals, and other criminal activity.<sup>26</sup>

CBSA – Powers for Customs and Immigration enforcement emanating from the Immigration Refugee Protection Act (IRPA) and the Criminal Code of Canada (CCC). Other authority is derived from the *Oceans Act* and United Nations Convention on Laws of the Sea (*UNCLOS*). CBSA can board and inspect any type of transportation bringing

---

<sup>24</sup> Marine Security Operations Centre (MSOC), Concept of Operations, Draft 0.6 November 2004, 9.

<sup>25</sup> Securing an Open Society: Canada's National Security Policy, Internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 13 March 2006.

<sup>26</sup> Marine Security Operations Centre (MSOC), *Concept of Operations, Draft 0.6 November 2004*, 7.

people to Canada and examine their documentation and/or records. CBSA may search, seize and detain any means of transportation conveying individuals to Canada. Arrest and detain individuals with or without a warrant and to issue arrest warrants.<sup>27</sup>

DFO/CCG – Both components fall under the authority of the Minister of Fisheries and Oceans who is given the authority by Canada’s *Oceans Act* for all matters over which Parliament has jurisdiction, not assigned by law to any other department, board or agency of the Government of Canada for such activities as Maritime safety, marine environment protection and facilitation of maritime commerce.<sup>28</sup>

TC – Has responsibility for developing and administering the marine security policy in Canada. TC authority is drawn from the *Marine Transportation Security Act*, and the *Marine Transportation Security Regulations*. Its mandate is to enforce compliance with the *Regulations*. Activity may include vessel detention, denial of entry into Canadian waters, and the re-direction or expulsion of ships in Canadian waters.<sup>29</sup>

A variety of Memorandums of Understanding (MOUs) facilitate the ability of OGDs to assist each other. Provisions within the NDA permit DND vessels to specifically support the RCMP and DFO in support of domestic operations. The existence of these MOUs smoothes the progress of requesting assistance but does not eliminate the mandatory Ministerial approval processes. Although, intended as a streamlining measure, the generation and processing of a routine approval requests for naval support can be lengthy. Urgent or crisis requests are unhindered. Requests for

---

<sup>27</sup> Ibid, 8.

<sup>28</sup> Ibid, 8.

<sup>29</sup> Ibid, 10.

RCMP armed escort, in support of naval escort of nuclear powered vessels in Canadian waters are subject to corresponding delays in approval.

The National Security Policy is the cornerstone document for accelerating the collaboration and coordination of the multiple security agencies that make up the main elements of the MSOCs on the east and west coasts.<sup>30</sup> Carrying forward the evolution of such a capability to the MSV offers the reality of a “floating MSOC”. In such a role the MSV would be highly complementary to the MSOC by being in direct and sustained communication while performing the role of first responder and working partner.

### **Equipment Challenges**

The navy has a total of 15 major combatants, this includes 12 Halifax class frigates and three Tribal class destroyers and 12 Kingston class minor war vessels, called Maritime Coastal Defence Vessels (MCDVs). The larger destroyers/frigates are well equipped with superb command and control facilities, weapons and sensors, but have large crews in excess of 200 sailors. They are expensive to operate, costing tens of thousands of dollars per day in fuel alone. The smaller MCDVs are more fuel-efficient and are equipped with a good command and control suite. However, as the workhorses of core naval officer training and force generation, and only capable of a top speed of 15 knots, they are unsuitable for law enforcement and interdiction operations. Surprisingly, naval vessels as a whole are also ill equipped to handle the equipment used by OGDs and other supported agencies. In particular the RCMP and other Emergency Response Teams

---

<sup>30</sup> Securing an Open Society: Canada’s National Security Policy, Internet; [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 13 March 2006.

(ERT) boats cannot be embarked in naval vessels due to incompatible cranes and davits that cannot at present accommodate either the size or weight of these vessels. A marine ERT often needs in-theatre transportation and is hampered in its mission effectiveness if its arrival is late, or if its conveyance is disrupted or restricted in any way.

RCMP *Commissioner* Class vessels are also not intended, or designed for major federal policing requirements. Five are available on the British Columbia coast and one was recently acquired for Nova Scotia.<sup>31</sup> Partly funded by their respective provincial governments they are used primarily to support provincial law enforcement and supplementing policing in areas where no road access is available.<sup>32</sup> This small vessel is capable of high speeds (30 plus knots) but is not well suited for coastal operations and does not have the berthing capacity for embarking specialized teams or their equipment for anything but short trips. Their generally rudimentary command and control capability relies primarily on radio and/or cell phone voice communications; they are not compatible with the sophisticated secure digital Internet Protocol (IP) in use with the Canadian Navy.

The Canadian Coast Guard, despite having the largest federal fleet, is rusting out with a significant number of its 107 vessels requiring replacement. CCG vessels whether they be icebreakers or buoy tenders are generally slower and thus ill suited for interdiction operations, they are, however, capable of loading and transporting RCMP and other ER teams and their equipment. Command and control equipment in these vessels is also

---

<sup>31</sup> Royal Canadian Mounted Police (RCMP), Westcoast Marine Detachment; Internet <http://members.shaw.ca/rcmpwcmd/Photogallery.htm>; accessed 16 March.

<sup>32</sup> Treasury Board, Osbaldson Report, *All the Ships that Sail – A Study of Canada's Fleets*. (Ottawa: Supply and Services Canada, 1990). 23

rudimentary and incompatible with sophisticated naval equipment. The CCG fleet was summed up by Charles Gadula, Director General, Fleet Directorate, Marine Services, CCG who: “[e]stimated that the CCG would require \$350 million dollars in order to replace the vessels that need replacement now.” This shows that the CCG is having difficulty performing their current roles and responsibilities because of their lack of proper resources.”<sup>33</sup>

Despite the shortcomings in its fleets the Government is investing in alternative means of supporting marine security, these methods include electronic surveillance, detection and information devices such as High Frequency Surface Wave radar (HFSWR), Satellite observation (Polar Epsilon), Uninhabited Aerial Vehicles (UAVs) and Automated Information System (AIS). These state of the art systems can significantly enhance real time domain awareness of the number of vessels in an area but they also increase the demands of surveillance management and the corresponding call for rapidly reducing the amount of ambiguous information.<sup>34</sup> Generally, a ship in area is the best means of resolving unknown vessel identity and purpose.

There is Government willingness to respond to threats, particularly along its more compelling security risk area of the St Lawrence Seaway where: “[t]here is almost no capacity to stop and board vessels in the Seaway.”<sup>35</sup> This was evident with the

---

<sup>33</sup> Report of the Standing Senate Committee on National Security and Defence, October 2003, *Canada's Coastlines: The Longest Under-Defended Borders in the World*, Volume 1, Internet <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/defe-e/rep-e/rep17oct03-e.htm>; accessed 12 April 2006.

<sup>34</sup> Ambiguous information can be generated by multiple sources of high flowing automated data and information corresponding to the same contact. This also applies to the existence of “time-late” or expired information that must be deleted or purged from the system to more accurately reflect what vessels actually are present at the right moment in time.

<sup>35</sup> Senator Colin Kenny, *A Porous Coastal Defence*, The Toronto Star. 29 October 2003, internet

announcement of the partnering of the CCG and RCMP, who will use purpose built vessels (by 2009) to support the RCMP patrolling the waterway.<sup>36</sup> A significant step considering the Navy is not capable of supporting or responding to events occurring in the St Lawrence Seaway or Great Lakes because of the *Rush-Bagot Agreement* with the US that restricts warships in the Great Lakes. An MSV is the best option to ensure interdiction is a responsive and credible capability.

This arrangement certainly endorses the submission that no single department can singularly take on the responsibility for marine enforcement or surveillance. It must be shared to ensure that it is effective and comprehensive in order for OGDs to be capable of responding more quickly, and be more likely to improve their detection, investigation and response requirements.

### **Tactical and Operational Enhancements**

Canada has twofold challenges when it comes to deterrence and interdiction capability, it must be both effective in deterring the terrorist and be seen as credible by the US. Joe Sokolsky, states that:

[i]n efforts to enhance the maritime security of the United States, there are no boundaries. Canadians must keep pace with the Americans in maritime security in order to avoid an intrusion upon our sovereignty, as well as deter many potential terrorist threats.<sup>37</sup>

---

<http://sen.parl.gc.ca/ckenny/OPED%20Tor%20Star%20Oct%2029-03.htm>; accessed 7 April 2006.

<sup>36</sup> Fisheries and Oceans Canada. *RCMP and Coast Guard Partnership*; internet [http://www.dfo-mpo.gc.ca/media/backgrou/2005/hq-ac66a\\_e.htm](http://www.dfo-mpo.gc.ca/media/backgrou/2005/hq-ac66a_e.htm) accessed 6 march 2006

<sup>37</sup> *Marine Security Shield or Sieve*: internet <http://www.cda-cdai.ca/symposia/2005/Farion.pdf>; 13April 2006.



The USCG is setting a high standard of protection and has significantly increased its marine interdiction capabilities. In the past few years over 80 patrol vessels, 15 coastal patrol cutters and five former US Navy war vessels have been added to its inventory for additional on water interdiction and deterrence capability, and still it may not be enough.<sup>38</sup> Canada in contrast has not increased its vessel fleet in any way since 9/11; in fact the Navy reduced its complement of warships by paying off HMCS HURON in October 2005.

If Canada is to successfully deter and enforce laws it will need an effective and timely means of obtaining additional guidance particularly as it pertains to the use of force in an enforcement capacity. A component of this efficiency rests with the capacity to support decision making within the lead department but also between the other agencies involved.<sup>39</sup> Familiarity, understanding and practice of any of these procedures are not only the underpinning of proficiency but also signal a commitment of purpose. The MSV presents unity of command, incorporating a synergistic team of multi agency experts into a single hull, which can readily respond to all manner of incidents. It will become a compelling symbol of the homogeneous range of Government department capability, working towards upholding and reinforcing Canadian marine capabilities, while concurrently strengthening international trading connectors.<sup>40</sup>

---

<sup>38</sup> United States Coast Guard, internet  
<http://www.uscg.mil/news/Headquarters/FY07%20Statement.CG%20Border%20Security.Apr06.pdf>;  
accessed 14 April 2006.

<sup>39</sup> Robert H Edwards, *The 1995 Canada-European Union (EU) Turbot Crisis: Canada's Use of Force in Fisheries and Diplomacy*. (Halifax NS: Dalhousie University, 1996), 24.

<sup>40</sup> Ibid, 36.

In contrast the fractional and irregular system of enforcement with specific departments exercising jurisdiction in what may appear a random and unproductive way cannot be as effective as the focused defence in depth approach of a unified system that an MSV presents. Moreover, an MSV would be a deterrent to all transgressors and not just those engaged in single unlawful activity.<sup>41</sup> For example, it is unlikely that a DFO vessel would dissuade a criminal cartel using a sea borne means of smuggling contraband into Canada. DFO enforcement is narrowly focused on resource protection; it is then implausible that such a vessel not engaged in criminal detection would deter this illegal activity. However, consider the same malfeasant organization craft in the vicinity of a unified enforcement platform such as an MSV, the circumstances change dramatically, with the MSV very much becoming a deterrent for the criminal. Moreover, the very presence of such a commanding constabulary force would have more extensive and effective influence in discouraging offenders. The presence of an immediate enforcement capability inherently provides deterrence and dissuades illegal activities. Its lack, however, has the opposite effect, and thus should Canada's sovereignty appears to be undefended, it will invite exploitation.

Criminal or terrorists organizations will in turn, develop to their advantage, any fracture in maritime security to the fullest potential. More ominously, should Canada's enforcement capability be seen as less capable than that of the US, then these same organizations will explore any relative security weakness and act upon them. As US maritime security gets tighter it will encourage offenders to find an easier ingress

---

<sup>41</sup> D.T. Neil, *Exercise New Horizons: A Case for a Para-Military Coast Guard*. 31 March 1988, 13

location, without a visible build up in deterrence and interdiction capability Canada will become the attractive recourse.

Preventive policing, which is different from emergency response is in large part reliant upon extensive DND vessel support, cannot be maintained on a regular basis because the navy does not have sufficient ship availability to transport the RCMP for extended/permanent periods off the coasts without compromising its expeditionary capability in support of the War Against Terror and its requisite extensive training that ensures its high readiness mandates.<sup>42</sup> This precautionary police role would be much better served by the MSV concept that would be available on an enduring basis.

Threats to Canada are building beyond the realm of organized crime and terrorism and Canada's responsibilities to protect its interests only continue to expand. As the understanding of the potential conditions of *UNCLOS* become more widespread, ambitious countries may well expand their ocean territories and the limits of their authority to become the competitors that were never experienced before. Considering that Canadians are leading proponents of affirming jurisdiction and applying national laws to its ocean territories the MSV will become even more important in reinforcing any claims to territory.<sup>43</sup> Bearing in mind the adoption of follow-conventions such as *UNCLOS 3* will significantly increase Canada's maritime areas by a size equivalent to

---

<sup>42</sup> Treasury Board, Osbaldson Report, *All the Ships that Sail – A Study of Canada's Fleets*. (Ottawa: Supply and Services Canada, 1990), 38.

<sup>43</sup> Peter C, Killaby, *Canadian Gunboat Diplomacy and the Turbot war*. MA Thesis RMC War Studies 28 June 1997, 4.

three Prairie Provinces, without the MSV Canada will by default, dilute its capacity to lay claim to, or control new ocean domains.<sup>44</sup>

Experientially, the collegiate concept of the MSV will strengthen the collective abilities of the partner departments. Working together will foster greater inter-departmental collaboration and incubate greater efficiencies. Certainly, from the Canadian Navy's perspective the inclusion of detachments of sailors within the MSVs will foster relationships, enhance working-networks and generate constabulary experience that will pay greater dividends over the long term. Moreover, experience with MSVs could be adapted or modified to benefit the activities of naval tasks groups working in operational interdiction environments that today exist in places like the Persian Gulf or previously in the region of the former Yugoslavia. The concept of the MSV and its ability to readily bring to bear significant sources of information and intelligence concerning merchant shipping will be a powerful tool to leverage in promoting the effectiveness of any Canadian contribution.

The Navy's main response mechanism that supports OGDs is the Ready Duty Ship (RDS), with its on-call, eight-hour emergency response posture. This concept has inherent disadvantages that could be overcome by the MSV, which unlike a warship only has the primary mission of domestic operations. MSVs will avoid the need or trepidation of employing the RDS, as it will be available on a permanent basis, equipped with real time access to intelligence and information that will significantly enhance the execution of complex missions. The MSV presence and predictability will not have the same

---

<sup>44</sup> Centre for Foreign Policy Studies, Dalhousie University. *The Canadian Navy and the New Security Agenda*, Proceedings of the Maritime Security and Defence Seminar, Toronto 26- 27 April 2004, ed by Ann L Griffiths, (Dalhousie University Press, 2004), 68.

security considerations as the RDS because it will always be the primary response vessel. With the assignment of ships to RDS duty rotating between vessels at irregular intervals it is difficult to predict what ship will be employed when any call to action is made. This uncertainty of the specific ship compounds the overriding hesitation for releasing classified information too early and potentially compromising a mission. For example, should the RDS be a consideration in a counter drug mission, at the inception of an operation it is generally unknown as to when the ship will be needed to assist in apprehending a mother ship or transporting the ERT. Mission security mandates that information be withheld until the last moment. Advising a ship that it may partake in an impending event too soon presents unnecessary risk of information disclosure. Moreover, in an emergent situation the rapid marshalling of an entire ships company to respond to an incident is an event of such significance that it will generate media inquiries. Deploying the RDS unexpectedly will incur press interest with a good chance it may consequently alert or tip-off a sophisticated adversary.

Canada's marine interception capability pales in comparison to that of NORAD's air interdiction capability. In the growing interests of continental defence, Canadian and US marine interdiction capability may well call for a common standard. Given our shared geography and waterways, unidentified vessels in Canadian coastal waters can enter or exit Washington or Alaskan State waters in very short order. The RDS, whether for political reasons or otherwise will not always be the appropriate vessel to investigate suspicious vessels. Consequently, as investments in detection and analysis infrastructure expand, inevitably interdiction and/or escort of suspect vessels will be required. As the USCG already practices its model of "expanding boundaries" which permits escort and

interdiction of vessels-of-interest wherever they are encountered Canada must advance in its own similar method for incidents in its own territory or risk potential USCG incursions.<sup>45</sup> The MSV will facilitate these maritime security provisions and foster a more rapid capability to interdict vessels of interest while ensuring that the protection of Canada includes continental defence.<sup>46</sup>

MSVs can present a greater series of options for dealing with issues where political sensitivity is a concern. Warships are also not the best method of responding to events. They are provocative symbols of national power and military force and as such must be carefully considered when being employed in imposing domestic laws because of their connection with foreign policy as W.J. Fenrick, former JAG Director of International Law advised:

The use of warships to enforce national laws against foreign vessels can present a number of problems. In general, the activities of warships tend to have a greater foreign policy impact than similar activities conducted by vessels owned by civil departments. Further, the use of warships in the initial stages of an enforcement action makes it very difficult to escalate the level of confrontation without recourse to the actual use of force.<sup>47</sup>

---

<sup>45</sup> United States Coast Guard, internet <http://www.uscg.mil/news/Headquarters/FY07%20Statement.CG%20Border%20Security.Apr06.pdf>; accessed 14 Apr 2006.

<sup>46</sup> Centre for Foreign Policy Studies, Dalhousie University. *The Canadian Navy and the New Security Agenda*, Proceedings of the Maritime Security and Defence Seminar, Toronto 26-27 April 2004, ed by Ann L Griffiths, (Dalhousie University Press, 2004), 49

<sup>47</sup> W.J Fenrick, Legal Limits on the use of force by Canadian Warships Engaged in Law enforcement, *The Canadian yearbook of International Law* 1980, Vol XVIII, 113-114.

The Osbaldson report also acknowledged: “there is marked concern for the militarism of inherently civilian functions.”<sup>48</sup> To this end the MSV will be a civilian vessel and thus retains the perception of the civil authority acting with the legal power of the nation.

Political flexibility of the MSV will facilitate addressing the newly elected Conservative Government’s commitment to “Canada First” and its Canadian Arctic initiative of basing several armed icebreakers in arctic waters.<sup>49</sup> While the CCG operates all of Canada’s existing icebreakers and possesses the corporate knowledge and skill sets for efficiently employing such specialist craft, any shift in this responsibility would compound the navy’s existing challenges with meeting its expeditionary tasks. However, the designation of icebreakers as MSVs would preserve CCG expertise and command authority, while the inclusion of a naval component in its crew would meet the spirit and intent of Government plans of a military presence. This proposal would certainly be less disruptive to both the CCG and the Navy. Moreover, this concept is well suited to carryover over into the Great Lakes where there is no naval presence and interdiction capabilities and defence of the St Lawrence Seaway are a high priority issues.

## **CONCLUSION**

When it comes to providing marine security in Canada no single ministerial department can take on the full responsibility for national sovereignty and enforcement. Clearly, only through integration, sharing and cooperation of effort will security roles and objectives assure a viable, responsive and robust interdiction capability against marine

---

<sup>48</sup> Treasury Board, Osbaldson Report, *All the Ships that Sail – A Study of Canada’s Fleets*. (Ottawa, Supply and Services Canada, 1990), 50

<sup>49</sup> Conservative Party of Canada, *Defending Sovereignty - Strengthening Canada’s Arctic Forces* 22 December 2005, internet <http://www.conservative.ca/2023/36540/>; accessed 15 April 2006.

threats to the nation. Protections of territorial interests not only fortify domestic jurisdiction but also Canada's contribution towards its continental and international obligations. Government needs options; synthesizing the combined effort of all departments into a single vessel such as the MSV will best facilitate the exploitation of collective efficiencies. Working incrementally in centralizing joint OGD efforts through implementation of PSEPC and other committees are measurably enhancing conditions, while palpable funding for new initiatives is improving capabilities. RCMP and CCG construction of a shared vessel for St Lawrence Seaway and Great Lakes patrols express the inadequacies of current departmental resources while validating the concept of the component crew MSV. There remains, however, no overall vision that coalesces the needs and requirements of the entire marine security spectrum and inter-departmental MOUs are still essential for quickly coordinating activity. With no improvements in Canada's interdiction capability since 9/11, the operational and tactical efficiencies of the MSV must be put into service, not only to deter incursion into Canada but also to give surety to the US that Canada, can and will, readily counter threats in its territorial seas and waterways.

Progress is being made slowly, but the Government must revitalize its efforts and develop the MSV model so that we no longer need to "judge for ourselves," but "see for ourselves" a robust and effective marine interdiction capability.



## Bibliography

- Avis, Capt(N) Peter, CANCAPPS Conference: internet  
<http://www.cancaps.ca/conf2004/avis.pdf>; accessed 16 March 2006.
- Avis, Capt(N) Peter, *Maritime Security and the Culture of Prevention*: internet  
[http://www.carleton.ca/csds/occasional\\_papers/NPSIA-42.pdf](http://www.carleton.ca/csds/occasional_papers/NPSIA-42.pdf); accessed 16 March 2006.
- Canada. Kenny Report: [http://ww2.psepc-sppcc.gc.ca/publications/national\\_security/pdf/Kenny\\_report\\_e.pdf](http://ww2.psepc-sppcc.gc.ca/publications/national_security/pdf/Kenny_report_e.pdf)
- Canada. Department of National Defence: *LeadMark The Naval Strategy 2020*, Ottawa: Director of Maritime Strategy 2001.
- Canada. Department of Fisheries and Oceans: *Collaboration on Marine Security Initiatives*, Internet; [http://www.dfo-mpo.gc.ca/media/newsrel/2004/hq-ac15\\_e.htm](http://www.dfo-mpo.gc.ca/media/newsrel/2004/hq-ac15_e.htm); accessed 6 March 2006.
- Canada. Department of Fisheries and Oceans, *RCMP and Coast Guard Partnership*. Internet; [http://www.dfo-mpo.gc.ca/media/backgrou/2005/hq-ac66a\\_e.htm](http://www.dfo-mpo.gc.ca/media/backgrou/2005/hq-ac66a_e.htm); accessed 6 March 2006.
- Canada. Department of Fisheries and Oceans: 2005-2010 Strategic Plan: *Our Waters, Our Future*, internet [http://www.dfo-mpo.gc.ca/dfo-mpo/plan\\_e.htm](http://www.dfo-mpo.gc.ca/dfo-mpo/plan_e.htm); accessed 16 March 2006.
- Canada. Department of Transport. internet,  
<http://www.tc.gc.ca/mediaroom/releases/nat/2003/03-gc001.htm>; accessed 6 April 2006.
- Canada. Department of National Defence; internet  
[http://www.forces.gc.ca/site/newsroom/view\\_news\\_e.asp?id=1346](http://www.forces.gc.ca/site/newsroom/view_news_e.asp?id=1346); accessed 16 March 2006.
- Canada. Department of National Defence: Internet  
[http://www.vcds.forces.gc.ca/dgsp/pubs/rep-pub/ddm/dpr2003/dpr-4d\\_e.asp](http://www.vcds.forces.gc.ca/dgsp/pubs/rep-pub/ddm/dpr2003/dpr-4d_e.asp); accessed 13 March 2006.
- Canada. Department of National Defence, *A Time for Transformation, Annual Report of the Chief of Defence Staff 2002-2003*, Ottawa: DND Chief of the Defence Staff, 2003, 4.
- Canadian Institute of Strategic Studies, internet;  
[http://www.ciss.ca/Comment\\_Newpolicy.htm](http://www.ciss.ca/Comment_Newpolicy.htm); accessed 13 March 2006.

- Canadian Institute of Strategic Studies, internet;  
[http://www.ciss.ca/Comment\\_CANCOM.pdf](http://www.ciss.ca/Comment_CANCOM.pdf); accessed 13 March 2006.
- Canadian Institute of Strategic Studies, internet;  
[http://www.ciss.ca/Comment\\_SecSov.pdf](http://www.ciss.ca/Comment_SecSov.pdf); accessed 13 March 2006.
- Canada. Government of Canada. Internet  
[http://ricommunity.gc.ca/reference/documents/working\\_in\\_partnership/index\\_e.asp#horizontal\\_collaboration](http://ricommunity.gc.ca/reference/documents/working_in_partnership/index_e.asp#horizontal_collaboration); accessed 6 March 2006.
- Canada. Government of Canada, Privy Council Office, *Securing an Open Society : Canada's National Security Policy April 2004*. Internet [http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat\\_e.htm](http://www.pco-bcp.gc.ca/default.asp?Language=E&Page=publications&Sub=natsecurnat&Doc=natsecurnat_e.htm); accessed 6 March 2006.
- Canada. Government of Canada: *Exercise Sea Barrier*, internet  
<http://news.gc.ca/cfmx/view/en/index.jsp?articleid=198489>; accessed 30 March 2006.
- Canada. Public Safety and Emergency Preparedness Canada PSEPC, internet  
<http://www.psepc-sppcc.gc.ca/media/sp/2004/sp20040325-en.asp>; accessed 13 March 2006.
- Canada. Royal Canadian Mounted Police, *Safety and Security for Canadians*, internet  
[http://www.rcmp.ca/security/feature1\\_e.htm](http://www.rcmp.ca/security/feature1_e.htm)  
[http://www.cisco.com/web/strategy/docs/gov/agencies\\_secure\\_resilient.pdf](http://www.cisco.com/web/strategy/docs/gov/agencies_secure_resilient.pdf);  
accessed 13 March 2006.
- Canada. Royal Canadian Mounted Police: Security Update, internet [http://www.rcmp-grc.gc.ca/security/security\\_e.htm](http://www.rcmp-grc.gc.ca/security/security_e.htm); accessed 13 March 2006.
- Canada. Royal Canadian Mounted Police, *New Patrol Vessel*, internet  
[http://www.rcmp-grc.gc.ca/nb/news/May1403\\_143318.html](http://www.rcmp-grc.gc.ca/nb/news/May1403_143318.html); accessed 16 March 2006.
- Canada. Royal Canadian Mounted police, *West coast Marine Detachment*; Internet  
<http://members.shaw.ca/rcmpwcmd/Photogallery.htm>; accessed 16 March 2006.
- Canada. Report of the Standing Senate Committee on National Security and Defence, October 2003, *Canada's Coastlines: The Longest Under-Defended Borders in the World*, Volume 1, Internet  
<http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/defe-e/rep-e/rep17oct03-e.htm> accessed 12 April 2006.

- Canada. Report of the Standing Senate Committee on National Security and Defence, October 2003, *Canada's Coastlines: The Longest Under-Defended Borders in the World*, Volume 2, Internet  
<http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/defe-e/rep-e/rep17vol2part3-e.htm#APPENDIX%20X> accessed 12 April 2006.
- Canada. Senate Committee on National Security and Defence: internet  
<http://www.parl.gc.ca/37/2/parlbus/commbus/senate/Com-e/defe-e/witn-e/cms-e.htm>; accessed 30 March 2006.
- Canada. Transport Canada, *Security*, internet  
<http://www.tc.gc.ca/mediaroom/releases/nat/2005/05-gc001ae.htm>; accessed 13 march 2006.
- Canada. Transport Canada. *Environmental Response Systems*, internet  
<http://www.tc.gc.ca/marinesafety/Ships-and-operations-standards/environmental-response/menu.htm>; accessed 13 march 2006.
- Canada. Transport Canada, *Marine Security Initiatives*, internet  
<http://www.tc.gc.ca/mediaroom/backgrounders/b03-M001.htm>; accessed 30 March 2006.
- Canada. Treasury Board of Canada, *Marine Security*, internet [http://www.tbs-sct.gc.ca/rma/eppi-ibdrp/hrdb-rhbd/ms-sm/description\\_e.asp?printable=True](http://www.tbs-sct.gc.ca/rma/eppi-ibdrp/hrdb-rhbd/ms-sm/description_e.asp?printable=True); accessed 13 March 2006.
- Canada. Treasury Board, Osbaldson Report, *All the Ships that Sail – A Study of Canada's Fleets*. Ottawa, Supply and Services Canada, 1990.
- Canadian American Strategic review. <http://www.sfu.ca/casr/ft-senate2.htm>
- Centre for Foreign Policy Studies, *The Canadian Navy and the New Security Agenda*, Proceedings of the Maritime Security and Defence Seminar, Toronto 26- 27 April 2004, Edited by Ann L Griffiths, Dalhousie University Press, 2004.
- Centre for Foreign Policy Studies, internet  
<http://centreforforeignpolicystudies.dal.ca/pdf/spc03conferencereport.pdf>; accessed 13 March 2006.
- Conservative Party of Canada, *Defending Sovereignty - Strengthening Canada's Arctic Forces*, 22 December 2005, internet <http://www.conservative.ca/2023/36540/>; accessed 15 April 2006.
- CTV News, *Tories' ambitious defence plan needs more money*, internet  
[http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20060218/tory\\_defence\\_plan\\_060218/20060218/](http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20060218/tory_defence_plan_060218/20060218/); accessed 15 April 2006.

- Edwards, Robert H, *The 1995 Canada-European Union (EU) Turbot Crisis: Canada's Use of Force in Fisheries and Diplomacy*. Halifax NS: Dalhousie University, 1996.
- Fenrick, W.J, *Legal Limits on the use of force by Canadian Warships Engaged in Law enforcement*, The Canadian yearbook of International Law 1980, Vol XVIII, 113-114.
- Guarding the Continental Coasts. *United States Homeland Security and Canada*, internet <http://www.irpp.org/pm/archive/pmvol6no1.pdf>; accessed 30 March 2006.
- Haydon. Peter. Canadian Naval Future, internet <http://www.irpp.org/wp/archive/wp2004-12.pdf>; accessed 13 March 2006.
- Killaby, Peter C. *Canadian Gunboat Diplomacy and the Turbot war*. MA Thesis RMC Warstudies, 28 June 1997.
- Marine Security Shield or Sieve: internet <http://www.cda-cdai.ca/symposia/2005/Farion.pdf>; 13 April 2006.
- Marine Security Operations Centre (MSOC), *Concept of Operations, Draft 0.6 November 2004*
- Counter Drugs Memorandum of Understanding (MOU) between Royal Canadian Mounted Police (RCMP) Commissioner and Chief of Defence Staff, 20 January 2005.
- Naval Review, internet <http://naval.review.cfps.dal.ca/pdf/canadasoceansmurray.pdf>; accessed 16 March 2006.
- Neill. D.T. *Exercise New Horizons: A Case for a Para-Military Coast Guard*. 31 March 1988.
- The Heritage Foundation, *Port Security and Foreign Investment*: internet <http://www.heritage.org/Research/HomelandDefense/tst030306a.cfm>; accessed 6 April 2006.
- United States Coast Guard, internet <http://www.uscg.mil/news/Headquarters/FY07%20Statement.CG%20Border%20Security.Apr06.pdf>; accessed 14 Apr 2006.
- United States Coast Guard, Commandant Remarks, Internet <https://www.piersystem.com/go/doc/786/76787/> ; accessed 13 April 2006.