



AN INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (ISR) VISION FOR THE CANADIAN FORCES

by Commander Josh Barber

The events now unfolding in the wake of the terrorist attacks of 11 September have brought to the fore the importance of having robust Intelligence and Information (I²) capabilities in the military and in other branches of government. Given the limited resources that have been allocated to the field, the Canadian Forces (CF) has developed a relatively respectable intelligence capability over the past several decades, but it was largely designed to support high-intensity conventional conflict between highly structured, technologically advanced military forces. Well before the recent crisis, it was clear to senior decision makers that the CF must upgrade its information and intelligence capabilities if it was to operate effectively in the future. That possible conflict for which the CF must be ready is likely to be more diffuse, diverse and rapidly evolving than anything experienced in the past. The present fight against terrorism may be the harbinger of future asymmetric threats.

The key determinant of success in conflict in the 21st century is likely to be the effective use of information, rather than brute combat power. Information, at least as much as hot lead and high explosive, will be a weapon of war. Precision engagement will demand precise information. If we are to fight and win an 'Information War', we will need to achieve 'Information Superiority' — the ability to obtain precise, reliable information in a shorter time than our opponents. Clearly, if our commanders are to make informed, battle-

winning decisions in such an environment, they will need access to the best possible information delivered in the fastest possible manner.

Operating in the 'Information Age' will challenge 21st century decision makers. In the future, the problem will be one of having to make decisions in the face of too much information, rather than too little. It is anticipated that the coming decade will bring a billion-fold increase in C⁴ISR data (computing power x bandwidth x sensor acuity). To make sense out of this flood of information, the CF will have to create a new way of processing sensor and intelligence information, and of providing the results to commanders who must make timely operational decisions.

THE ISR CHALLENGE

Recognizing these challenges, senior decision makers and policy analysts within the Department of National Defence have, over the past few years, begun to create a vision for the Canadian Forces of the 21st century. The foundation document, *Strategy 2020*, published in 1999, calls for a force that will be modern, globally deployable, and interoperable with our principal allies. The Canadian Forces of 2020 will need to have adopted leading-edge doctrine and technologies. Given that the CF will have to operate in an

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JSPA Combat Camera photo by: Sgt. V.M.W. Striemer, IHD001-826a

Reconnaissance.

'Information Age' battlespace, investment in information technologies and a transformation of culture to fight in an information-dominated battlespace will be pre-eminent requirements. Adopting the US-originated concept of ISR (Intelligence Surveillance and Reconnaissance), *Defence Plan 2001* has directed the Deputy Chief of Defence Staff (DCDS) to develop an ISR plan for the CF as one of the key Change Initiatives leading towards the implementation of the Canadian Forces' *Strategy 2020* vision.

At this point, it is appropriate to provide some basic working definitions of the terms involved in ISR:

Intelligence. The product of processed information concerning hostile or potentially hostile forces;

Surveillance. Systematic observation by technical sensors or human beings. This implies continuous 24 hours a day/7 days a week surveillance of areas or forces of interest;

Reconnaissance. Directed mission(s) to obtain specific information; and

ISR. The capability that integrates command direction, sensors, and processed formation and intelligence with

timely dissemination in order to provide decision makers with effective 'Situational Awareness'.

It is important to note that at present there is no standard approved definition of ISR in any community or nation. The working definition above was developed after extensive consultation with DND and CF personnel involved in the present ISR community. The key concepts to note in this definition are "integrated", "timely" and "Situational Awareness". Most importantly, ISR is a human *process* and a way of doing business as much as it is the adoption of particular sensor and information processing technologies. What ISR is really about is the provision of the right information to the right people and places at the right time.

To a large extent, the present ISR capability within the CF is characterized by the 'I', the 'S', and the 'R' having all developed separately and being operated separately. Except perhaps at the maritime operational level on Canada's two coasts, there has been little integration of military surveillance and reconnaissance capabilities with the full array of intelligence capabilities. The CF's strategic intelligence capability is characterized by a degree of 'stove piping', in which different elements of the intelligence puzzle are collected, processed and disseminated to decision makers by intelligence exploitation centres operating in various degrees of isolation from each other. Fusion of all the information generated and reported by these different sources has had to take place in the heads of senior decision makers. This may have worked adequately in the past, but can no longer continue to do so in the information-saturated environment of today and the future. There will be too much information, from too many sources, coming in far too rapidly, for decision-makers to have a manageable 'Situational Awareness' from which they can make truly informed operational decisions.

To address the *Strategy 2020* objectives, the DCDS Group at National Defence Headquarters last year formed a new division to address joint force development. The Joint Force Development division (DG JFD) incorporates doctrine development, the space directorate and all elements related to C⁴ISR, as well as other key 21st century joint capabilities. In response to the specific challenge of creating an integrated, modern ISR capability for the CF, staff within the Directorate of Joint Force Capabilities in this division, in cooperation and consultation with knowledgeable colleagues across the Department and among our allies, have been engaged for the past year in the intellectual process of developing an ISR Vision for the CF. Having evolved through a number of iterations and drafts, the CF ISR Vision document will be ready for promulgation in the latter part of 2001. A long-term vision, by definition, provides broad, sweeping generalization. It provides the context from which specific capability improvements can be developed and implemented. This document will serve as the blueprint for developing the Canadian Forces' ISR capability over the next two decades. Clearly, the Vision will have to be continually updated in light of changing circumstances and evolving technology.

THE ISR VISION

The Canadian Forces ISR Vision calls for an integrated system of capabilities that aims to provide commanders at all levels — tactical through to strategic — with the enhanced situational awareness they need to make better informed operational decisions. The ISR process will integrate raw sensor data with processed Information and Intelligence (I²). Achieving the CF ISR Vision will be a major milestone in turning the *Strategy 2020* concept into a reality, and will also be critical in maintaining interoperability and relevance with our key allies.

Technological improvements will assist with the high speed processing and integration of data into information. However, we will also need to create organizations where this information can be integrated in a single place, rather than in separate ‘stovepipes’. We will have to transform the training and occupational structures of those members of the CF/DND team who are in the business of processing all forms of operational information. The CF will also need to invest in improving its organic surveillance and intelligence collection capabilities. A combination of space-borne and unmanned aerial vehicle-based sensors will be necessary in order to assist in collecting operational information on a continuous basis.

The ISR Vision recommends a transformation of the current CF I² community from its present loose confederation of separate specialities and reporting chains into an integrated enterprise. This is aimed at generating sufficient information advantage so that commanders at all levels will be able to make better informed decisions in the information-intensive environment of future operations. Because the CF operations are likely to be only one element among many in the government’s range of responses to specific situations, the CF’s ISR capability should also take into account broader governmental requirements for operational information.

ISR CAPABILITY IMPROVEMENTS

The ISR Vision has identified a number of key improvements that need to be implemented in order to provide the CF with an integrated ISR capability. At the heart of the Vision is the establishment of an ISR Fusion Centre capability. The existing separate, strategic-level, single-source sensor and information exploitation centres (at the very least, SIGINT, Imagery and Geomatics) would be co-located in a single facility. The Centre would also be the focal point for the timely and systematic exploitation of open source material, which, at present, is barely handled anywhere within the community. Not only would the establishment of an ISR Fusion Centre create a single point for the exploitation and fusion of all-source information, it would also create the impressive synergy that arises from having a team of skilled and knowledgeable people working closely together on different aspects of the same problem. This would truly be a case of the whole being greater than the sum of the individual parts. The

proposed ISR Fusion Centre would operate on a ‘24 hours a day/7 days a week’ basis to create and maintain digitized Common Operational Pictures (COPs). The envisioned COP of the 21st century will be a dynamic, digital and complete representation of the battlespace that will allow commanders at all levels to share a common understanding and situational awareness in near real-time. The Fusion Centre would report directly to the DCDS, as the CF’s Chief Operations Officer. However, through the use of leading edge command and control information technology, its products would also be available on a continuous and near real-time basis to CF commanders at all levels and in all locations. The Fusion Centre in Ottawa would be linked with existing operational fusion centres on the two



Intelligence Fusion – maintenance of a digitized Common Operational Picture – will be assisted by technologies such as the large scale Topographical Map Display developed by the Defence Research Establishment Valcartier.

coasts and in NORAD that, respectively, provide operational situational awareness concerning maritime and aerospace activity.

The Fusion Centre will be of little value if it does not have appropriate data and information to process. Improvements to the present CF ability to exploit space-borne imagery are already being addressed through Project Polar Star. This will deliver enhanced capability in about the same time period as envisaged for the formation of the Fusion Centre. Therefore, logic suggests that the Fusion Centre should be the place to process this source of information. Further investment in space-based surveillance capabilities beyond the time frame of the present CF Joint Space Project (of which Polar Star is just one part) will be required if the CF is to obtain the full range of benefits that can accrue from space-based surveillance and intelligence-gathering capabilities. While space-borne intelligence collection will add greatly to the CF’s ability to understand the battlespace, it is well understood that no single source can ever provide complete understanding or entirely reliable information. Investment in other information sources and sensors will continue to be required.

One shortcoming in current CF information-gathering capabilities lies in the area of tactical/operational aerial reconnaissance. To overcome this deficiency, the CF ISR Vision calls for the acquisition of a squadron of surveillance Unmanned Aerial Vehicles (UAVs). UAV technology has evolved rapidly in the past decade, and UAV-obtained information has been shown to be of great value in a number of recent operations. More than fifty nations now operate UAVs for reconnaissance and surveillance purposes. Canada is not one of them, even though some Canadian companies have developed world-leading expertise in niche areas related to UAV technology; in particular, sensors and UAV command and control. The capabilities desired for Canadian Forces UAVs include multi-sensor capability (optical, radar and infrared as minimum requirements) and long endurance (at least 24 hours). The long endurance capability would permit UAVs to provide wide area surveil-

play an important role in resolving these issues. It is likely that the UAV trial process prior to acquisition will involve a mix of simulation-based and live-fly experimentation.

The third, and perhaps most important, leg of our ISR Vision rests on people and organization. Technology is currently driving change, and will provide major enhancements in both sensor capability and information flow. However, without the right numbers of people with the right kinds of training, working in the right kind of organizational structure, operational information will not be processed and provided to those who need it in the manner that they require in order to make the best decisions possible. Revolutions in Military Affairs (RMAs), of which ISR is one part of the continuing Information Revolution, do not take root until doctrine, structures and culture have been changed to adapt to the introduction of new technology. Thus, for ISR to take root and be successful as a way of doing business, the present I² culture must be adapted to the realities of the continuing Information Revolution. The most important part of this change will come through changing the organization, training and employment of those personnel (both military and civilian) who are employed in the business of operational information. The ISR Vision has identified a need for a new Operational Information career field for both officers and NCMs. This new career field will be developed in concert with the ongoing Military Occupational Structure analysis, redesign and tailoring process, and provide the CF with the skilled 'Information Warriors' need-



Surveillance. The Canadian Forces' ISR Vision calls for the acquisition of unmanned aerial vehicles to improve tactical/operational aerial surveillance capabilities.

lance and reconnaissance over, for example, Canada's ocean areas of interest or the Arctic. Equally, long endurance offers the possibility of providing sustained or continuous surveillance over smaller areas in support of deployed CF operations. Although no decisions have been taken regarding UAV types, capabilities or numbers, it is envisioned that Canada could achieve an operational capability with UAVs within two to three years of project approval being granted.

There are a large number of UAVs of widely varying capabilities available on the commercial market, some of which might meet Canadian Forces requirements. However, a number of areas related to UAV operation need to be resolved before full operational capability can be achieved, or even before the exact type and numbers to be acquired can be determined. The areas that need to be examined include UAV flight operations, communication and command and control procedures, sensor operation and information processing, and personnel issues related to the flight and maintenance of UAVs, and to the processing and reporting of UAV-obtained surveillance and reconnaissance information. It is anticipated that the new Canadian Forces Experimentation Centre (CFEC) will

ed to process and transform sensor data and operational information into useful situational awareness. This career field will probably be developed from among the several existing military occupations that presently handle individual parts of the overall situational awareness puzzle. In addition, the ISR Vision calls for the creation of deployable, integrated ISR support teams that would be able to provide direct support across the full range of ISR-related capabilities to deployed CF commanders.

FURTHER ISR ISSUES

The extent of interoperability with other government departments, and how this will be effected, must be defined in addressing the ISR concept. As well, our principal allies are likely to continue being important contributors to our national knowledge base, particularly for deployed military operations. However, this is not a one-way information flow, since, as we are seeing in the present operations against the international terrorist threat, Canada will also be expected to contribute its share to the combined situational awareness of coalition and Allied operations. All of these issues raise questions of interoperability and connectivity in

both technical and doctrinal terms. These issues can only be resolved through mutual dialogue among all players, and will be a continuing part of the evolution of the ISR Vision.

ISR will also continue to evolve in process and in technology. Therefore, the CF ISR Vision has identified the requirement to establish a permanent concept development component as an integral element of our ISR capability. This will be the focal point for evaluation and measurement of ISR effectiveness, and for research and development of new ISR technology and processes. It will recommend changes to the CF ISR architecture and process, as needed. This component will work closely with Operational Research, the CF Experimentation Centre, Defence Research establishments, and Lessons Learned centres.

IMPLEMENTING THE ISR VISION

A vision without a plan for implementation would be pointless. The ISR Vision recommends implementation in three phases. The first phase would take place between 2001 and 2005. This would address relatively straightforward and easy-to-adopt changes, including the development of ISR strategy, doctrine and procedures, as well as low cost measures to enhance current ISR capabilities. The second phase would encompass the period from 2005 to 2010, and would introduce new capabilities and technologies that would transform our ISR capabilities. In this period, we would see the establishment of the CF ISR Fusion Centre, surveillance UAVs in operational service, and the first fruits of changes to our training and military occupational struc-

tures. By the end of this phase, the CF would have a robust national ISR capability. The third phase, from 2010 to 2020, would see the continuous refinement and improvement of this capability to match changes in technology and CF capabilities and missions.

It should be noted that this is all vision and, at this time, none of it has been formally approved as part of the CF's capital program. However, it is planned to bring these proposals forward over the next few months and turn them from vision into approved and funded projects for implementation over the next decade.

In addition, over a similar time frame, there will be a number of other related capital projects that will enhance the CF's total ISR capability. These will be coordinated with the omnibus ISR project, but will be developed as independent projects. Such related projects will include North American Radar Modernization, Aurora Incremental Upgrade, Maritime ISR initiatives, Land Force ISTAR capability, and Canadian Forces Command System I and II, plus other Command and Control Information Systems (C²IS) technology enhancements.

CONCLUSION

The Information Age RMA is upon us. If the CF is to be able to operate successfully in the real-time information-saturated environment of the 21st century, it must adapt the way it processes and produces operational information to this new reality. The ISR concept is the way to effect such a transformation. In preparation for the implementation of an integrated ISR capa-



bility in the CF, the ISR Vision provides a broad examination of the CF's ISR requirements for the next twenty years, and provides a roadmap towards achieving a robust ISR capability. Several new technical capabilities are proposed, but the most important changes will be the creation of a coherent organization, culture and doctrine for the provision of operational information to decision makers. The Vision identifies a costly, but manageable, investment program for the next decade to bring about a much-needed capability improvement in Information and Intelligence at the strategic and operational levels. Key elements of the program include the

development of an integrated ISR Fusion Centre in Ottawa, acquisition of an effective surveillance UAV capability, continued investment in space-borne surveillance capabilities, and the transformation of organization, doctrine, and occupational structures to match the information challenge of the future. With these tools, CF decision makers will have the means of making decisions based on the best possible operational information and situation awareness.



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