

## USE OF COTS TECHNOLOGY IN C2 INFORMATION SYSTEMS: BALANCING THE BENEFITS AND RISKS

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**Abstract.** The overlap in requirements of military and commercial information systems is steadily growing. Wider use of Commercial-Off-The-Shelf (COTS) information technology in military systems offers the prospect of reduced development and support costs, improved interoperability, reduced technological risk, accelerated deployment, and incremental system evolution. On the other hand, COTS products are effectively “black boxes” and are usually not of military grade, raising significant security and reliability concerns if they are used in critical Command and Control (C2) information systems. Management difficulties can also arise as a consequence of frequent product revisions, immaturity of released products and vendor “lock in”. In the search for affordable leading-edge capability, military forces are seeking to take advantage of commercial technology wherever possible. This paper examines potential benefits and risks associated with use of COTS technology in C2 information systems and outlines a number of risk mitigation strategies.

### INTRODUCTION

The military sector is declining in importance as a developer and purchaser of high technology [1]. Industrial R&D spending has grown to be several times that of the US Department of Defense. DoD purchases of computers and electronics are now less than 5% of the total.

Development of customised military products is increasingly difficult to justify in technology areas with strong commercial competition. In mid-1994, US Secretary of Defense Dr William Perry decreed [2] that future DoD purchases should use performance-based or commercial standards where possible rather than Milspec, reversing the previous policy. He noted that “in the fields of technology most important to the Defense Department today - semiconductors, computers, software, telecommunications - the technical leadership is in [commercial] industry. If we do not accept their standards, we are not only paying the extra price needed to adapt their equipment and their technology to our requirements, but we’re also buying a generation of delay in being able to get the equipment” [1].

Military use of COTS products in areas such as personnel, logistics and finance is well advanced. Because of their different requirements and critical importance, military operational systems are usually considered separately from business systems. Superiority in C2 capability is an important strategic and tactical asset. To maintain such superiority, supporting information systems must allow ready insertion of new technology and functionality. These systems must also be robust, reliable and affordable. Use of COTS technology in operational information systems offers potential advantages here but also raises legitimate concerns regarding security and reliability.

### DRIVERS FOR TAKE-UP OF COTS TECHNOLOGY

A central concept of the current Revolution in Military Affairs is that “force multiplication” can be achieved through a combination of dominant battlespace awareness, speed/mobility, coordination of various force elements, precise targeting and delivery of munitions, focused logistics, and full-spectrum defence. These factors in turn depend on advanced C2 information systems that can

interoperate across system, functional and organisational boundaries. The following sections outline characteristics that favour use of COTS technology in such systems.

### Converging Military and Commercial Requirements

The functional and infrastructure requirements of military and commercial information systems are steadily growing closer. COTS office automation and database technologies, for example, are already widely used in both business and operational military systems. Consider the military parallels with the following examples:

- Businesses with large fleets of vehicles use GPS and GIS to maintain real-time displays of vehicle locations.
- Multinational corporations use encrypted data links for secure connectivity between separate divisions.
- Commercial inter-application messaging systems meet requirements for reliable delivery (once and once only), authentication, confidentiality and integrity.
- Executives at separate locations use Computer Supported Cooperative Work tools to plan confidential marketing campaigns, etc.

Certain requirements in military information system (such as those associated with electronic security) will depend on customised military-grade solutions. Future overall C2 systems will likely comprise a mixture of COTS products, general-purpose military modules (eg. Defense Information Infrastructure Common Operating Environment (DII COE) segments [3]), custom modules and “glue” code.

### Cost, Implementation Time and Functionality Issues

Products in the information technology industry are generally characterised by high fixed costs relative to the marginal costs of manufacturing or reproduction. This characteristic leads to clear economies of scale: both initial fixed costs and ongoing product development costs can be amortised across a large base. Common Operating Environments such as the DII COE represent an attractive intermediate position between customised one-off systems and high volume COTS products.