

The future lies in the IMIX

Future soldier capability depends not only on the quality of information, but also the ability of individual soldiers and their commanders to pull out and exploit the information that is most relevant from a host of different sources. Technologies from the civil domain could be of great help, as **Professor Bob Madahar** of the Defence Science and Technology Laboratory tells Jim Banks.

A US soldier using an iPhone in the field.

Information is one of the most powerful weapons on the battlefield, but with the wealth of data sources available to today's military, the overriding priority is to ensure that only the most relevant and useful information is extracted. Information management and

exploitation (IMIX) is one of the most important areas of technology development for the armed forces.

"The key technological priority is to address the question of how to manage and exploit the plethora of information services and data we have," says Professor Bob Madahar,

chief technologist/scientist at the information management department (IMD) at the Defence Science and Technology Laboratory (Dstl).

"We need to address heterogeneous information sources, the temporal validity of information, and how to extract what is most pertinent for a

given operation. From the range of sources we have, it is vital to extract only the information that is of use to an individual soldier or to a higher level on the chain of command.”

IMIX impacts both software and hardware development. On the software front, the goal is to develop tools that can extract relevant and timely information for each level in the command chain, from strategic planning to the soldier on the ground. For this, Dstl is looking at service-based information concepts from the civil domain, such as web services, which help to manage the ever-increasing flow of data that businesses have to manage.

On the hardware front, the military is looking at the exponential growth of multimedia devices to inform how it will deliver information to the soldier on the ground. Developments in mobile phone technology, for instance, are bringing ever-greater

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sophistication to the way information is displayed. Once again, the innovations that are shaping technology in the civil domain are likely to have a great impact on military hardware.

“Most businesses must deal with a deluge of information as part of their business, and this is a challenge for most industries,” says Madahar. “The flow of information in the civil domain is growing rapidly, so this is an interesting area for the military, but although we can use that technology, we face different security and vulnerability concerns. In the military, and in industry, there are many sources of information available, but the question is how to make the best use of them.

“We always need to innovate in developing new sources of information, such as the growing number of social media interactions that take place worldwide, to see what can be gleaned

from them that is useful. But the priority is achieving the best use of the information we have and sharing it with the people who need it.”

Too much information

For the individual soldier, the key priorities are the relevance of the information and the simplicity of accessing it. Though a wealth of information may be available, it may only be necessary to pass on simple locational information to a soldier, though additional data on potential threats or other environmental conditions could be added if they would significantly enhance the chances of a mission’s success.

“There is a cognitive burden that comes with redundant or superfluous information, so we must deliver only what is important for the role and in a format that can be easily used. Civil technology for multimedia devices is developing very rapidly, but it may not be what we need,” says Madahar.

One interesting concept from the civil domain is augmented reality, which allows a device to overlay useful information on the view seen through the camera of a multimedia device. In the civil domain, this technology is used to provide directions or information on local services, for instance, when the camera on a mobile phone is pointed at a particular street.

For example, you can stand on a street in London, point your camera towards the nearest street and ask the way to the nearest tube station, and arrows appear on the camera view to

point you in the right direction. It is easy to see how augmented reality could be very useful for providing locational information to the soldier on the ground.

“This could work in the military domain, but the information must be pertinent and the soldier must not be overloaded with information or different formats to manage. You need a simple visual form,” explains Madahar.

Security and interoperability

Working with industry is seen as vital at Dstl, which has done much to encourage close cooperation with equipment manufacturers from the civil domain. Their input is seen as crucial to the development of the next generation of military technology.

Dstl has at its disposal an information capability laboratory, which provides a representative infrastructure in which to work with developers of new technology. Acting as a neutral test environment, it provides a space in which to evaluate new technologies and identify issues affecting interfacing and interoperability. Working in such an environment gives important clues as to how technology needs to be adapted to suit the needs of the military.

“It is a test-bed environment that allows close collaboration with industry to ensure rapid prototyping,” remarks Madahar. “It is very useful for evaluating new technology and gives us the opportunity to identify where improvements can be made to existing applications already in use. It also allows us to explore human factors, as we can see how soldiers interact with equipment, and to train soldiers with new applications. That is very important for IMIX.”

One of the most important adaptations that needs to be made to

all technology brought in from the civil domain is enhanced security. What passes for security in everyday life is not sufficient in the military space, where it is vital to protect operational information from interception by hostile parties. Furthermore, on the hardware front, what passes for robust equipment in the civil domain will not suffice on the battlefield.

“When adapting technology, the biggest challenge is always to take into account the vulnerabilities of any new technology because security is more important than in the civil domain. Hardware must work in stressed environments, so it must have the ability to withstand shock and vibration. Software must be secure so that the information relayed cannot be exploited by others,” says Madahar.

Another key area that Dstl must

address is interoperability. New equipment must interface seamlessly with the systems architecture in use and this is perhaps the biggest challenge for any new piece of kit.

“The information capability laboratory is a test-bed environment that allows close collaboration with industry to ensure rapid prototyping.”

“We have come a long way in the last decade, but the key issues remain,” says Madahar. “We need to understand the architecture of the system into which we are trying to integrate software and hardware, and the standards of the infrastructure with which we must comply. With civil technology, standards have developed to allow devices to integrate very easily, which gives confidence that new devices

will be easier to integrate. We can do that with newer equipment, but the military also maintains legacy equipment and interfacing with that is a big challenge.”

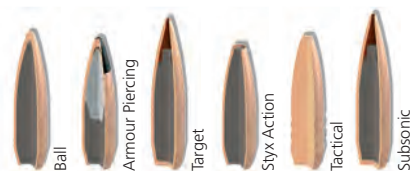
Standards are vital to interoperability and much work has been done by Nato partners to ensure that there are relatively simple paths to the integration of new equipment. Nevertheless, each new piece of hardware or software requires extensive testing to ensure it interfaces well. This is Dstl’s biggest challenge, but IMIX is making rapid progress and keeping pace with civil technology development. ■



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