Australian Government

Department of Defence

Explaining NCW

Network Centric Warfare

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CDF Foreword

Australia's recent operational experience shows that modern technology and tough, well-trained people can create a warfighting advantage. It is this combination of people and technology that makes the concept of Network Centric Warfare (NCW) so important to our future.

Despite this, many people in Defence still only have a passing awareness of NCW, and are probably unsure of what it really means. That is why this booklet, *Explaining NCW*, has been produced, to develop a common understanding of NCW across Defence.

As you read the following pages, you will learn that Defence has a well-developed and practical plan to use NCW as a means for our continuing modernisation. A detailed description of the future NCW capability envisaged by Defence is in *ADDP-D.3.1, Enabling Future Warfighting – Network Centric Warfare*, and the framework for achieving the required capability is explained in the *NCW Roadmap,* 2005.

I hope you will see that each and every one of you, as a member of Defence, has an important part to play as the changes are made to link our people and technology into one networked force.

Air Chief Marshal A.G. Houston AO, AFC
Chief of Defence Force

Network Centric Warfare

Introduction

This booklet introduces the *Network Centric Warfare* concept and outlines the Defence plan for employing the concept, to increase the effectiveness of future warfighting. Defence is making changes that take advantage of converging technologies, and these changes will affect every member of the organisation. Some members will feel the influence of NCW on the way they work before others, but all should expect to see the effects of change within 5 years.

Consequently, every member of Defence needs to understand what NCW means, and how the concept will be implemented.

This booklet has two parts. Part 1 defines NCW, explaining what NCW means to Defence, who it will effect and why it is important. Part 2 explains how Defence will move NCW from concept to reality and when this is to occur.

Understanding Network Centric Warfare

Part 1

What Does NCW Mean to Defence?

NCW is a means of organising the force by using modern information technology to link sensors, decision makers and weapon systems to help people work more effectively together to achieve the commander's intent.

This definition highlights that NCW is more than a concept or collection of new technologies, but rather is a tool that can contribute significantly to producing a **warfighting advantage.**

Warfighting is the unique contribution that Defence makes to national security. It is not the only situation where NCW will be useful, because Defence will adapt its warfighting skills to a wide variety of tasks including peace keeping and humanitarian operations (for example, the provision of aid and relief to Indonesia in the wake of the 2004 Boxing Day Tsunami).

The major contribution that NCW makes to producing a warfighting advantage is via increased synchronisation through four major and interdependent elements:

- command and control systems (the C2 grid)
- sensor systems (the sensor grid)
- engagement systems (the engagement grid)
- the network (the information network)

In practice, these grids are not always distinct and some systems are a combination of grids.

In terms of organisation, Defence sees NCW as a way of structuring itself so that people can take advantage of information, and ultimately increase joint force combat power.

Figure 1.1 illustrates the interdependence of the component grids.

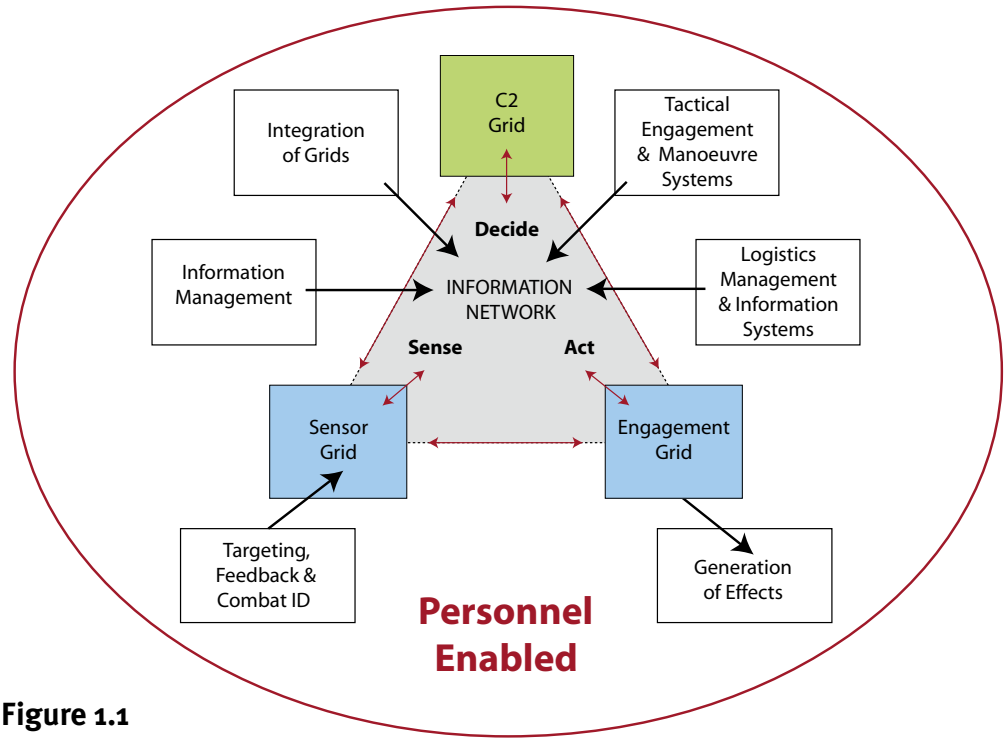


Figure 1.1

Electronic banking: an illustrative example

Up until the 1970s, people paid for purchases using either cash or cheques. Credit card use has only become popular over the last 30 years. Automatic teller machines (ATM) did not exist in Australia 25 years ago and facilties for electronic funds transfer at the point of sale (EFTPOS) only became available in the late 1980s.

Figure 1.2

Due to the convenience and efficiency provided to the consumer, EFTPOS and BPAY®, have gained universal acceptance. Over time, using them has become second nature.

There is no single date as to when this change to electronic banking occurred. The development and evolution of technology such as the Internet, have in themselves taken decades and will continue to evolve into the future.

The point is that a whole variety of technology, skills and attitudes have all converged, across a relatively short period of time, to produce a relatively rapid change to the way buying products is done.

NCW is a lot like the change to electronic banking:

- The technology (the new capabilities that Defence has identified in the Defence Capability Plan) is only one piece of the puzzle. NCW, just like electronic banking, is about how people use this technology to improve the way that they do things.
- NCW, like electronic banking, will take decades to reach maturity. A good plan (like the one described in the *NCW Roadmap*) provides Defence with a sound basis to move forward.
- As with the changes in the banking industry, NCW is about the convergence of capabilities, skills and knowledge that lead to rapid changes in the long-established ways that Defence does its business.

- Just as is the case with EFTPOS and BPAY, Defence will know it has reached a mature NCW capability when our people routinely use NCW tools to conduct their everyday activities.

Networks and Networking

Most people understand 'networking' in a general sense, especially as networks are part of our daily lives. For instance, networks – based on modern information and communications technology – are changing the way people deal with government, the way retail stores sell products, and even the way we are entertained.

Networks are also a part of life in Defence. In fact, a number of Defence functions – such as offensive support, surveillance and logistics – are networks. Other functions, such as personnel management, are emerging networks.

All these networks are different, but share some common features. Members share information, support each other, and perform different parts of common tasks. Ultimately, network members help each other to achieve common goals faster and more effectively than individuals could alone.

These networks can be improved with the smart application of information and communications technology. Increased connectivity allows information sharing between different computers and databases.

The creation of more effective networks through increased connectivity has led to the concept of NCW.

The NCW Concept

The NCW Concept describes what Defence wants from its future NCW capability. The NCW Concept is **not** about how Defence will fight in the future but instead how the Defence NCW capability will **enable** future warfighting.

The Defence NCW Concept is detailed in *ADDP-D.3.1, Enabling Future Warfighting: Network Centric Warfare* and can be found at: http://www.defence.gov.au/strategy/fwc/default.htm

Dimensions of NCW

NCW comprises two dimensions, a network dimension and a human dimension.

The **network dimension** concerns the way different platforms, headquarters and firepower are linked.

The **human dimension** recognises that the network includes people; people who make decisions, crew platforms and fight. This dimension highlights the importance of high standards of training, the ability to cope with ambiguity, and the ability to make judgments that could have lethal consequences.

People provide strength to the network by applying their skills and experience in transforming data into action. They are the 'glue' that binds the network. But people must be trained to deal with the increased demands that this networked environment will place upon their skills, competencies and physical and mental abilities.

The different dimensions of NCW are brought together through **networking,** which provides the essential planning and coordination needed to move from concept to reality.

Foundations of the NCW Concept

The Defence NCW concept is built on five premises that explain how the network dimension, human dimension and networking come together to provide a warfighting advantage. This is illustrated in Figure 1.3.

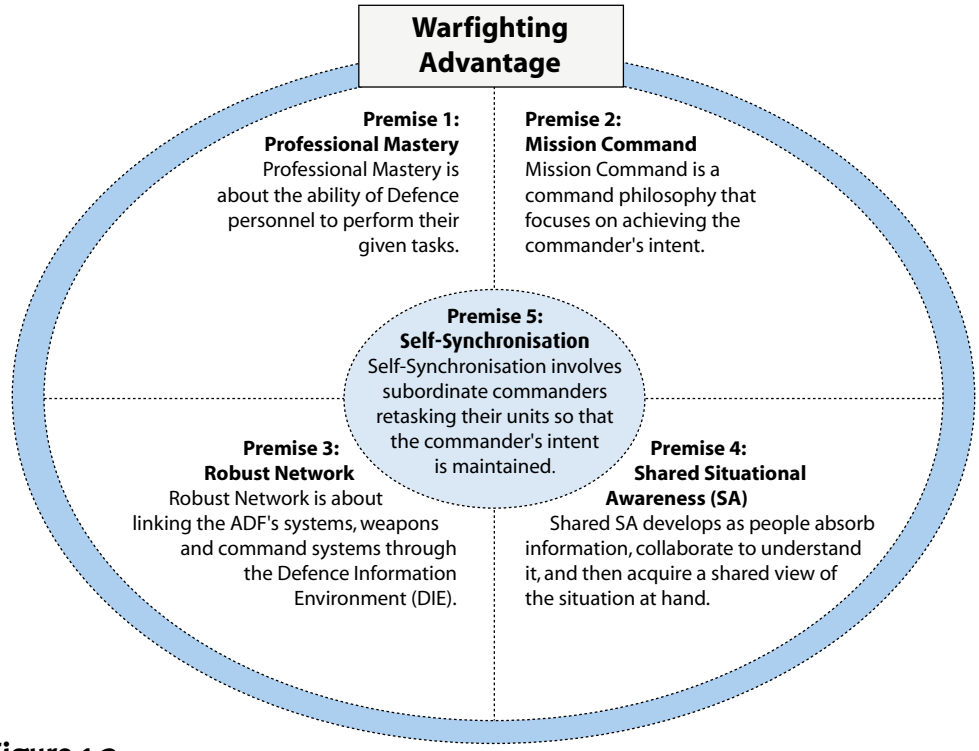


Figure 1.3

Premise 1: Professional Mastery

Professional mastery is essential to NCW.

People are the key to the success of Defence, and Defence personnel are successful because they are immersed in a culture of professional excellence.

Professional mastery binds competent individuals into a seamless team. It also creates the basis for trust between people, which is critical to effective warfighting.

Professional mastery is applicable to every member of Defence. As an organisation, Defence is renowned for the high quality of its people and their proficiency at doing their job.

Premise 2: Mission Command

Mission command will remain an effective command philosophy into the future.

Mission command provides a superior way of organising action in complex situations as it focuses on the commander's intent, rather than prescribed missions.

The strength of mission command is that it is flexible enough to cope with unforeseen circumstances. This flexibility comes when junior commanders trust themselves to use their initiative to take opportunities that will promote the commander's intent.

Some parts of Defence use mission command more effectively than others. NCW will deliver the maximum warfighting advantage when every member of Defence contributes to mission command.

Premise 3: **Robust Network**

Information and intelligence sharing occurs when a network is built with connecting engagement systems, sensor systems and command and control systems.

Making the network robust is also about training people. They need to get the right information from the network, know how to trust information and understand its sources, and know how to communicate with others in the networked environment.

Personnel should understand that the network cannot provide total awareness. Commanders still need to assess risk and make judgments. This highlights the importance of professional mastery and mission command to NCW.

Most people within Defence are already organised into networks. Just like in the electronic banking example, networks are most useful when they help people to work more efficiently.

Premise 4: **Shared Situational Awareness**

Robust networks will allow Defence, and supporting agencies, to collaborate more effectively and achieve shared situational awareness (SA).

Collaboration, based on shared SA, is central to NCW. It moves warfighters away from sequential planning, and allows people to share their expertise with people who can benefit from their knowledge.

Every member of Defence makes a contribution to someone else's SA.

Premise 5: **Self-Synchronisation**

Shared SA will enable self-synchronisation, which helps warfighters adapt to changing circumstances and allows them to apply a warfighting advantage more effectively.

Personnel will be able to use their experience, initiative, shared view of the situation and understanding of the commander's intent to make decisions about the emerging battle.

The idea of self-synchronisation need not be limited to commanders in battle. For example, logisticians can use networked information to anticipate demands from front-line units.

Self-synchronisation is something that everyone within Defence needs to concentrate on. The NCW Education, Training & Development (ET&D) program will provide the tools for developing self-synchronisation skills.

Developing a Warfighting Advantage

In the same way as the electronic banking components converged to produce better and more flexible ways to pay for things, the five NCW premises will converge to produce better and more flexible ways of fighting.

The NCW contribution to producing a warfighting advantage is depicted in the picture below (image courtesy of BAE Systems Australia). Defence personnel at all levels will be able to operate more effectively through an interconnected network of command and control systems, sensors and engagement systems.

Image courtesy of BAE Systems Australia.

NCW Benefits

The benefit of NCW is the ability to fight more effectively as a truly joint force. This is because networked forces can:

- operate faster if they choose, by speeding up manual processes
- develop new ways of doing things, such as using data transfer to link weapons, commanders and sensors
- know friendly force locations through the use of 'blue force tracking' systems
- collect, combine and share information about the geography of the battlespace, help each other to avoid known problem areas, and understand what they might find 'over the next hill'
- adapt their information processes to non-warfighting tasks, such as disaster relief and search and rescue

These advantages are achieved through improved information sharing, and better individual and joint training.

NCW Challenges

Defence will also face a number of challenges as it implements NCW, such as:

- networked forces will need new tools that make information available in useful ways
- people will need training to deal with different kinds of information
- the person-machine interface and information filtering tools will need to evolve to reduce the problem of 'information overload'
- procurement processes will need to be more responsive to the very short life-cycles of information technology products
- the challenge of building, operating and protecting the network increases as adversaries seek to attack the network

Encouraging innovation, whether through minor improvements to procedures or complex changes, is essential to understanding and getting the most from NCW.

The strategy chosen to make the most of NCW and to overcome these challenges is 'learning by doing', and is described in Part 2.

What Should You Do Now?

- discuss NCW with your colleagues, and ask how it could make you more effective in your job
- think about what 'professional mastery' means in your specialisation. Identify how you can improve your personal skills and those of your subordinates
- embrace mission command and learn how to apply or work with it. Taking account of the circumstances, apply mission command in the office or barracks environment so that you become familiar with its principles
- improve your knowledge of information and communication systems, particularly with internet searching and mobile computing devices such as laptops and personal digital assistants
- enhance your knowledge of Defence and relevant contractors, so that you understand how you support others, and how others are supporting you
- think about the information you have, who else could use that information, and how do you go about passing on that information today
- read the *NCW Concept* and the *NCW Roadmap*

Implementing NCW

Part 2

NCW will have a broad impact on Defence – from strategic and capability planning to warfighting. It will also affect other government agencies and private sector companies who work alongside Defence.

The broad impact of NCW makes a well-coordinated and realistic implementation plan essential. This plan must consider not only equipment and information systems, but also personnel.

Where Are We Now?

Defence already has some elements of an NCW capability. Some ships and aircraft can already exchange data across linked digitised networks, and a degree of data connectivity exists with fixed and deployable communication systems. Joint doctrine is well understood across Defence and this provides a solid basis for future integration. In addition:

- **The C2 grid** can deliver secure C2 to small-scale deployments worldwide
- **The information network** is still developing, but some connectivity exists through systems such as Defence Secret and Restricted Networks, Link 11 and Parakeet
- **The sensor grid** is still in the early stages of development. However, Defence is able to draw information from sources, such

as Jindalee Over-the-horizon Radar Network (JORN) and radars on Navy ships, to create basic 'situational awareness tools'

- **The engagement grid** consists of the major combat units. Today, most of these are linked by voice communications only, although some aircraft and ships can send and receive data. Elements, such as Special Forces, can receive and send data via secure satellite communications. Ground Based Air Defence has the ability to access the latest air operations picture direct from the Royal Australian Air Force Regional Operations Centre via secure satellite data-link

The Chief of the Defence Force (CDF) sees NCW as an important contributor to the 'seamless force' of the future.

The plan for delivering a NCW capability to support the seamless force in 2020 is called the *NCW Roadmap*. This can be accessed at http://www.defence.gov.au/Capability/docs/NCW_Roadmap_V2.7.pdf

The *NCW Roadmap* details the plan for Defence to continue developing its NCW capability. It does this by:

- informing both the public and the Defence community of the Defence vision for NCW
- providing a status report on the evolving Defence NCW capability
- outlining the capability development path for the Defence NCW capability
- describing the milestones that Defence views as critical to the realisation of its vision for NCW.

The Roadmap is based on a 'learn by doing' strategy which takes advantage of a 'model-test-model' approach. This means that a concept will be developed, tested on major exercises and then adapted into an improved model. To do this, a high level Master Question List is being developed for NCW. These NCW questions will be examined in major exercises (the first being Exercise TALISMAN SABRE 07) and the results will guide the Defence approach to NCW development.

Defence is creating a networked force by:

- creating new doctrine, better training and a more agile organisation so that people can operate more effectively as a network
- developing the *NCW Roadmap* and *NCW Integration Plan* *to guide force development*
- delivering projects to connect broad areas of Defence so that information can be shared and used more cooperatively
- creating a rapid prototyping, development and evaluation program as a way to introduce new technology.

NCW aspirations for 2020 are described in terms of target states. These target states are illustrated below in Figure 2.1

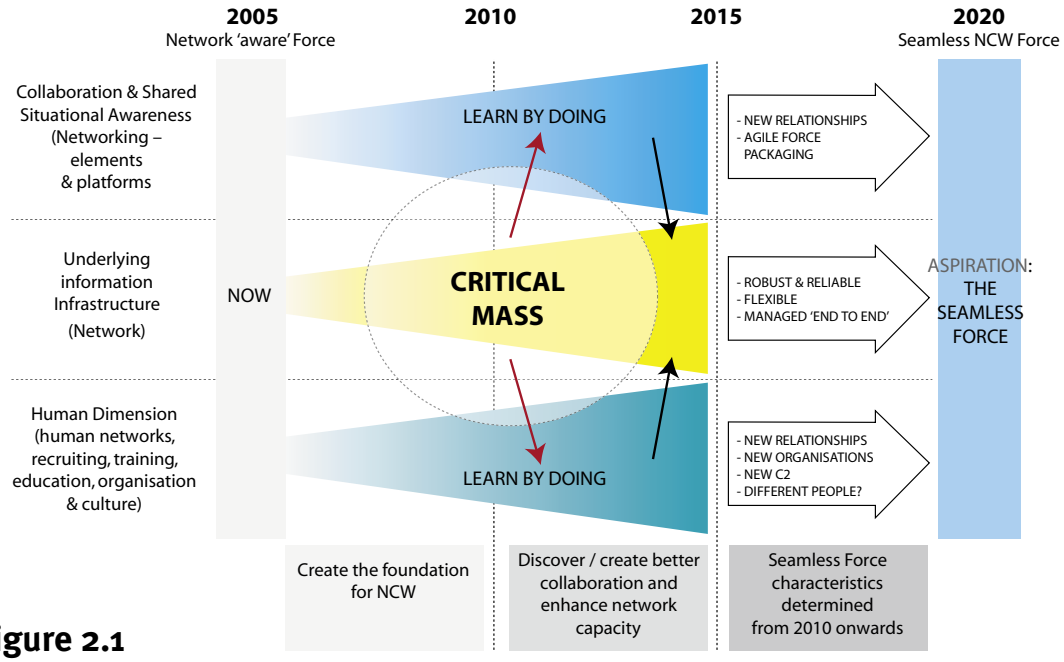


Figure 2.1

NCW Target States

Force Application in 2020

The ADF can generate a range of lethal and non-lethal effects that are both timely and appropriate and are synchronised with each other and partners to achieve the desired effect.

Information Superiority and Support in 2020

Defence has continuous information connectivity to link fighting units, sensors and decision makers in a way that increases situational awareness and the capacity to act decisively.

Command and Control in 2020

The Defence command and control system promotes collaboration.

Force Deployment in 2020

Defence is capable of rapid and accurate identification, and the protected deployment of an optimised force.

Force Protection in 2020

Forces deployed, and in home locations, have a pervasive network of active and passive sensors in order to achieve an enhanced level of awareness about their surroundings.

Force Generation and Sustainment in 2020

Key logistics function networks are linked and provide connectivity and collaboration.

Coordinating Defence Efforts

The CDF has directed that the Chief Capability Development Group is responsible for the implementation of NCW across Defence.

This does not mean that the normal capability development responsibilities of Defence will be removed. The Service Chiefs and Group Heads will continue to play their vital roles in raising, training and sustaining capability.

Major Network Projects

The NCW concept as described is somewhat theoretical. However, personnel will actually 'see' NCW when they go on career development courses, participate in large exercises and when new equipment is delivered to their units.

While all Defence projects have some role in a networked force, the projects that are central to NCW are illustrated in Figure 2.2.

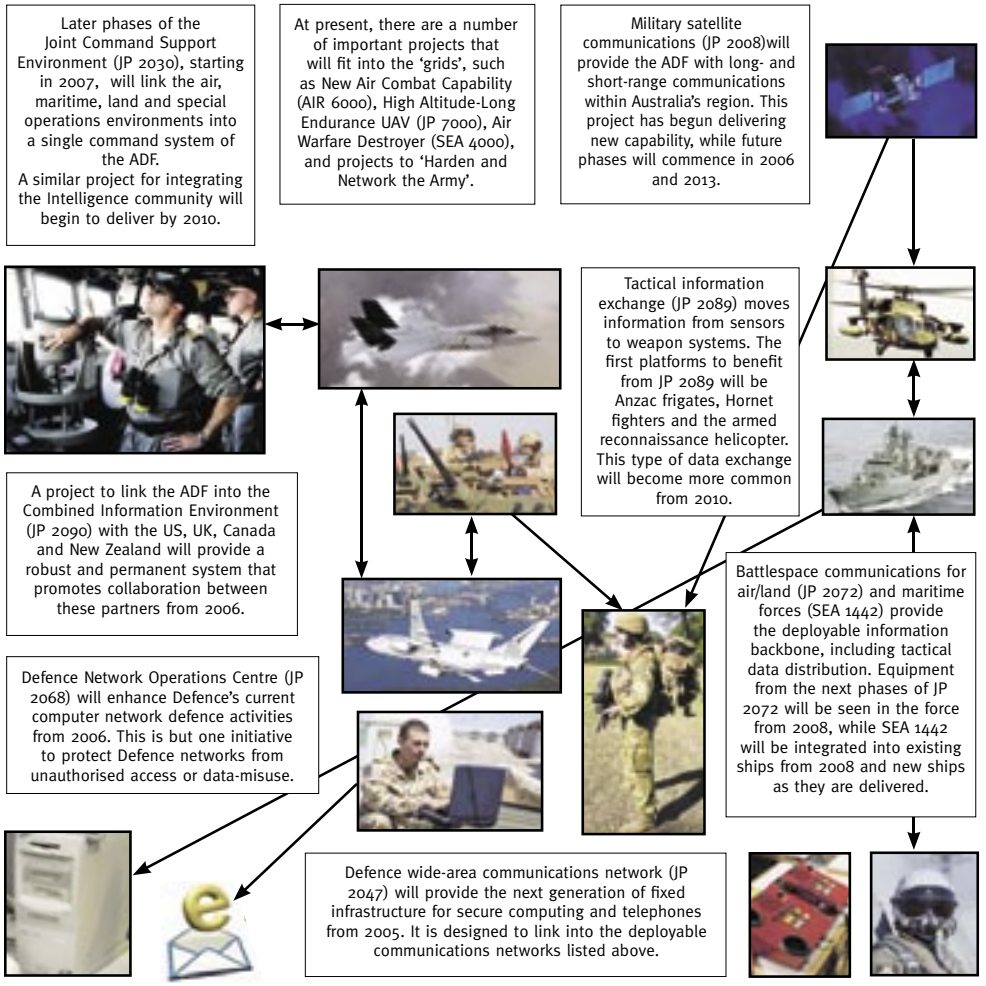


Figure 2.2

Implementing the Human Dimension

Defence will pay significant attention to 'people issues' as it implements NCW.

Necessary changes to doctrine will be identified as experimentation and practical experience in the networked environment uncovers new and better ways of operating.

Individual training and education is informed by doctrine. Changes will require practical training on new technology and new operating methods, and education to develop the individual's understanding of how the networked environment works. Education and training will emphasise leadership and mission command in a networked environment.

The Defence focus on collective training will remain important, particularly in areas that allow people to develop collaboration skills. New initiatives, such as the Joint Combined Training Centre, will provide modern facilities to support training, while the Defence Program of Major Service Activities will provide an 'ideas testing ground' for NCW-related initiatives.

Workforce planners are already addressing issues such as entry standards, the best mix of uniformed, civilian and contractor staff, specialisation, critical employment categories, and workforce demand projections. In addition, career management issues, such as performance assessment, posting patterns, and preparation for command, will require attention in the networked force.

The new ways of passing information, the emphasis on individual initiative, and the goal of self-synchronisation, will also challenge the current Defence organisational structure. Just how the structure could change will be the subject of future experimentation and practise, but it is likely to include flatter command hierarchies and direct information channels between units that can share relevant information.

Defence has identified the following as priorities when considering the human dimension of NCW:

- examining C2 in the networked force, the role of the commander, implementing C2, the effect of continuous operations, and coping with information
- transitioning to new ways of operating by collaborating more effectively
- identifying how NCW influences culture, with the ultimate aim of achieving the 'seamless force'
- nurturing innovation by experimentation and learning from 'useful failures'

The NCW Education, Training and Development study has considered these issues. Defence expects to be implementing the outcomes of the study by the second half of 2006.

Conclusion

A widespread and cohesive view of NCW is needed before Defence can be networked.

Importantly, NCW is a way of improving warfighting effectiveness. NCW is about organising Defence to make the best use of information to conduct operations, whether they are warfighting operations, peace operations or humanitarian tasks. These changes will also help make Defence more effective in managing this large organisation.

Every member of Defence, along with the contractors and academics who support Defence, has a part to play in implementing NCW. Some will play an early and direct role as they work on tasks related to the *NCW Roadmap*. Others will design, build and integrate equipment into the network. Still others will be thinking critically about the concept, trying to identify any possible challenges for Defence.

At this stage, you should be preparing yourself to be a part of the networked force. You will undergo training, learn how to use technology, and create new ways of using the network to *do things better*, and to *do better things*.

Glossary

Explaining NCW

Capability

The power to achieve a desired operational effect in a nominated environment within a specified time and to sustain that effect for a designated period.

Coalition Partners

Other nations that fight alongside Australia.

Defence Information Environment

Refers to the single entity that encompasses intelligence, surveillance, reconnaissance, communications, information warfare, command and headquarters systems and management (logistic and business) systems.

Doctrine

Doctrine encompasses the fundamental principles by which military forces guide their actions in support of national objectives. It is authoritative but requires judgment in application.

Fundamental Inputs to Capability

Refers to the standard list for consideration of what is required to generate 'capability', comprising: organisation, personnel, collective training, major systems, supplies, facilities, support, command and management.

Intelligence, Surveillance, Reconnaissance

These three activities gather and interpret information about the activities and the

conditions found within a specific area of operations.

Joint Force

A 'joint force' includes units form each Service. Where a joint force is deployed on operations, it is called a **joint task force**.

Networked Force

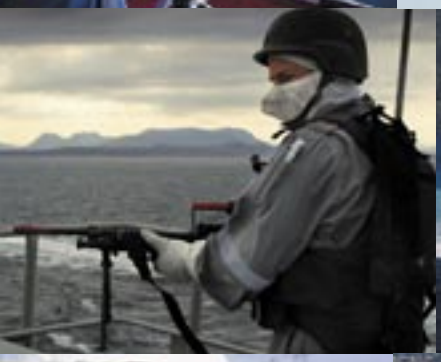
A force that is able to use NCW to improve its warfighting effectiveness.

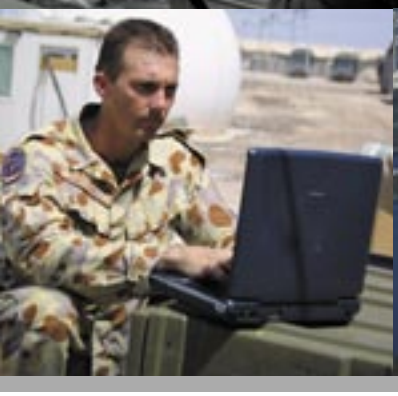
Logistics

Logistics is the science of planning and carrying out the movement and maintenance of forces.

Warfighting

Warfighting is the application of force (lethal and non-lethal) in combat against a recognisable enemy.





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