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The Human Terrain of NCO

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Abstract

This paper follows on from the paper presented at ICCRTS 2004: Warne et al "The Future Warrior", www.dodccrp.org. It discusses the outcomes of an Interview Program investigating the human dimension of Network(er) Centric Operations (NCO). This paper gives an overview of the findings in terms of the skills and attributes required for the 'networker' in NCO, as perceived by the warfighters themselves. The interviews indicate that issues of trust, teaming skills, skills in communicating and handling information; knowledge of Joint and Coalition capabilities, tempo tolerance, cultural awareness and sensemaking skills were most highly valued. Furthermore, several issues not previously identified in the literature emerged in interviews with the Australian Defence Force (ADF) including the importance of: prior operational experience, Joint, Coalition and CIMIC training/exercise experience, developing informal and social networks underpinned by strong relationship building skills and the ability to tolerate ambiguity. These and other human characteristics and behaviours are linked to the tenets of NCO in an attempt to better understand the human requirements in the NCO environment. This work has led to the creation of a Model of the Human Dimension of NCO which is the subject of a later paper.

Introduction

The success of Network Centric Operations (NCO) or Network Centric Warfare (NCW) is based on the idea that rapid information transmission is useful as it allows personnel and units to act more effectively, through enhanced connectivity, distributed warfighting and the linkage and interaction of national policy, government agencies and military operations. NCO can, therefore, be described as the style of warfare that is potentially possible when individual combat units are robustly connected by information. If this is achieved, many familiar constraints may disappear, as units should become able to interact, more rapidly, in more productive ways than are possible under traditional systems of command and control. However, while most of the effort expended on working towards NCO has been expended on connectivity problems, platforms and technology, the author of this paper, and the team with which she works¹, believe that the human, just as much as the technological, dimension of warfighting is pivotal and central to its success (Warne et al, 2004a). The human dimension aspects of NCO appear to be the least understood and researched in the NCO/NCW literature, however, a shift in emphasis from the network to the 'networker' is a positive step in addressing this lack of understanding.

From 2003 to 2007 the Human Dimension Concepts Team of DSTO, Australia, has been conducting a research study investigating the human issues inherent in Network Centric Warfare (NCW, or NCO). This study examines broad psycho-social issues that need to be considered so that the Australian Defence Force (ADF) can develop a force able to fully exploit NCO and other future operating concepts. This research is designed to illuminate these issues so they become an integral part of concept development for future warfare and part of the Australian NCW Roadmap (Dept. of Defence, 2007). However, it should be noted that this research, and the interview data that it is based on, is being conducted at an unclassified security level, so issues of sensor to shooter network characteristics have not been examined by this research. This paper focuses on insights into the generic skills and attributes that will be required of the future warfighter.

¹ The content of this paper is derived from the work of the Human Dimension Concepts Team in DSTO, and the author would like to acknowledge input from all team members involved in this work: Irena Ali, Mark Lewis, Celina Pascoe, Derek Bopping, Gavin Hazel, Brigit Maguire and Dennis Hart.

NCO Context for the Human Terrain

If, as stated above, NCO is based on the idea that information is only useful if it allows personnel and units to act more effectively, this makes understanding the people and groups in the network, and more particularly their capabilities and limitations, fundamental to successful NCO. NCO aims to communicate the commander's intent while encouraging lower level units to self-synchronise in order to achieve the effects desired. However, this aim must be considered within the broader battlespace context envisaged by warfighting concepts such as multi-dimensional manoeuvre and effects based operations. These prescribe high levels of interoperability and jointness between military personnel and units. Furthermore, they seek to displace older, less dynamic approaches to warfighting with adaptive and agile interconnections. Agility is described as "the ability to be quick and nimble; the ability to be adaptive and responsive to changing circumstances; and, the ability to innovatively solve problems" (Garstka & Alberts, 2004, p. 21). Nimbleness, adaptability, and innovation are more readily expressed and refined in humans than in technology. According to Gartska and Alberts (2004) agility is made up of six interrelated attributes: robustness, resilience, responsiveness, flexibility, innovation and adaptation. These attributes are just as applicable to individuals as to technology and forces. This capacity is also assumed to be dependent upon the achievement of a shared situational awareness among those involved. But there are reasons to believe that this shared awareness can be extremely difficult to achieve. Reasons for these doubts include issues of information overload due to the volume of information, time constraints in filtering, assessing and interpreting it, variations in the reliability and quality of the information, and the presence of disinformation and conflicting information. While some possible approaches exist or have been proposed for dealing with these problems, they are not yet well understood or validated (Warne et al, 2004b). However, some of the defining characteristics of effective human networking are known.

From the literature considered in this area it would appear that trust plays a pivotal role, underpinning the teamwork, social cohesion and common identity assumed by NCO. Recent developments in the military environment of the Western world have clearly influenced and will continue to influence the military organisational structure. Military organisations, like their civilian counterparts will have to develop new, more decentralised structural forms, with more open boundaries and flatter hierarchies. The old traditional, centralised and routinised structures, that were suitable for relatively stable and predictable conditions, will have to be replaced by flexible organisations, better adapted to the new, uncertain and changeable environment of the new century (Manigart, 2003). In terms of information demands, command and control and operating within the NCO battlespace, the primary issue is sense-making: "Once an understanding of a situation that requires attention has been reached, individuals and organisations engage in a process best known as sense-making, in which they relate their understanding of the situation to their mental models of how it can evolve over time, their ability to control that development, and the values that drive their choices of action"(Alberts et al., 2001). Once the sense-making process has resulted in a number of possible alternative actions, a set of criteria for evaluating the alternatives and an assessment of the alternatives, a decision can be made. However, many military decisions, particularly in the NCO context, involve considerable uncertainty, new situations and novel features that require innovative thought and sense-making in the cognitive domain. Research has shown that, in the military domain, complex decisions are best made by small numbers of individuals who have different backgrounds and different perceptions of the situation (Alberts et al., 2001). These analytical processes are often performed quickly, even subconsciously, by individuals, but, in a NCO context, shared

sense-making and shared decision-making can become a crucial part of the process (Warne et al, 2004b).

Research approach

From 2003 to 2007, semi-structured interviews were conducted with personnel who had returned from deployment to the Middle East. Some interviewees had also served in East Timor, Rwanda, Bosnia, and taken part in the humanitarian relief operation, Sumatra Assist. The sample was stratified across ranks, Services and gender. Over one hundred and fifty interviews, totalling about 200 hours, were conducted with interviewees drawn from all three Services, both genders, and ranks ranging from Private (and equivalents) to Brigadier (and equivalents). One civilian member of the ADO who had returned from the Middle East was also included in the sample. During the interviews, questions dealt with a range of the following NCO-related issues, identified in the existing NCO literature:

- pre-deployment training and preparation
- duties during deployment
- decision-making processes
- command and control (C2) arrangements and processes
- interdependence between Services, nations (or other agencies)
- information gathering and sharing
- communication flows and channels
- important skills and competencies
- lessons learned.

All but six interviews were recorded on either minidisk or tape, with the remaining six summarised long-hand. Recorded interviews were transcribed and entered into N'Vivo, a computer database for qualitative analysis. Sections of the transcripts that referred to particular issues were coded within the N'Vivo database according to previously predetermined categories or "code terms". If an emerging issue was not adequately represented by the existing code terms, new codes were agreed upon by all members of the HDCT team, and added to the database for future coding. The data from the interviews could then be examined according to these topics/code terms and consistent trends identified.

Although each interviewee related their own perceptions and reflections on the issues outlined above, there are several common themes that have emerged and remained constant over the four years that interviews have been conducted. These are highlighted in the next section.

Research Findings

The research data clearly indicates the critical role occupied by the networker. A willingness to collaborate and connect with others is a necessary ingredient for building situational awareness, achieving agility and, ultimately, securing successful mission outcomes. Trust and a common purpose keep networkers together and provide an underlying foundation for collaboration and the sharing of information. Interview data indicates that personal networks provided a means to obtain situational awareness when the availability of secure communication networks could not be guaranteed.

The importance of contextual factors and the relative inability of electronic communication methods and information systems to provide these came across strongly in the interviews. Moreover, the assumption that more data and information is better than less was also called into significant question (Ali, 2006). A person's understanding of not only their own situation but also that of the others with whom they communicate plays a very important part in shaping how that communication takes place (and possibly even if it occurs at all). This, in turn, impacts on the effectiveness of conveying intentions, meanings and implications. Technological interconnection therefore only provides the base on which to build a successful communicative infrastructure through which the ambitions of network-centric operations can be achieved.

In analysing the interview data, it became clear that all the human attributes or abilities outlined in the literature were of relevance to the ADF. However, in the NCO-like context of the MEAO there was particular emphasis on issues of: trust, team building, teaming skills, information skills, the need to know more about Joint and Coalition capabilities and skills, tempo tolerance, cultural awareness, and sensemaking. Furthermore, several issues not seen in the literature emerged, including: the importance of: prior operational experience, Joint, Coalition and multi-agency training and exercise experience, informal and social networks underpinned by strong relationship building skills, and sensemaking enhanced by certainty about one's role and the ability to tolerate ambiguity. Many of the issues outlined above are intertwined and interrelated, and it is not always possible to deal with them in isolation (HDoFWT, 2007). The following section attempts to present some of these findings through the voices of the interviewees.

Warfighters' Voices

In this paper, the findings have been clustered into sections on: teams, trust and collaboration; information; and training and tempo, although it should be emphasized that these issues can be intertwined and interdependent.

Teams, Trust and Collaboration

Interdependence and effective collaboration is at the core of a seamless networked force and trust underlies successful collaborative initiatives. Over the past decade, the amount of organisational research examining the antecedents and effects of trust (and distrust) has increased dramatically. An agreed-upon definition of trust has proved elusive; however, the term generally refers to positive expectations held by one party (individual or group) about the actions or intent of another when there is some degree of risk involved. For example, Mayer, Davis, and Schoorman (1985) define trust as:

...the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party (p.712).

In many locations in the Middle East theatre, interdependence with other Services and countries in Joint and Coalition units was a fact of everyday life. Some interviewees found this problematical, for example:

All the coalition needed to be educated on the fact that you are a coalition regardless of whether we went there knowing we were a coalition or not. Everyone was very single Service, single country focused.

Others found that collaboration with other units within the Australian contingent and with the Coalition forces was dependent, to a large degree, on building good relationships. Collaboration provided access to information, equipment, parts and general support. Good interpersonal relationships enabled the development of trust. Often, this trust was consciously developed through face-to-face contact, and once established, it successfully facilitated further collaboration.

This need to establish good working relationships and trust was recognised by many interviewees, as an important skill, as illustrated in the following comment:

It is still about building a relationship, I think, because to get something out of someone that they do not necessarily want to give up, then it is all about them knowing and trusting and liking and thinking there is going to be a mutual benefit out of it.

It was basically good business as far as we were concerned to keep up good relationships with the Americans. We took it as an opportunity to draw on their mass of knowledge and experience... So, to work with these guys and to take on as much information as you could, was invaluable.

Relationships within the Joint environment were similarly varied, but, in this case, the majority of comments were typically about the Services' lack of understanding about each other, their training, their skills set and their Service-specific ways of operating:

...I had an Air Force corporal under me who I found is very different to an Army corporal...One thing I found with Air Force is...you can have two Air Force corporal technicians and their skill sets are totally different, depending on their postings, where they've been. Where Army, we do, on our promotion courses and training courses, everyone does the same training.

I did see that where new tradesmen were brought in to replace other tradesmen who finished their tours, and that is where I saw some interesting clashes, and once again, just between different cultures of bringing in other Service personnel...bringing in Air Force personnel to replace Army personnel and vice versa, and people just have different expectations on what is required.

The individual service-person's identity plays a crucial role in achieving or defeating jointness. Joint identity relates to the ability of personnel to form teams and share individual experiences without being inhibited by their service's culture and its sub-cultures. The aim is to develop a common understanding of the team's goals, determine jointly how the team will go about achieving those goals, and decide the contribution and role of each team member. The challenge, however, is to maintain a creative tension between the new team identity and the individual's service identity:

How we used to operate in our own little tactical mires that we're used to...[For] other people [it] might have been infantry or on a ship. The thing is here in this type of headquarters, you've got to leave that baggage aside and get on as a team...You've got to sort out what they know and what they're capabilities are as soon as possible and foster the team to go ahead.

What you should do is find out how Navy does it and how Army does it and how Air Force does it, get together, get the best bits of all of them and come out with a joint way ahead. An agreed way ahead. So, you know, work as a team collegiate all the way through. And once

the people started thinking in that way you could then, I suppose you could call it the synergy - the synergy of having the three services together then gives you a better output, because they take into account all their own strengths to minimise all their own weaknesses to come out with a good joint outcome.

One challenge, however, is maintaining a collective and joint identity in the face of the changing composition of the group due to posting cycles, rotation and casualties. Another issue relates to service culture with some members of one service having little idea of other service cultures. This meant that personnel had to build trust to show their worth in working together, despite a predominant service identity and bias:

One of the things I had to learn a lot... being in a joint environment, was learning how Air Force did business. I had an Air Force corporal under me who I found is very different to an Army corporal, their training, and some of the nodes that I was looking after, communications nodes, were Air Force manned, and their philosophy and the way just they do business is different to Army.

It's been commonly said that Navy people in a joint environment are more adaptable. You can throw something at a Navy person and they'll go, "Oh, yeah, well let's just see how we can get it done", because we don't constrain our people's thinking I don't think, as much as Army and Air Force seem to do. And again, I think it's that experience at sea.

Relationship building within work teams on operations was considered to be very important by the majority of interviewees:

Probably the thing I was under-prepared for was the personnel aspects, essentially the man management side of things ...you are living in the same compound...in the same room and area, and there is no escape. You have to take a step back and behave quite differently because you are in a situation where there is a high threat, you are being attacked. ... The management of those interpersonal and command relationships 24-hours a day was very difficult.

Notably, when asked about the skills and qualities people would look for in team members, cognitive ability, integrity, maturity, adaptability, flexibility, competency, and a sense of humour were rated highly. Having worked with other team members before was also an important factor for many interviewees:

I would look for people that I have either worked with or people that I have worked alongside and trust, and I know that they have that back in me...You need people that are absolutely 100 per cent with their integrity; you just can't have any people there.

I didn't know who I was going to end up with and I didn't feel particularly comfortable with some of the people that I ended up with. Not because of any particular reason, just because I'd never worked with them before. So I would like it to be somebody that I'd worked with and I knew what skill level they had.

Face-to-face contact and social skills were perceived to be the most effective way of establishing rapport and building relationships:

I don't do email to anyone in my battalion. Everything is face to face because they say for mission command, "We've got to know - we've got to understand each other".

Informal networks and the need for personal and social networks seem a constant in the Middle East Area of Operations.

I think it's the best part about Aussies, you know, you get mateship pretty quickly when you start talking to people and doing things, and if you don't - you know, you don't stuff them around and show them that, you know, you're there just to get a job done, you can pretty much get whatever you want sort of thing, and it's - I think it's just one thing that we have.

Getting to know them and what they could do, what positions they held, and how they could benefit us ...we're pretty good at ganging up on people and getting - you know, just getting to know them sort of thing because we're pretty friendly.

Many interviewees reported that the process of teaming was enhanced by developing non-work related commonalities allowing individuals to relate to each other on a more personal level and helping them develop informal networks within and beyond the teams they worked with.

Information

It is of particular importance for NCO environments to be aware that the introduction of information and communication technologies has the potential to exacerbate as well as to ease communicative difficulties. As Ramprasad & Rai (1996, p179-193) say:

The new forms [of information and communication technology] multiply the capacity for information generation and dissipation; more people have access to the same stimuli to generate information, and more people can act upon the same information and dissipate it [to others]. As such there is increased scope for conflict as well as cooperation in interpreting the stimuli and determining the action to be taken based on the information.

As Stamper (1992) has noted, computerised information systems, such as NCO systems, do not necessarily support meaning and intent where context is even more important to the certainty of meaning. For example, one interviewee noted that, with more traditional communication methods "you sort of pick up tones in people's voices [whereas] in emails you can come across as being terse" and another said, referring to communications occurring through electronic chat rooms "... it was at times difficult to know if I was being ordered to do something or if it was just general conversation". He then went on to explain that:

The difference of course is, if you're talking to someone on a radio circuit, you can understand by their tone of voice or - or whatever. And it's not only if it is an order or if it's a command, but also if you're upsetting someone because you're pushing a particular point, you can normally gain that by the tone of the voice that comes back at you. Well, you can't do that on the written text until you - until it comes bluntly over the circuit that, "No. This is what I want you to do. Go and do it".

Another interviewee gave an email-based example:

... this is one of the problems with email, you see. I use - and this is not a personal thing, but I use it as a very clear vivid example of conducting business by email. You have to read stuff and you have to say, "This has nothing to do with me," or "There's something there that I should be aware of. I mean, they haven't asked me this question but I know that they should have asked me this question, therefore I should prepare something for it."

A common assumption underlying much of the discussion of NCO is that more data or information is almost invariably better than less. However, it was clear from the interviews

that this was not necessarily the case. In fact, the ability of information and communication technologies to collect and transfer increased amounts of data and information can be a positive hindrance rather than a help. For example:

On more than one occasion, I would get involved in multiple chats and ... one night there I was in six chat rooms at once holding six simultaneous conversations. ... Now, while I was able to keep everybody sort of satisfied and still pass information, what I did notice was that it was like a set of blinkers being put on me. Because I wasn't able to stand back and look at the bigger picture about what's actually happening, I was, you know, dealing with snippets of information all over the screen

I'd say, "What does it mean? You put this information together, what am I going to do with it? Is it of any value and why have you done this, because if it is of no value, why have you done it?"

The large amount of information coming in to some interviewees, and the variety of sources for that information, was a frequently mentioned problem.

As a staff officer you deal with a lot more information than you did in the past because you have accessibility through computers. So you're inundated with knowledge, with information. And also people are always asking you questions and everything else. And we've actually got to the stage now where we command through email.

If I went to every conference that [I could] with the Americans I'd spend my whole day at conferences so what I would need to do is pick particular conferences which I thought were important.

I think we're going to have to come up with a better way of filtering information. I think we're going to start suffering from information overload, if we're not suffering from it already...I mean, from what I've been able to read in the media and all the rest of it and following the Senate Committee's probings, there was information in this country that there were concerns about [a particular incident], but there is such a plethora of information out there, that nobody at the level at which it was handled realised the significance of this information, you know. I mean, the opposition are always going on about "It's a cover-up. It's a cover-up". It's not. It's a cock-up. It's not a cover-up.

Some interviewees developed successful strategies to deal with information overload:

I've got a watch-keeper, two watch-keepers working 24 a day, 24 hours a day, day shift and night shift and their job is to go through and pull out items which identify anything pertinent to us which we need to know. Otherwise, you just skip.

Well, I find that I had far more [information] than I needed, and actually I got to the stage where I would cut off things, I would only read it, but I made the point of saying, okay, when we got things from Central Command, right, I'd go and say, "You, person, will read all the Central Command things. Your job is to ensure that anything that's relevant to us, pertinent to us, you extract it. You are the backstop. And the rest of us, if we have a chance we'll read it, but you're the person responsible for it. And if there's nothing there, I take the assumption that you have made sure it's not there". So, you have to do that, you have to build in management things, all right, because not everybody can read everything.

I made sure I could communicate with who I wanted to. And my orders were do not ring until we ring you. All right. Unless you have, you know, one of these, one, two, three requirements, the criteria, do not ring. And when you ring this is the format, one, two, three, four, five, get off the phone, because I need to be able to use the communications if I

need to get fire engines or ambulances or anything around. And again that comes back to training awareness.

Another interviewee noted the potential of information and communication for uncritical and wide dissemination of redundant information, as well as the potential this had for avoidance of responsibility to act:

... one of the problems is, and you know, we all do it, okay, I get a message and I think, "Well, that's interesting, I should tell my subordinate," so I just go forward. All right? So, I just forward it, and by the way, I'd better forward it to so and so, so and so, and so and so. So, one message becomes four. Okay? They get the message and they go, "Oh, who else needs to know this?" so they forward it. So, it just flows, it cascades down into the system. And the result is that you will get on your system, and so I was getting, 150-200 emails a day, most of which have got nothing to do with me, but might do. And one of those things, just to be safe, right, because it's this culture of avoiding risk now, I'll just send it to you and that way I can say, "I sent you an email". All right? And this is another bad thing about this email process is that we tend to fire off things, fire it off and forget it because I've done my bit, if the bit goes wrong it's not my fault, I passed it on.

Even use of the richer communication channels (e.g., face-to-face, or voice), could not always prevent ambiguity and misinterpretations when parties were of different cultural backgrounds. As one interviewee suggests, it was vital that care be taken to ensure:

...the wrong interpretation or a local interpretation of the rules of engagement didn't lead to something escalating beyond the point of which it should have.

The data revealed many other occasions when individual and cultural differences caused problems ranging from ambiguity and uncertainty through to misinterpretation of terms. The need for cultural awareness and understanding of other nations was not limited to non-Western interactions. For instance, the following were typical of comments on relationships with the Coalition:

There's some pressures in Australia at the moment that even though as a nation we're very close to the Americans and they have been our major ally since 1941, 1942 - even though we're close to them, we don't really understand them ...and the only way really to understand them is to live with them.

...we didn't actually spend a lot of time out with and amongst the locals. ...The biggest culture shock was with the Americans. That's what I wasn't prepared for.

Given the need for personnel to develop cooperative relations with those of other professions, Services, or nations, it was not surprising to find that knowledge of other cultures was widely regarded to be particularly valuable:

If you need to rely on or interoperate between two different nations, it's just a matter of getting in there. You know, I suppose the trick for people who haven't worked with the US before is to understand their work ethos and culture.

Information sharing is inextricably linked to relationship building. Several themes relating to information gathering and sharing emerged from the interviews. Arguably the most important one is that information gathering and sharing cannot be assumed to be a natural and direct consequence of the existence of network or other technological communication links between different parties. Face-to-face or voice interaction was

often preferred to electronic means of communication, even when these were available, and frequently pre-establishment of at least some level of relationship was mentioned as an important enabler or precursor of information gathering and sharing activity. As examples:

How did I get the information? Word of mouth. Walking around, talking to a lot of people ... You would - you would find out who's the person you need, who's got that piece of information, or may have that piece of information, or knows who knows somebody who has that piece of information. And you would just start ringing, walking, phoning ... it was all personality based. ... the networks, in a sense, were person to person, personality based networks.

... they did not build the relationships they needed. Again, a lot of people – I learnt a lot of stuff off the Americans that a lot of other people did not know because I would spend two or three hours saying “Hi, this is who I am.” You know, I would give them stuff or get back from them. .

Informal, non-technological-based means of information gathering and sharing continue to be very important, even given technological connectivity and means of communication. For example:

Largely it was all informal, “Did you hear that last night?” “Yes, where did it come from?” “We think somewhere over there.” So, you would give them very general hints, but you could not tell them the recommended flight paths or anything like that. You could not tell them what was going on. So, I suppose, what we decided on and what was decided on as a group was that you cannot tell them specific events, because you just were not allowed. They were classified and you cannot talk about them, but you would tell them general things to keep them safe. You did not want them to die.

... because once it is on paper everyone can see what you have said. So, while the e-mail is supposed to be informal, that is a load of hogs wallop, I know it gets stored. So, if I was ever worried about something I was going to say, then I would ring someone up and say it in a caged way, talk to them.

On the other side of the information spectrum, tactical battlespace and sensor to shooter fixed message networks, which have been excluded from this research, are also likely to have a significant impact on the human nodes in the network, and may well require skills sets and attributes that should also be considered for the NCO environment.

Training Needs and Tempo

Comments on pre-deployment training and preparation were positive overall and most interviewees felt reasonably well prepared for deployment. Although they recognised that every deployment is different and briefings can only offer limited insights of what may lie ahead. Many pointed out that briefings by those who had recently returned from the theatre were invaluable:

I think there's no doubt that some sort of brief from someone that had been to a similar situation is always going to help. And grim and gruesome pictures always make it a little bit more - more realistic.

There were many positive comments about the content of formal training and briefing packages, however, there was some repetition in briefings personnel received in Australia

and in the Middle East particularly in the case of those who had been on multiple deployments. This was seen as a nugatory exercise:

We found that because we did training here in Australia, we were in training before we left, then we got to Kuwait, we did some more training there before we hopped across to Iraq. And some of the training sort of overlapped. There was revision, repeats. Even some of the lectures in Australia were repeats.

Some interviewees spoke about a disconnect between the training they received in Australia and their experience in the Middle East, with some referring to a lack of 'deployment specific' training:

When I say the preparation could be better, the mission in Iraq is a very defined mission with defined rules of engagement and until you are actually put there and understand that it's very different from your service career and your training...

Despite the preparation and pre-deployment training, it was evident from the data that more training in a number of areas would have been useful. For instance, uncertainty with respect to the operational environment continues to be a major issue in the MEAO. Uncertainty regarding the conduct of operations was often considered to be a function of limited or restricted access to time and/or information. In this vein, one participant argued that limited access to information technologies meant:

...You didn't have time to make a perfect decision. So you always were dealing with some risk associated with your decisions. It was just how much you were willing to accept.

Uncertainty was also evident in personnel's knowledge of the capabilities they were working with, particularly if the capabilities were those of a different service or coalition partner:

...we had [a UAV] providing information to us. Never struck a UAV before. What could it do? What couldn't it do? High definition synthetic radar we didn't know about. I was in command of the ... but I really didn't know what they could and couldn't do...if you just had a better understanding of all that sort of stuff and where it fitted in, that would be most useful I think.

Another type of uncertainty that was evident in the interviews was that related to personnel's own knowledge of their role. Role uncertainty was a pervasive theme across interviewees from all ranks and Services, and is illustrated by the following comments:

I knew who my boss was. I knew the type of organisation that I was working for. But I didn't know where I was working in that organisation, who I was reporting to, what my specific skills required, or whatever else.

I didn't know my job at that stage. It was, it was just information for me because up until I arrived in theatre, I didn't know what I was doing.

We went down to ... and worked there one day. And they said the next day "You're out there" and we sort of got dumped in the middle, like "Now what?", you know, "What can we work on? What can't we work on? ...What role am I playing here? Am I just one of them or can I actually have a role as a higher ranking type person as well?"

Many respondents also spoke about the need to carefully plan whom to deploy for various stages of operation. Experience of previous operations was seen to be an advantage during the initial stages where new processes, operating procedures and liaisons had to be established:

I think at the beginning of an operation when you deploy somebody, you deploy somebody who's done it before. That should be the first priority. During the sustainment phase, you choose somebody who hasn't done it before, because everything's settled down or all the procedures and all approaches are up in place and you can then get experience in an employment environment where you can learn. And in the redeployment, possibly get somebody who was there in an operation in the past where they were in the sustainment phase, and that way you can get an even spread of experience.

Regardless of rank or Service, interviewees agreed that prior operational experience was the most significant contributor to their sense of confidence and preparation. Indeed many participants stated that prior operational deployments, exchange programs or multinational exercises were far more valuable than participation in formal pre-deployment briefings. As the following excerpts suggest, such experience provided an awareness of Coalition procedures, exposure to different technologies and command styles, and a first-hand introduction to the stresses and uncertainties of life in a theatre of operations.

I think the majority of my experiences serving in both the line brigades of 1 Brigade and 3 Brigade, and having experience in East Timor were probably the greatest preparations I could have expected to take to the Middle East. Certainly, the lead-up and the time at DFSU was pretty much insignificant, really.

Each time I've done something and then gone on to do another operation, it holds you in good stead because you have a better understanding of the processes that are operating, particularly within the UN organisation. And in the Iraq deployment, I guess I had a greater understanding of the Coalition organisation than perhaps others that haven't had that privilege.

I would say that either deployment on other operations ... are critical, because we had ... several people there who had only worked in one specific area, and because they were a certain rank or trade they were deployed and put in there, they were clearly out of their depth. Where others, who had that experience on other deployments, or through their training through their Service, were clearly in their comfort zone...and you can't take away the experience that you learn on other deployments.

The need for more and better joint training was another prevailing concern. Many participants saw joint training not only as a vehicle for the development of common identity but also as means of teambuilding and establishment of mutual trust.

The whole working in the Joint environment, we need to do a lot more of that. And I think that starts at the training; we need to re-align and we need to align our Service communications, skill sets and training.

Visibility or knowledge of what the other Services' skill sets are and how they operate. And what - what backgrounds, I suppose, each of them have. Or if you are an Army guy, to have knowledge of what the naval assets are. Same with the Air Force and vice versa, so all around tri-Service type knowledge.

We would need to see more Naval and Air Force personnel of all ranks doing similar trade training, and then professional development for production in rank or moving in rank, all

right. Then, as they get more senior, that develops into more managerial type and working in Ops group. And from the officer corps we need to have all tri-Service, like Navy, Air Force and Army personnel, doing junior officer training consolidated ...Not all of it - not each of the Services do things in the same way, but there are certain modules or components that need to be - everyone conducting or completing. And then once we get into the intermediate courses they want to be doing those and the senior courses together ... because we never deploy as an individual Service.

Furthermore, ongoing operational experience and training were considered to be a vital part of maintaining a warfighter's professional mastery. In its official articulation of NCW, the Department of Defence (2004) describes the complexity of the human dimension as follows "The human dimension is based on professional mastery and mission command, and requires high standards of training, education, doctrine, organisation and leadership". Typical comments on professional mastery included:

Professional mastery. It's experience, and not necessarily experience on operations, but making your training as realistic as possible. And I think someone - I heard this not too long ago actually - said that half the ability to do something is actually having done it before. So, if you've been in a similar experience before, then that's half your ability to cope with that in your situation.

[Professional mastery] is bred from personal experience, it is bred from being mentored by people above you. A lot of my professional attitude has been mentored by people above me and seeing what they do and how they do it and saying "I want to do it like that" or "I could do it better than that" so I strive to do it better or to do as good."

Particularly in this technical age we are now, to really have professional, you know, mastery, or whatever, we've got to invest. We've got to invest in the soldier, and, as I said, part of that investment is the retention issue, keeping it in. The training is good we've got at the moment, and we do a lot of training, but a lot of people aren't staying in.

It is not immediately evident how to train people to tolerate accelerating and variable tempos and the ambiguities that arise with it. However, within the NCO literature, there is a widely held view that the tempo of future warfighting and operations will be directly increased by new information and communication technologies, particularly those facilitating the participation of personnel located 'out-of-theatre. To investigate these issue interviewees were asked a number of questions regarding the tempo of operations while deployed to the MEAO. Interviewees spoke of a heightened tempo sometimes demanding 15- 18 hour workdays:

We'd get up at 5 in the morning. Go to a brief at 6. Write my report... saying what the Americans had done overnight and where they were intending to go for that day, and then send that back to the Australian HQ, and then attend about four or five briefs for that day, just to get updates, and send that back

We have the ability to keep our military and political masters far better informed than we were in the past. Again, that is a two-edged weapon. The demands being made for us for information from the operational area are far better simply because we've got the communications systems that allow those demands to be made.

Interestingly, enhanced connectivity with personnel from remote Headquarters was also occasionally associated with periods of decreased tempo, or 'down time'. Here, many interviewees spoke of situations where the tempo of activities slowed considerably because of a need to wait for analysis to be conducted or decisions to be made out-of-theatre. This is

inconsistent with the idea of ‘power to the edge’ often expressed in contemporary analyses of NCO (Alberts & Hayes, 2003). As one interviewee explained:

We had a lot of waiting around but it wasn’t due to anyone’s fault or access; it was just the fact that the brief was gone too long or someone hadn’t made a decision yet.

It is not surprising that interviewees associated prolonged periods of heightened tempo with a range of negative psychological and behavioural outcomes. By far the most prevalent of those mentioned were fatigue and complacency. Interviewees often commented that deployments lasting six months were particularly stressful in this regard. In the words of one:

It’s six months; you will be tired. You need to be aware of when you are getting too tired, so you’re not functioning well, because it’s already hard to get there and work these horrendous hours when you’ve really got to pace yourself to achieve your goal.

The other trades pushed us to two shifts to work 12 hours to help their work load, which we weren’t required to do. And one of the boys dropped a bomb off the trailer because he’d been working, you know, and he forgot a silly thing to do, so we went back to three shifts [cycles] pretty quick.

The cyclical nature of operational tempo revealed by the data is in line with the view, that there is a need for flexibility and adaptability. This is further emphasised by the fact that decreased tempo brought about its own pressures in the form of having to wait for decisions to be made whilst data was being analysed out-of-theatre.

Summary of Findings

The table below attempts to summarize the human terrain requirements in an NCO environment mapped against the required attributes and abilities, as derived from the literature and the Interview Program (Hazel et al, 2006). The human attributes and abilities perceived to be of most importance by the warfighters from the MEAO are highlighted.

Table 1. Required Human Attributes and Abilities for NCO.

NCO Characteristic	Required Human Attribute or Ability
Agility	Adaptable, Flexible, Cognitive skills, Sensemaking skills, Appropriate Education & Training, Empowered to make decisions, Tempo tolerance, Prior operational experience, Role certainty.
Collaboration – Civilian-Military (CIMIC)	Communication skills, Teamwork skills, Teambuilding skills, Co-operation, Understanding and trust of collaborating partners’ culture, capabilities, modes of operation and information protocols, CIMIC training experience, Relationship building skills.
Collaboration – Coalition	Communication skills Teamwork skills, Teambuilding skills, Co-operation, Understanding and trust of coalition partners’ culture, (including language sometimes) capabilities, modes of operation and information protocols, Relationship building skills.
Collaboration – Joint	Communication skills, Teamwork skills, Teambuilding skills, Co-operation, Understanding and trust of other

NCO Characteristic	Required Human Attribute or Ability
	Service partners' capabilities and modes of operation, Joint Training Experience, Relationship building skills.

NCO Characteristic	Required Human Attribute or Ability
Information Management	Ability to adapt to different technologies, Capacity to deal with information overload, Information filtering, assessment, retrieval skills, Understanding of information protocols.
Information Sharing	Communication skills, Relationship Management skills, Trust in others, Shared objectives, Co-operation, Relationship building skills, Role certainty.
Mission Command	Empowered, Education, Training, Prepared, Cognitive skills, Sensemaking skills, Information filtering, assessment, & retrieval skills, Communication skills, Trust in self and others, Confidence in self and others, Role certainty.
Professional Mastery	Education, Training, Experience, Ethos, Continuous learning, Prior operational experience.
Self-Synchronisation	Empowered, Adaptable, Education, Training, Prepared, Cognitive skills, Sensemaking skills, Information handling, Trust in self and others, Confidence in self and others, Prior operational experience, Role certainty.
Shared Situational Awareness	Education, Training, Information handling, Information filtering, Communication skills, Memory Accuracy, Information integration, Shared objectives, Cognitive skills, Sensemaking skills, Tolerance of Ambiguity, Prior operational experience, Relationship building skills, Role certainty.

It is clear from the table above that the required, high-level human attributes and abilities, pose a challenge for those charged with providing the military workforce of the future. While many of these characteristics are learnable through training and education, some may be embedded and personnel may have to be selected for these attributes. Some may even be partly cultural and require organizational change.

Conclusion and Ongoing Research

The outcomes of this research substantiate the claim made by Albert and Hayes (2003) that NCO requires greatly enhanced peer-to-peer interactions. In other words, it requires the focus to be on the 'networker' rather than the network itself. Although contemporary technologies are claimed to have reduced the fog and friction of war, it is essential to optimise the human terrain to ensure the total effectiveness of operations in an NCO environment. To complement these findings, further research is required to examine the human element in classified, tactical battlespace networks.

It is important that future training does not overlook these issues. In the end it is the human element that wins or loses a battle, and it is the human element that is the essence of lessons learnt and the training that captures them. Lessons learnt in operations must, therefore, be incorporated into training and preparation programs, particularly as they apply to understanding service or national cultural differences, relationship management, team-building skills and sensemaking in the battlespace. The interviews indicate that issues of trust, teaming skills, skills in communicating and handling information; knowledge of Joint and Coalition capabilities, tempo tolerance, cultural awareness and sensemaking skills were most highly valued. Furthermore, equally important for the ADF were: prior operational

experience, Joint, Coalition and CIMIC training/exercise experience, developing informal and social networks underpinned by strong relationship building skills and the ability to tolerate ambiguity.

Ongoing Research

This work has led to the creation of a Model of the Human Dimension of NCO linked to the Network Centric Operations Conceptual Framework, listing individual characteristics and team behaviours and interactions believed to be critical to successful NCO. This model, as it stands to date, will be discussed at a 13th ICCRTS plenary session by one of the members of the team involved in this research. The final result will be an ADF-specific model of Human Dimension NCW metrics based on warfighters' perceptions, document analysis and field studies. The model will highlight the high-level human characteristics and behaviours believed to be important for the optimal performance of the future force in an NCO environment.

Further work is planned to draw from the model to group requisite characteristics and behaviours for different operational contexts and to assess personnel's readiness according to these requirements. The team performance literature, military and non-military, already has many validated questionnaires and survey instruments that can provide suitable metrics for the characteristics and behaviours depicted in the Model. These include instruments to measure difference types of trust, team cohesion, cooperation, tolerance of ambiguity, organisational identification, and communication climate.

However, top level metrics for groups of desirable characteristics and behaviours will be developed by the research team via sets of relevant quantifiable survey questions. The team will then conduct an initial survey to baseline the requisite skills and attributes for these characteristics and behaviours. Desirable targets will be determined for 2015 and for intermediate milestones. It is hoped that the survey questions can then be incorporated into the routinely applied Defence Attitudes Surveys, so relative metrics can be determined automatically.

References²

- Alberts, D. S., Garstka, J. J., Hayes, R. E. and D. A. Signori. (2001). *Understanding Information Age Warfare*. Washington, DC, CCRP, US Department of Defense.
- Alberts, D., & Hayes, R. (2003). *Command and Control in the Information Age*. Information Age Transformation Series. Washington, DC: CCRP Publication Series.
- Ali, I (2006) "Information sharing and gathering in NCW environment: voices from the battlespace", in the Proceedings of the 11th *International Command and Control Research and Technology Symposium*, 26-28 September 2006 Cambridge, UK, http://www.dodccrp.org/events/11th_ICCRTS/iccrts_main.html
- Australian Department of Defence. (ADF) (2004) *Enabling Future Warfighting: Network Centric Warfare*. Defense Publishing Service, Canberra, ACT.

² This paper is a derivative of several research papers including those asterisked in the list above.

Australian Department of Defence. (ADF) (2007) *Network Centric Warfare Roadmap 2007*. Defence Publishing Office, Canberra, ACT.

Garstka, J. J. and Alberts, D. S. (2004) *Network Centric Operations Conceptual Framework, Version 2.0*, Vienna, VA: Evidence Based Research.

Hazel, G., Maguire, B., Lewis M., Warne, L., Ali, I., and Pascoe, C. Evaluation of the Human Dimension of NCW: Towards a Human Dimension Campaign for the ADF, *Draft DSTO Report*.

*HDoFW Team (2007) *The Transition from Network-Centric Warfare to Networker-Centric Warfare: Outcomes of the Human Dimension of Future Warfighting Task* (Restricted Access) DSTO Report CR-2007-0311, Defence Systems Analysis Division, Defence Science and Technology Organisation, Department of Defence, Edinburgh, S.A.

Mayer, R. C., J. H. Davis, E. D. Schoorman. (1985). "An Integrative Model of Organisational Trust." *Academy of Management Journal* **20**(3): 709 to 734.

Mayer, Davis, and Schoorman (1985) define trust as:

Manigart, P. (2003). Restructuring of the Armed Forces in *Handbook of the Sociology of the Military*. Ed, G. Caforio. New York, NY, Kluwer Academic/ Plenum Publishers.

Ramprasad, A., & Rai, A. (1996). Envisioning management of information. *Omega, International Journal of Management Science*, *24*, 179-193.

Stamper, R. (1992). Signs, organizations, norms and information systems. *Proceedings of the 3rd Australasian Conference on Information Systems*, Melbourne, Australia.

*Warne, L., Ali, I., Bopping, D., Hart, D., and C. Pascoe (2004a) "The Future Warrior", *Proceedings of the 9th International Command and Control Research and Technology Symposium (ICCRTS) - Coalition transformation: An evolution of people, processes, and technology to enhance interoperability. 14-16 September 2004, Copenhagen, Denmark*, www.dodccrp.org

*Warne, L., Ali, I., Bopping, D., Hart, D. and C. Pascoe. (2004b) *The Network Centric Warrior: The Human Dimension of Network Centric Warfare (U)* DSTO Report CR-0373, Defence Systems Analysis Division, ISL, Defence Science and Technology Organisation, Department of Defence, Edinburgh, S.A. (Approved for Public Release).

*Warne, L., I. Ali, C. Pascoe, D. Bopping, & D. Hart. (2005). "Training for the future Warrior: Lessons From Iraq". *Proceedings of The Land Warfare Conference 2005*, Gold Coast, QLD, October, Gold Coast, QLD, Commonwealth Australia: 293-306