Interoperability: Some Aspects of Coalition Operations

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Abstract

Combined operations may be defined as "two or more independent nations pursuing a common political objective through military means". At one end of the spectrum it may be a group from one nation undertaking a specific task in support of an operation led by another nation. At the other end is the concept of multinational manning of platforms operating within a combined command structure. The issue addressed in this paper is the nature of that interoperability, not simply in terms of technical interoperability but especially considering the human and organisational aspects of interoperability in a coalition setting. These latter aspects can easily be overlooked with the increased focus on digitisation and network focused concepts. The measurement of the success or failure of such operations is complex and related to civil (commercial) joint ventures, which emerge as having many similar attributes.

1. Introduction

1.1 *New Technologies in Context*

Digitisation within defence forces is effectively a parallel activity to the introduction of e-business in the civil world. What has clearly come to the fore in recent weeks is that once the technology achieved critical mass, then the acceptance and growth exceeded all expectations. The key feature in achieving critical mass was in implementing cross network, international working as in the almost universal penetration of the credit card.

However it has become clear that whilst the technology continued to meet expectations, the underlying human and organisational systems were inadequate to cope with both rapid growth and then a decrease in rate of demand. It will be also be observed that the growth did not occur through a single step but through a number of overlapping technology steps, perhaps seen most clearly in the development of the cellular phone handset.

However the most crucial element in the growth was not in the development of technology (which was the enabler) but in the development of organisational systems that could manage these interoperable systems and in the human acceptance of the systems.

This paper considers some of these aspects in the context of applying civil lessons into the military environment. It is recognised that some of the statements are oversimplified and it is recognised that the subject is complex and indeed has occupied many minds over some period of time within the defence world.

The context for this paper is considering the issues associated with successful interoperability within the context of combined operations and emphasises the threefold aspects:

- Technical
- Human and
- Organisational (command structure).

1.2 *Relevance to C2*

Command and Control is about taking information, deriving a course of action in response to the received information and implementing that course of action. In a coalition setting the provision of coherent information is not trivial and provides the first test of interoperability. Technical interoperability is followed by a human process, when a commander has to make a decision on the quality of the information. When more than one nation is involved, an additional process has to be undertaken in evaluating the information as each nation may put differing stress on the elements of the information provided.

Whilst objectives may be harmonised, military doctrine and policy will differ between nations. More important is the issue of trust between the coalition partners as this will impact not only on the freedom with which information will be exchanged, but on the intangibles that lead to operational success. Most critical is the impact on the command chain, which is likely to have significant variations between coalition partners.

Three factors have been identified in the development of digitisation:

- The **opportunity** afforded by increased comprehension
- The **challenge** of management where commanders and their subordinates have similar levels of detail and
- The **threat** that opposing forces will have a clearer picture of each other's forces

1.3 *The International Perspective*

By definition, defence forces are representative of a single nation state with the majority of their equipment procured for the purposes of defending that nation state. Allies will, to a greater or lesser extent be transitory and there is therefore a dichotomy when functioning as part of a coalition force.

In contrast, globalisation of the defence industry means that all major defence contractors supply to more than one nation. Potentially this can create conflicts of interest with impacts on individual national sovereignty.

Coalition operations range from a task group from a particular nation undertaking a specific operation within a multinational deployment through to the concept of multinational manning of platforms operating within a coalition command structure. The paper envisages deployments where the force headquarters are within a coalition command structure but where individual tasks may be assigned to specific nations.

2. **Technology as an enabler**

2.1 ***Acquisition***

Technological superiority never equates to warfighting superiority unless technically advanced weapon systems are fielded when soldiers need them. Indeed Wiedewitsch (1993) points out that technology is a perishable commodity and that a new technology may be dominant for only 30 months before becoming obsolescent. Defence planners should be aware of the trade-offs inherent in acquisition strategies aimed at preserving technological supremacy. It is difficult to simultaneously optimise resources with regard to both mission effectiveness and technology maximisation. Optimal acquisition solutions will therefore be achieved by focusing on user critical technologies, allowing current and future military needs to dominate the acquisition process and using technology as the enabler.

In high-technology industries, global strategic partnerships are key elements driving development and growth. It is not hard to believe that similar partnerships in defence industries need to follow this trend. Forging real strategic partnerships, with systems integrators on both sides of the Atlantic, will be a key part of any interallied Revolution in Military Affairs (Laird & Mey, 1999). This, of course, assumes an extrapolation of current trends in international business, including closer links between U.S. and overseas defence companies (Laird, 1999)

Military and corporate (e.g. commercial) strategies are frequently considered as independent activities but this paper focuses on the interrelation between the two. The increased emphasis on digitisation and network focused concepts needs careful consideration, as the underlying technologies for military systems are critically dependent on commercial systems.

2.2 ***The Fallacy of Total Interoperability***

The vision of total technical interoperability is purely a vision. Innovation and standardisation are not complementary. The realities of differing forms of command mean that even if systems are identical, the content of information within the systems may well not be identical.

The reality is that equipment programmes are never stable. ‘Legacy’ equipment remains providing issues for interoperability even within a single nation site, along with the issue of maintenance. This, in a military sense, is a ‘good thing’ in that totally standardised equipment

within electronic C2 systems offers a potential ‘single point’ of failure in the event of electronic attack or software failure.

3. Organisation and Joint Ventures

3.1 *The Drivers*

In the commercial marketplace technology has developed extremely rapidly, driven by market and technology demands for shorter times for having new products. Current defence procurement cycles struggle to keep pace. Moynihan and Jonash (1993) considered the issues of the need for shorter cycle times, commenting "we have termed this new paradigm for managing as strategic technology leveraging" and note that it features externally acquired technology, moving away from the large, internal R&D groupings of major corporations. They identify areas of importance as:

- Joint ventures
- Alliances
- Closer supplier/customer contacts
- Relationships with smaller companies
- Corporate acquisitions
- Licensing of technology

They observe that valuable relationships can be developed, not only with other companies, but also with universities, consortia and government. Three generations of research and development are identified, as in Table 1.

	1st Generation	**2nd Generation**	**3rd Generation**
Management/ Strategic centre	No long term framework	Partial strategic framework	Holistic strategic framework
Operating principles	Fatalistic and isolated	Project orientated	Strategic and cross functional
Funding	Line item	Project	Competitive impact

Table 1. R&D Generations

It will be noted that the 3rd generation provides an environment amenable to the development of net-centricity, especially in terms of the strategic and cross functional operating principles. It will also be observed that funding becomes more complex.

3.2 *Complexity in procurement*

One option for 'bridging the gap' between organisations is for a joint venture to be established. Joint ventures are defined in a variety of ways but the following compromise is suggested; ‘a separate activity jointly established by two or more parents’. Obviously the parents (which could

be a company, or a defence research organisation) will expect to gain from the joint venture. In turn the joint venture would expect to have some independence in decision making[1]. As Geringer (1991) points out, the right choice of partner, especially in international joint ventures needs careful consideration.

The issue of international defence procurement and alliances has been the subject of a number of papers written from various perspectives. Perhaps the greatest issue is the dominance of the big US prime contractors who are focusing their energies on three key tasks, enhancing efficiency, applying commercial technologies more effectively and becoming global players (Laird, 1999)

4. **Human Aspects**

4.1 ***Culture***

Johnson & Scholes (1993), building on other management studies, identify the cultural 'web' as being a key component in bridging people to the organisational paradigm. Six attributes are cited as being relevant:

- *Rituals and Routines* – training and promotion, built in assumptions of fairness, 'interpretation' of the 'rules', etc.
- *Stories* – past successes, disasters, stories of mishaps of more senior staff etc
- *Symbols* – logos, status symbols, physical location of management, dining facilities etc.
- *Control Systems* – measurement and reward systems, manual procedures, inspection
- *Power Structures* – balance of power between units, informal links forming 'power' groupings etc
- *Organisational Structure* – hierarchy, job boundaries, peer to peer tasking etc

If these factors are identified as key in a commercial organisation, then clearly within a much tighter military organisation these factors become even more noteworthy. However it will also be seen that in coalition operations the cultural paradigms will differ substantially.

4.2 ***Other factors***

A major issue that impacts on both commercial and military organisations is that of divestiture (Dranikoff et al, 2002). Whilst it is easy to join in a coalition or a joint venture, these will be for a limited duration and the real skill is in determining the point at which the balance of benefits ceases to be worthwhile for one, or all, of the parties.

Another factor that impacts on the area is impatience - values now are accepted in preference to values in the future. The application of utility functions is a useful tool and clearly differentiates between risk averse and risk loving people (or organisations). Madsen (1989) extends this to a

[1] Separate studies have shown that successful joint ventures are those which have been permitted a high degree of autonomy.

theoretical concept and as a process of rationalisation within the microeconomic framework of rational choice.

5. **Issues**

This paper has focused on the need for interoperability to be considered in the context of coalition operations and on recognising that technology is only one component, alongside organisation and human factors. The reality is that it is easier to quantify technology than other factors. Moffat (2002) has made a valuable contribution in developing formal bases on which a commander's C2 process can be mathematically modelled.

Netcentricity will have in itself an impact on military organisation. Dekker (2002) has developed a testbed that allows exploration of different organisational architectures and evaluation of theoretical effectiveness through the use of metrics. This approach, once validated, could provide a valuable method of optimising coalition command architectures that, by definition, are not rigorously planned from a design stage.

The issue of joint ventures has many parallels with coalition operations and areas where there is common ground (although no easy solutions) are:

- Frameworks for resolving variations that emerge as ventures develop
- Impact of cultural variations
- Implications of risk in formation and execution.

However the 'hard' issues, common to coalition operations and to commercial ventures are

- Conflict of interests
- Problems in the disclosure of information
- Lack of communications (before, during and after establishment)
- Greater interest in launching than in maintaining.

The degree of resolution of these issues will depend upon the calibre of those with responsibility for 'making it happen'.

6 **Conclusions**

A Netcentric approach to warfare places increased emphasis on interoperability, especially when coalition operations are involved. The study of management has developed a substantial body of both theoretical and practical tools. These provide a basis that can be used to develop and enhance military concepts.

It has been recognised that the commercial path has been far from smooth, but the instabilities have been in the human aspects of the implementation as well as the organisational. It is considered that these issues will be reflected in military practice over the next decade.

However the real skill will be in national military organisations working with defence contractors to provide independence without interdependence.

7 References

Dekker, A.H. *C4ISR Architectures, Social Network Analysis and the FINC Methodology: An Experiment in Military Organisational Structure* DSTO (2002).

Dranikoff et al, *Divestiture: Strategy's Missing Link* Harvard Business Review, May 2002 pp 74-83.

Eatwell et al (Eds.) *Utility and Probability* Macmillan (1990).

Geringer, J.M. *Strategic Determinants of partner selection criteria in International Joint Ventures* Journal of International Business Studies Vol. 22 No 1 1991.

Johnson, G & Scholes, K. *Exploring Corporate Strategy - Text and Cases* 3rd Ed Prentice-Hall (1993).

Laird, R.F. *The inevitability of global defence industry alliances* in "Europe's defence industry: a transatlantic future?" Centre for European Reform (1999).

Laird, R.F & Mey, H.H. *The Revolution in Military Affairs: Allied Perspectives* National Defense University (1999).

Madsen, E.K., *Beyond the Expected Utility Proposition in Rational Decision Making* in "Understanding Economic Behaviour" [Grunert, K.G. & Ölander, F. (Eds.)] Kluwer Academic Publishing (1989).

Moffat, J *Command and Control in the Information Age: Representing Its Impact* TSO (2002).

Moynihan, M. and Jonash, R.S., *Leveraging technology in the New Global Company* Economist Intelligence Unit (1993).

Wiedewitsch, J.L. in *Developing Battlefield technologies in the 1990s* McNair Paper 21 [Carlisle, E.R. (Ed.)] National Defence University (1993).