Models of Jointness: Infrastructure Issues for Inter-Organisational Working

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Abstract

This paper examines seven models of jointness and the difficulties in defining a transformation framework for transitioning between models. A key issue that arises in the transformation framework is that there are multiple discontinuities that must be navigated as we move from platform-centric to network-enabled warfare.

1. Introduction

Operating jointly is a pervasive theme in modern military operations. Joint organisations are synthetic organisations (Thompson and Hawkes, 1962) that are created to meet the requirements of the situation, and have authority for action and decision-making in the situation.

A key issue in the design and acquisition of future forces is what is the synthetic construct from which we construct a joint organisation from the single services (O'Neill and O'Brien, 2001)? The Australian Defence Force has had multiple attempts at defining a Joint Warfighting Concept as the synthetic construct over the past eight years. These attempts include: Decisive Manoeuvre, Air-Land-Sea Battle, Manoeuvre Operations in a Littoral Environment, The Australian Way of Warfighting, and the Future Joint Warfighting Concept.

A fundamental issue is that there is not a single, universally agreed model of jointness, and we do not understand the transitions required to move between models of jointness.

In this paper, we explicity define and analyse seven models of jointness. These models have emerged from analysis of existing exercises, operations and doctrine, and examination of the development of future concepts. The seven models of jointness are then analysed in terms of the spectrum of operations, and our ability to transform the force and move between models of jointess.

2. Models of Jointness

Seven models of jointness have been identified. Each model will be analysed in terms of their characteristics, how jointness is conceptualised, and the decision-making requirements at a whole-of-force level. The seven models of jointness are:

- Environment-specific
- De-confliction across environments
- Joint Headquarters
- Integrated Organisation
- Integrated Systems
- Hierarchical Command, Networked Control
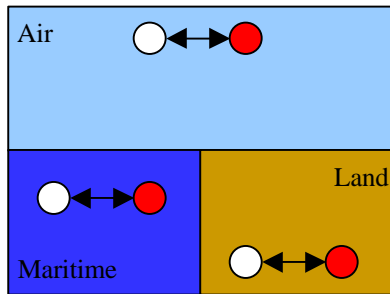- Adhocracy

2.1 Environment-Specific

Figure 1. Environment-Specific model of jointness

The environment-specific model of jointness is characterised by weapon systems that only engage targets in their own environment. For example, ships only engage maritime targets and aircraft only engage aircraft. Figure 1 shows how the friendly forces in white only engage the red forces that are in the same environment as the white forces.

The conceptualisation of jointness in this model is of three environments independently fighting a common enemy. The most important decision-making at a whole-of-force level concerns the balance of investment across the three environments.

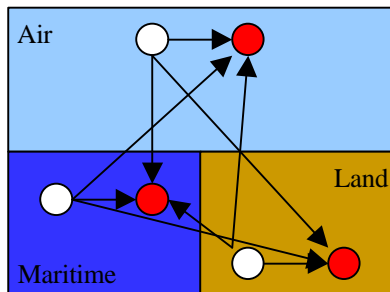## 2.2 De-confliction Across Environments

Figure 2. De-confliction Across Environments Model of Jointness

The de-confliction across environments model of jointness is characterised by weapon systems that can *cross* environmental boundaries. For example, a land weapon system can engage land, air, or maritime targets. Figure 2 shows how the friendly forces in white can engage red forces in any environment.

The conceptualisation of jointness in this model is of single-service campaign planning followed by top-down de-confliction across the single-service campaign plans.

The most important decision-making at a whole-of-force level concerns the need for a higher-level headquarters to de-conflict the campaign plans from each of the single services. The need for de-confliction arises due to the ability of weapon systems to cross environmental boundaries and that single-service campaign planning is conducted in isolation of the other services. An example of how a higher-level headquarters would ensure de-confliction would be to allocate separate airspace in particular timeframes for air weapon systems, land weapon systems, and maritime weapon systems, based on the needs identified in the single service campaign plans.

The US model of jointness is primarily a de-confliction model.
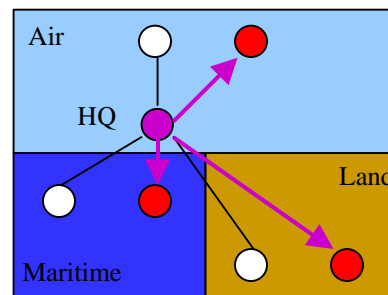
2.3 Joint Headquarters

Figure 3. Joint Headquarters Model of Jointness

The joint headquarters model of jointness is characterised by top-down joint campaign planning, followed by single-service planning. Construction of a top-down joint campaign plan requires leveraging environmental expertise in a joint context. A simple way of leveraging this expertise is by co-locating environmental campaign planners in a joint headquarters and developing doctrine to facilitate the development of joint campaign plans. Figure 3 shows how the results of the joint campaign planning in the purple

headquarters are used to facilitate co-ordinated engagement of red forces.

The conceptualisation of jointness in this model is the top-down leveraging of environmental expertise to facilitate co-ordinated attacks on enemy targets.

The most important decision-making at a whole-of-force level concerns the shaping, phasing and timing of how the war will be conducted across all environments, with particular emphasis on the coordination across environments for attacking targets. Once the joint campaign plan is defined, pieces of the campaign plan are then allocated to each of the environments for detailed planning and execution within this coordination framework.

Australian joint doctrine, and the establishment of Headquarters Australian Theatre, was based on the joint headquarters model.

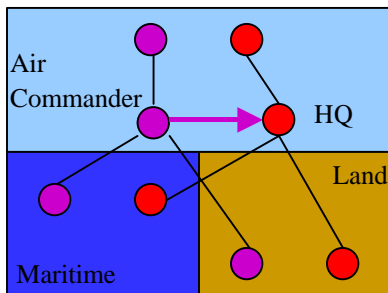### 2.4 Integrated Organisation

Figure 4. Integrated Organisation Model of Jointness

The integrated organisation model of jointness is characterised by the development of organisational systems that facilitate the creation of a single joint military organisation. The single-services are abolished and the integrated organisation exists in both peacetime and operations. Figure 4 shows how the integrated organisation is represented as a purple force whose commander directs attacks against the enemy forces.

The conceptualisation of jointness in this model is that the organisation is naturally joint since it is an integrated organization, and that working jointly is the normal form of operating. The forces "naturally" train together, operate together, and develop doctrine and procedures to support this natural form of operating.

The most important decision-making at a whole-of-force level is simplified to decision-making within the integrated organisation.

The integrated organisation model is based on the Canadian integrated Defence Force model.
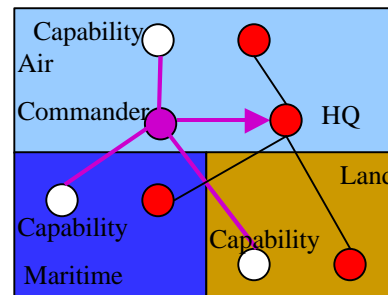
2.5 Integrated Systems

Figure 5. Integrated Systems Model of Jointness

The integrated systems model of jointness is characterised by exploiting network-enabled warfare and the revolution in military affairs concepts to develop joint systems architectures and information systems that support joint co-ordination in the battlespace. Figure 5 shows how the integrated systems model requires moving from platform-centric to capability-centric thinking, how the capabilities are still located across the single services, how the capabilities are networked together (the purple lines), and how the commander can use these networked capabilities to co-ordinate attacks on the enemy.

The conceptualisation of jointness includes:

- that both our own forces and the enemy forces are viewed as systems-of-systems
- that our forces are a digitally-networked systems-of-systems
- that by designing the force as a systems-of-systems we are inherently designing a joint force
- that by conceptualising both our own force and the enemy force as a systems-of-

systems we provide the basis for effects-based thinking

The most important decision-making at a whole-of-force level is focusing on the novel and different situational aspects in the context of a routine joint operation and routine campaign planning cycle. Realising the dream of a digitally-networked systems-of-systems to support situational awareness will require the redesign of campaign planning and operations using distributed cognition concepts (Hutchins, 1995) that go beyond our current conceptualisation of recognised pictures. Future capability acquisition will need to be incorporated into whole-of-force level planning for a future systems-of-systems, rather than traditional capability- or platform-centric stovepipes.

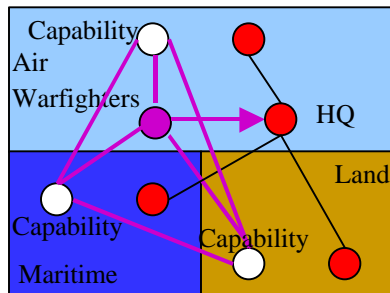### 2.6 Hierarchical Command, Networked Control

Figure 6. Hierarchical Command, Networked Control Model of Jointness

The hierarchical command, networked control model of jointness is characterised by enabling the warfighter to take the initiative. Enabling the warfighter requires providing situation awareness of the battlespace and knowledge of the available resources in order to maximise exploitation of initiative to achieve an effect. The warfighter in this model is *not* the commander. Instead, the warfighters are the front-line soldiers, the sailors on the ships, the aircrew in the aircraft, and the controllers operating unmanned vehicles. Figure 6 shows the shift in emphasis in our models of jointness by networking all the capabilities together without requiring interactions through the joint headquarters

thus allowing self-synchronisation, and the shifting focus from commanders to warfighters in the battlespace.

The conceptualisation of jointness in this model is facilitating self-synchronisation in the battlespace enabling warfighters to make decisions with strategic impact.

The most important decision-making at a whole-of-force level is the ability to construct resource spaces in the campaign plan that fully enable the warfighter's ability to self-synchronise in the battlespace.
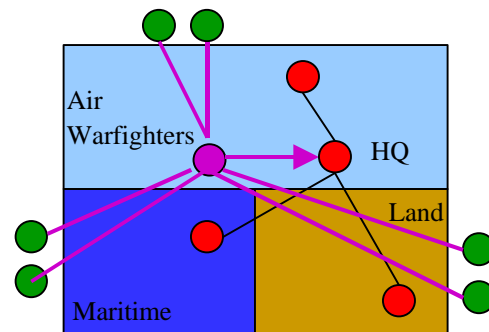
2.7 Adhocracy

Figure 7. Adhocracy Model of Jointness

The adhocracy model of jointness is characterised by the defence forces not owning any of the resources it uses to conduct operations. Figure 7 shows how the adhocracy model takes outsourcing to the extreme, with all the resources in green being contracted externally to the military. The key resource for the military is the development of a joint systems infrastructure that acts as a central governance mechanism and enables pulling together many organisations and people as a "gated community" for a situation, and then allowing self-organisation in that situation.

The conceptualisation of jointness is facilitating the construction of a gate community that self-organises in the battlespace.

The most important decision-making at a whole-of-force level includes:

- Defining and deploying the joint infrastructure as a central governance mechanism

- Determining which organisations and people are part of the gated community for a situation
- Enabling self-organisation through accountability rather than authority

The adhocracy model of jointess reflects the way some business organisations and some government agencies already operate, for example, the Coastwatch organisation in Australia.

3. Analysing the Models of Jointness

The Australian current doctrinal approach is the Joint Headquarters model of jointness. The future Australian model of jointness is based on integration, but there is some debate as to whether the integration is based on the integrated organisation model or the integrated systems model. Complicating the Australian perspective is the need to work in both combined and coalition operations, and the tendency to revert to the environment-specific and de-confliction models of jointness in these types of operations.

In this section we analyse why the selection of a model of jointness is so difficult, and why the transformation to a model of jointness is more problematic than expected. Specifically, we analyse the models of jointness in terms of the spectrum of conflict, a transformational framework, and a business perspective of the RMA.

3.1 Spectrum of Conflict

Analysing the seven models of joint warfighting reveals that the joint warfighting models are focused on the warfighting end of the spectrum of conflict as shown in Figure 8.
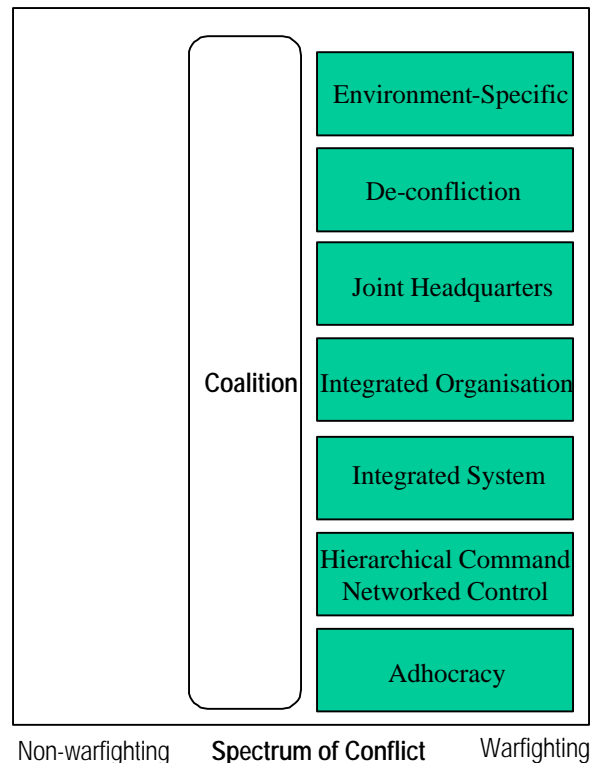

Figure 8. Mapping the Models of Jointness to the Spectrum of Conflict

The focus on warfighting has the following consequences for thinking across the spectrum of conflict:

- The models of jointess assume that the military will be the lead agency. However, there are many types of operations across the spectrum of conflict where the military is not the lead agency in a whole-of-government perspective, and the military may only be providing a service to the lead agency.
- The models of jointness do not inform the conduct of coalition operations. A simple answer to coalition operations is to have common equipment, language and procedures. However, in reality, coalitions will comprise some partners who are more technology-focused, some partners who are more mass-focused, and partners employing different models of jointness.

One mechanism for enabling the military to address the entire spectrum of conflict would

be to examine the strategies required to operate the Adhocracy model of jointness, and implement some of these strategies for both non-warfighting operations and coalition operations, freeing up the command structure for these types of operations.

3.2 A Transformational Framework

Our aim in analysing the models of jointness was to identify a transformational framework as the Australian Defence Force acquired new capabilities across time. As new capabilities were acquired, we assumed that we could simply transition from one model of jointness to another.

jointly is the routine and preferred mode of operating.

The key enablers for transitioning between models reflect changes in technology (weapon systems that cross environments), to leveraging people's expertise (co-locating people in a joint headquarters), to developing new information systems that supports joint working, to leveraging these information systems to provide the warfighters in the battlespace with the situational awareness they require for decision-making (note: here we are not talking about the commanders, instead the actual warfighters).

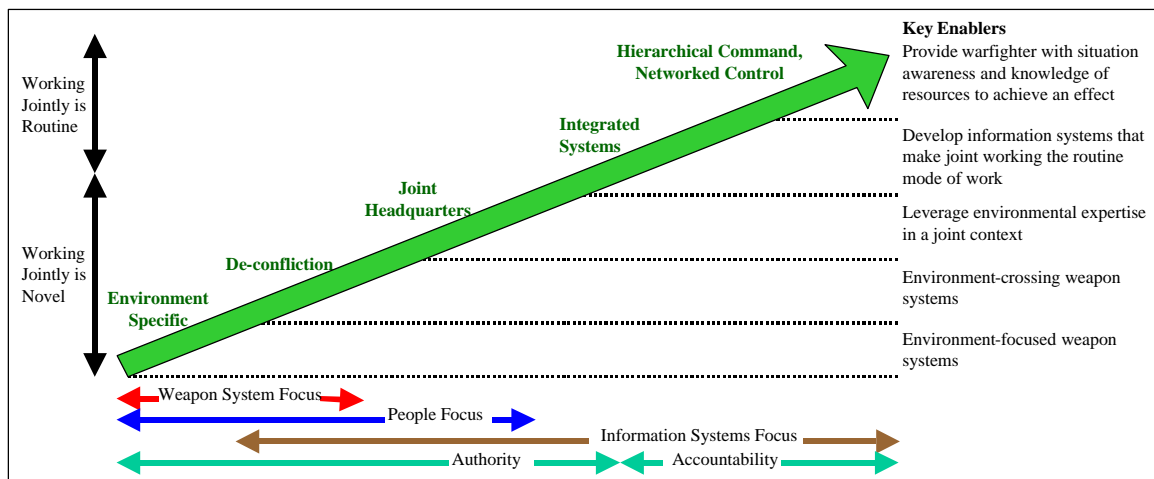The three key findings from the

Figure 9. A Transformational Framework for the Models of Jointness

Figure 9 reveals that a transformational framework for transitioning between models of jointness is actually a multi-dimensional framework. Transitioning between models requires a conceptual shift in the organisation's thinking in multiple dimensions simultaneously.

One dimension requires a shift from thinking about weapon systems to thinking about people to thinking about information systems. A second dimension entails a shift from authority models of command and control to accountability models of command and control. A third shift involves moving from situations where working jointly is a novel experience to a worldview where working

transformational framework are:

- The key enablers for one model of jointness become the routine infrastructure for future models
- While the models of jointness may be viewed as evolutionary transformation, the revolutionary aspects are the switch in mental models, organisational focus and decision-making required to implement and operate each model
- Focusing purely on people means that working jointly will always be novel and there will be a tendency to backslide to "simpler" models of jointness under stress, resulting in considerable organisational relearning.

3.3 A Business Perspective of the RMA

Despite defining the transformational framework, we still found it difficult to transition between models of jointness. Examining the way that information systems had been used in the business world revealed why it was so difficult to step straight from a platform-centric, weapon system focus to a network-enabled, hierarchical command, networked control view of operations.

Implementing information systems in the business world has involved a two-step process in changing the underlying business model as shown in Figure 10. The first step involved the creation of centralised brokers to manage the flow of information and develop the knowledge for how to use the information. Once the knowledge had been developed in a social context, the second step involved abolishing the brokers, enabling the "free" distribution of information across all agents and agencies. A good example is in the travel business. The early information systems for travel such as SABRE were designed to support travel agents (brokers). With the rise of the internet, dot coms saw the opportunity to remove the middle man, and we now have web-enabled information systems that enable the customer to do the whole travel process such as TRAVELOCITY. Indeed, analysing many of the dot com models reveals that they are either implementing brokers when none existed before (eg AMAZON.COM) or else are abolishing brokers and providing the information directly.
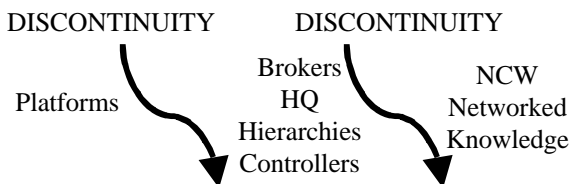
DISCONTINUITY   DISCONTINUITY

Platforms   Brokers   NCW
                 HQ   Networked
                 Hierarchies   Knowledge
                 Controllers

Figure 10. Discontinuties in Implementing
Information Systems

A key lesson for the military is that implementing information systems is not a "one-shot" operation that will move us directly to a networked view of the world where agents can self-synchronise in the battlespace. Instead, there are two discontinuities that must be navigated. The first discontinuity is transitioning to a model of brokers, headquarters, hierarchies, and controllers for learning how to manage and use the information. The second discontinuity then requires the distribution of this knowledge and the development of new systems that enable self-synchronisation in the battlespace.

Using this business model, we can see that the transformation framework described in Section 3.2 actually comprises a number of discontinuities that need to be bridged. The first discontinuity involves developing joint headquarters at the operational level as brokers and staffing controller positions at the tactical level. The second discontinuity then involves abolishing these headquarters and controlling positions, and instead distributing the knowledge and information as we move through the integrated systems and hierarchical command, networked control models of jointness.

In this analysis, we would view the creation of joint headquarters and controller positions as intermediary organisational forms, not the "final" desired organisational form in a network-enabled environment.

4. Conclusions and Future Work

This paper has identified a number of reasons why the design of synthetic constructs for creating joint organisations is so problematic. These reasons include:

- The models of jointness do not span the spectrum of conflict and do not recognise that in some situations the lead agency is not the military
- That migrating between models of jointness involves traversing multiple discontinuities
- That the headquarters, broker, controller model is an intermediate organisational

form on the way to a fully networked organization.

A key issue in designing future organisations and mapping the effects of new technology is understanding the impact on an organisation's value set. For example, the Australian Defence Force current value set includes the ability to be adaptive and to take the initiative. In transitioning to future models of jointness, a key question must be how these models impact the organisation's value set and whether the models need to be redesigned. For example, how does a hierarchical controller model enable the values of adaptiveness and taking the initiative? DSTO is embarking on a new research task investigating designing joint organisations from a value perspective.

Finally, while the Adhocracy model of jointness may appear to be very radical, exploring this model in more detail may reveal strategies that facilitate the ability of the military to work more effectively across the spectrum of conflict and in coalitions.

5. References

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