

INFORMATION AGE WAR AND THE QUESTION OF
PARADIGM SHIFT : UNDERSTANDING THE
INFORMATION AGE'S INFLUENCE ON WARFARE

Melissa McPherson

A Thesis Submitted for the Degree of MPhil
at the
University of St Andrews



1999

Full metadata for this item is available in
St Andrews Research Repository
at:

<http://research-repository.st-andrews.ac.uk/>

Please use this identifier to cite or link to this item:

<http://hdl.handle.net/10023/15105>

This item is protected by original copyright

Information Age War and the Question of Paradigm Shift:

Understanding the Information Age's
Influence on Warfare

Melissa McPherson

1 June 1999

Thesis submitted in fulfilment of the degree of
Doctor of Philosophy at the University of St Andrews



ProQuest Number: 10166673

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10166673

Published by ProQuest LLC (2017). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

TL
D 372

I, Melissa McPherson, hereby certify that this thesis, which is approximately 97,000 words in length, has been written by me, that it is the record of work carried out by me, and that it has not been submitted in any previous application for a higher degree.

Date 21 Jan 1999

Signature of Candidate _____

I was admitted as a research student in September, 1995, and as a candidate for the degree of PhD in October, 1996; the higher study for which this is a record carried out in the University of St Andrews between 1995 and 1999.

Date 21 Jan 1999

Signature of Candidate _____

I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of PhD in the University of St Andrews and that the candidate is qualified to submit this thesis in application for that degree.

Date 20/1/99

Signature of Supervisor _____

(Dr Bruce Hoffman)

In submitting this thesis to the University of St Andrews I understand that I am giving permission for it to be made available for use in accordance with the regulations of the University Library for the time being in force, subject to any copyright vested in the work not being affected thereby. I also understand that the title and abstract will be published, and that a copy of the work may be made and supplied to any *bona fide* library or research worker.

Date 1 June 1999

Signature of Candidate _____

ABSTRACT

This thesis examines the information age's influence on war, and attempts to establish both an understanding of what information age war is and how it may change warfare. Specifically, the thesis focuses on the question of military paradigm shift, and asks whether information age war constitutes a change of sufficient magnitude to challenge the established models for understanding warfare.

The first chapters examine the information age's role as a force of change: demonstrating that the question of information age military paradigm shift clearly warrants a more detailed investigation. The thesis then examines sequentially four critical aspects of war, and the information age's influences on each. The how, what, why, and who of warfare are identified as the most salient barometers of paradigm shift given that significant changes in each of these elements would necessarily and fundamentally alter both the practice and understanding of warfare. This thesis' argument that information age war does not clearly fulfil any of these criteria, and therefore does not require a new military paradigm, is perhaps its main and most important finding.

While information age war will doubtless introduce many significant and notable changes to modern war, the present models for explaining war should accommodate the majority of these changes relatively easily - though perhaps not necessarily always in the manner expected. One exception is particularly notable. The information age's influence on the 'who' of war proves difficult to reconcile with the current paradigm because of its potential to shift the balance of military advantage between state and non-state actors. Such a profound change could ineluctably challenge the traditional understanding of who can wage war. This, added to the significant, if not paradigmatic shifts in the other three criteria, points to the need not so much to establish a new paradigm of war, but to reinterpret and adjust the paradigm that currently explains this phenomenon. The thesis therefore concludes with an analysis of this reinterpretation and its implications both for the understanding of war and for the consequences of waging war in the information age.

ACKNOWLEDGEMENTS

During the past three and a half years, many people have crossed my path and won my gratitude for their assistance in the completion of this dissertation. First and foremost, thanks go to my parents, Marcella and John Keeler, without whose love, trust, and support I would not be where I am today.

Thanks also go to several institutions who provided generous financial support for this undertaking: namely, the University of St Andrews, the St Andrews Society of the State of New York, and Vassar College's Peabody Scholarship.

Several people kindly gave of their time - and their insights into information age war - by granting interviews. For this I would like to thank John Arquilla, Michael Brown, Martin Libicki, Terry Mayfield, Michael Mazarr, Neal Pollard, David Ronfeldt, and George Stein.

I am also especially grateful to the many friends who have played an invaluable role in keeping me sane throughout the course of my PhD work. In particular, several dear friends who have managed this feat even with an ocean to separate us: Jenna Smail, Amy Hamlin, and Monica Van Wert Martinez, who have been my anchors throughout everything. Thanks also to Charles Beggs, whose enthusiastic surfing of the internet helped to start me off on this quest. On this side of the ocean, I'd like to thank my flatmates at 35 Argyle Street, Joana Desterro, Davina Moothoo, and 'Scary' John Serrati, for being part of my home away from home. Also Penny Rush, Jane Nelson, Steve Ferguson, Lisa de Caux, and Mark Brewer. And thanks especially to Bernhard Rau, who always managed to remind me to smile even in the last months of completing this thesis.

In addition, several friends and colleagues deserve thanks not only for their friendship, but also for more direct contributions to my work. Whether proof-reading, offering research suggestions, answering questions, or poking holes in my arguments, this dissertation would not be the same without them. From my stint in Santa Monica, I'd like to thank Jacob Zimmerman, Ashley Tellis, Christopher Twomey, David Burbach, and John Mora. In St Andrews' IR Department, I am particularly grateful to Angus Muir (especially for patiently

answering endless questions of 'which sounds better?'), and David Claridge, both of whom excelled at helping me learn to laugh at life, work, and the department. Also, thanks to Magnus Ranstorp for his great stores of advice, and to Gina Wilson, a wizard of organisation who always knew how to find the answers I needed. Finally, I owe a great debt of gratitude to my supervisor, Dr Bruce Hoffman, for his support and guidance, as well as that intolerance of nonsense which never failed to put things in perspective. Many thanks.

Melissa McPherson
St Andrews, January 1999

TABLE OF CONTENTS

Abstract

Acknowledgements

Introduction

Conceptions of War in the Information Age	8
Other Views in the Debate	15
Paradigm Shift.....	24
Understanding Paradigm Shift in Context.....	32
The Interplay of Context and Content	40
A Word about Format.....	42

Chapter One: Context

The Information Revolution	48
CONTEXT	58
Man	59
The State.....	70
Weakening	71
Widening	83
Conclusion.....	86

Chapter Two: War and Information

Historical Manifestations of Information Warfare?	91
Military Revolution	91
The MTR - Technological Innovation and Military Revolution	101
The MTR as Force Multiplier	103
The MTR as Augmentation of Destructive Power	105
The MTR as Enhancer of Cost-Effectiveness.....	107
The MTR as Surprise Advantage.....	108
The RMA - Military Revolution not by Technology alone.....	109
IAW as Military Revolution.....	113
Taking IAW in Context	121

Chapter Three: How Information Age War Is Waged

The Changing Means of War as the First Criterion of Paradigm Shift.....	133
EFFICIENCY over MASS.....	137
Efficiency's Rise to Power	139
Efficiency in War.....	144
Speed & Accuracy.....	149
Organisation to Maximise Efficiency	156
A Sign of Paradigm Shift?	161

TABLE OF CONTENTS

Chapter Four: At What Information Age War Is Waged

Following Historical Precedent	169
Strategic Civilian Tools in IAW	183
Converging Trends: Civilians as Strategic Targets in IAW	192
Targeting Civilian Information	195
Targeting Civilian Information Systems	203
Civilianisation's Implications for Paradigm Shift	206

Chapter Five: Why Information Age War Is Waged

Why Wage War?	212
Tending to Extremes: How War Acts as Final Arbiter	218
First Order Reasons for Waging IAW	229
To What End War?	233
Why Wage War in the Information Age?	249
Information Age Motivations for War	253
Conclusion	263

Chapter Six: Who Can Wage Information Age War

The State	268
Widening	270
Weakening	282
Lesser State and Non-State Actors	286
Widening	289
Non-State Actors in Particular	295
The Widening Role of Lesser- and Non-state Actors: in Real Terms	301
Weakening	307
On Balance: Who Can Wage IAW?	308
Conclusion	314

Conclusion

Not a Paradigm Shift	319
What Then?	321
Implications	329
Future Directions	337

Abbreviations	340
---------------------	-----

Bibliography	341
--------------------	-----

INTRODUCTION

The close of the twentieth century has prompted many predictions about the end of the world and the beginning of a new era. Not the least of these is the claim that a new age has emerged, heralding an end to the era of industrialism that defined the pinnacle of development for the past two centuries and more. Its successor, named for the information technologies that spawned it, has been labelled the 'information age.' Signs of this age have already begun to appear in the form of pervasive changes in the way the world conducts business, education, politics, and even social interaction. The changes themselves present compelling evidence that the information age - and the new information technologies and practices that it introduces - holds the potential to spark significant societal shifts. The extent of the changes already evident, however, suggests the possibility of still further, more far-reaching shifts, and begs the question 'what might this information age mean for the world as we know it?'

Of its many possible effects on society, the information age's potentially most profound impact falls within the realm of war.¹ For that reason, this thesis focuses on how the information age may affect warfare, and what it may mean for the way the world conducts and understands war.² More specifically, this thesis will attempt to discern the implications of the information age's influence on war primarily through an examination of the proposition that the information age war form will create a paradigm shift in war. In the course of this investigation, this study addresses not only the issue of what information age

¹ Changes in war are likely to introduce some of the information age's most profound effects because they may alter not only war - an impact important in and of itself due to war's status as the final arbiter of conflict in the international system - but also the individuals and organisations who wage war and the system ordered by it. This possibility will be more thoroughly investigated in chapter seven.

war is, but how it differs from previous ways of conducting war, how significant those differences are, and what these differences suggest for those who wage war as well as for those who are affected by war.

As a preface to this investigation, it is useful to understand that the examination of information age war falls within a larger, ongoing debate over the typology of war. Throughout history, those who wage war and those who study war have made many attempts to categorise the phenomenon.³ In response to the many and varied changes introduced to warfare over the years,⁴ practitioners and theoreticians alike have identified various means to differentiate between one form of war and another. The most common (and generally most easily recognised) of these methods draws distinctions based on the tools and/or the tactics a war form employs. Heavily influenced by technological developments, forms of war defined by their tools most prominently include nuclear, chemical, and biological warfare.⁵ Categories of war defined by their tactics range from medieval siege warfare to industrial era trench warfare to guerrilla warfare. Secondary tactical differentiation is also based upon the medium in which battle is waged, for example land wars and air wars.⁶ Such tactical distinctions are most commonly influenced by

² Throughout this thesis, the concept of 'war' should be understood to mean episodic and at least potentially violent conflict conducted with the strategic aim of compelling an opponent to do one's will against his own.

³ Cf. Fastabend, David. "The Categorization of Conflict." *Parameters*. Summer 1997: 75-87. p.2

⁴ Or perhaps in the belief that a certain 'type' of war could be more readily understood than warfare in general.

⁵ Cf. Paret, Peter, ed. *Makers of Modern Strategy: from Machiavelli to the Nuclear Age*. Oxford: Oxford University Press, 1986.

⁶ Some, who see 'cyberspace' or 'the infosphere' as a fourth or fifth dimension of the battlespace - after land, water, air, (and space) - would argue that IW fits this typology. This study, however, takes the view that information is a tool and target in IAW, not a new medium for battle.

technological developments in combination with doctrinal developments, and are often coloured by political and/or socio-cultural concerns.⁷

A third method of war classification combines these factors with others - like, for instance, the character and organisation of the military forces involved - for a more holistic (but consequently often less distinct) typecasting which has given rise to the conceptions of 18th century 'limited warfare,' 'modern war,' and 'total war.'⁸ In addition to these traditional modes of categorising wars, a fourth feature has been added to the war typology over the past decades, the concept of a 'spectrum of conflict.' During the last years of the Cold War, this concept, which was heavily influenced by the prevailing geopolitical situation, placed particular emphasis on the intensity level of wars, classifying them as high-intensity and low-intensity conflict.⁹ Since the Cold War's end, that emphasis has shifted more towards the purpose of the operation, leading to discussions of Operations Other than War (OOTW), peacekeeping, peacemaking, and other elements that fall between 'peace' and 'war' on the conflict spectrum.¹⁰

⁷ Consider, for example, NATO operations in Kosovo in the spring of 1999. The decision to confine initial military activity to an air war was almost entirely politically motivated. Likewise siege warfare was heavily influenced by political and socio-cultural concerns - principally the fact that the ruling nobility typically reside in fortress towns or personal strongholds during the era in which siege warfare held sway.

⁸ Cf. Epstein, Robert M. Napoleon's Last Victory and the Emergence of Modern Warfare. Lawrence, KS: University Press of Kansas, 1994. p.3 and Parker, Geoffrey., ed. The Cambridge History of Warfare: the Triumph of the West. Cambridge: Cambridge University Press, 1995. p.233 Howard, Michael, George J. Andreopoulos, and Mark R. Shulman, eds. The Laws of War: Constraints on Warfare in the Western World. New Haven: Yale University Press, 1994. p.4, and Pearton, Maurice. The Knowledgeable State: Diplomacy, War, & Technology Since 1830. London: Burnett Books, 1982. p.186.

⁹ Fastabend, David. "The Categorization of Conflict." p.3 The latter is a concept of war that was particularly widespread during the Cold War, with its shadow of nuclear Armageddon.

¹⁰ United States Department of the Army. FM 100-5: Operations. Washington, DC: Government Printing Office. June 1993. pp. 2-0, 2-1. Fastabend. "The Categorization of Conflict." pp.4-5, Libicki, Martin C. "What is Information Warfare?" Washington, DC: National Defense College, 1995. Ch1, p.2 and Owens, William A., Adm., USN. The

This thesis examines war through the lens of yet another contribution to the typology of war - one that emerged contiguous to military interest in the spectrum of conflict, yet has achieved a much more controversial popularity. This most publicised of the typologies of war is based upon the idea that the conduct and character of war varies according the 'age' in which it is waged. The idea that the agricultural, industrial, and now information ages each gave rise to distinctive forms of war has captured the imaginations of many who study warfare and the changes it currently seems to be undergoing.¹¹ However, this concept of an age of warfare has been much questioned - not least because the definition of such an age is both indistinct and problematic. In particular, the issue of when such an age begins, and what exactly it entails has not yet been settled with the necessary rigour. The prevailing ambiguity is due in no small part to the fact that the concept was popularised by futurists and social forecasters, namely Alvin and Heidi Toffler, among others, whose research has been in many areas more provocative than it is empirically conclusive.¹²

Yet the concept of an 'age' of warfare holds a certain utility despite its detractions. As the following chapter will discuss, the idea of an information age carries with it a sense of change brought on not only by new information technology, but by the new methods, processes, organisational forms, and other societal and political innovations introduced to capitalise on the advantages that

Emerging U.S. System-of-Systems. Washington, DC: National Defense University World Wide Web page, February 1996. p.4

¹¹ Cf. DiNardo, R.L. and Daniel J. Hughes. "Some Cautionary Thoughts on Information Warfare." Air Chronicles. 1996. p.2

¹² Cf. Toffler, Alvin. The Third Wave. New York: Bantam, 1980. Drucker in Coates, Joseph F. and Jennifer Jarratt. What Futurists Believe. Mt Airy, MD: Lomond Publications, 1989. Bell, Daniel. The Coming of Post-Industrial Society: A Venture in Social Forecasting. New York: Basic Books, 1973. This issue will be addressed in greater detail later in the chapter. See p.34

the recent explosion of information technology offers. Classifying warfare by its connection to the information age, therefore, allows one to account for military shifts resulting from technological change, as well as from methodological and organisational change, and from political and societal shifts, providing a more comprehensive means to categorise and understand current developments in warfare. That, coupled with the fact that the idea of a war form particular to a certain age holds wide currency among those who are studying the present changes in warfare¹³ makes the concept of classifying, and understanding war through its association with the information age very attractive.

Having established the reasons for studying today's military developments through the lens of the information age, it is now possible to begin the investigation into the information age's effects on warfare. That investigation, however, will be by no means straightforward, as evidenced by the fact that the field of 'information warfare' (IW) has been fraught with debate since it took the spotlight in the aftermath of the 1991 Persian Gulf War. This debate is exemplified by the fact that common attempts to explain the current relationship between information and warfare run the gamut from 'a new way to do the same old things,' to a Revolution in Military Affairs,¹⁴ to a new paradigm of war, to a misguided justification for padding military budgets. At the heart of the debate lies great uncertainty over what, precisely, information

¹³ DiNardo and. Hughes. "Some Cautionary Thoughts on Information Warfare." p.2 Changes which, this thesis recognises, have been brought on by the revolution in information technology, the end of the Cold War, increasing economic interdependence, and other factors.

¹⁴ A revolutionary change not only in the weapons of war, but also in the strategies, tactics, and organisation employed by warmakers. The phenomenon of revolution in military affairs,

warfare is. With the very fundamentals of the field at question, this thesis examines the issues surrounding IW from the bottom up - beginning with the very definition of the phenomenon - in order to present a more rigorously analytical account of the information revolution's impact on war.

One of the few points of agreement within the information warfare debate provides testimony to the glaring need for such an account: that war is currently undergoing *some* sort of change. There is thus a general sense that, whatever the information revolution may ultimately mean for the nature of war, this phenomenon will inescapably affect the military and the way the military wages warfare.¹⁵ Consequently, while the significance of impending information age military shifts may still be very much in question, strategic thinkers must nonetheless take the information revolution into account when considering future conflict. Whether in the end they believe that the information age will transform war beyond recognition or that it will merely augment previous capabilities, if their preparations for waging war are to be relevant, military planners must at least attempt to come to terms with the concept most widely known by the name information warfare.¹⁶

Such an understanding unfortunately is not easily reached. One of the principal difficulties in arriving at a grasp of the 'information warfare' concept

along with the military technology revolution, will be discussed further in chapter two's 'Military Revolution' section.

¹⁵ Cf. sources as diverse as the US Department of Defense's *Joint Vision 2010*, John Arquilla and David Ronfeldt's seminal "Cyberwar Is Coming!", and Lawrence Freedman's sceptical "Will Battle Ever be Joined?" Shalikashvili, John, M. Chairman, Joint Chiefs of Staff. *Joint Vision 2010*. Washington, DC: United States Department of Defense, 1997. John Arquilla and David Ronfeldt. "Cyberwar Is Coming!" Santa Monica, CA: RAND, 1992. Freedman, Lawrence. *Information Warfare: Will Battle Ever Be Joined?*. London: International Centre for Security Analysis, October 1996

¹⁶ This concept has been called by many names, of which 'information warfare,' IW, Infowar, and Information Age Conflict or Warfare are only the most common. Other appellations in

arises from the fact that, even among those who agree that information warfare may pose a significant new challenge to national security, there is dissension over what precisely the term actually refers to. For instance, the US Department of Defense once defined IW as “actions taken to affect adversary information and information systems while defending one’s own information, and information systems.”¹⁷ However, in recognition of the fact that many such actions will not entail organised, strategically directed campaigns worthy of the name ‘war,’ the Pentagon has more recently applied this definition not to information warfare, but to the concept it now calls ‘information operations.’ Information warfare has, instead, become more specifically “information operations conducted during time of crisis or conflict.”¹⁸ The distinction is an important one, as the field has long been lacking a useful differentiation between information age military tactics (which can be employed across the conflict spectrum from peace to peacekeeping, insurgency, etc., to war) and full-fledged strategic information age war. With the establishment of this distinction, the new definitions now allow meaningful treatment both of true information age war and of mere trouble-making that employs information age tactics, leaving room in between to account for medium-scale information age threats as well. Despite the usefulness of the distinction, however, the fact that such basic definitions are changing even at this level of doctrinal definition is a

the literature include: Information-Based Conflict, *Knowledge-Based Conflict*, Third Wave War, Post-Industrial Warfare, and the Pentagon’s current choice, Information Operations.

¹⁷ Paige, Emmett, Jr. “Directive 3600.1 - Information Operations.” Arlington, VA: Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, 9 December 1996 Cf. also Everett, Charles D., Moss Dewindt, and Shane McDade. “The Silicon Spear: An Assessment of Information-based Warfare and US National Security.” National Defense University Sun Tzu Art of War in Information Warfare Prize 1997. Washington, DC: National Defense University Web page, 1997.

conspicuous sign of the confusing predicaments that afflict the information warfare debate.

Conceptions of War in the Information Age

This study interprets warfare in the information age very specifically as a war form in which information is, definitively, the centre of gravity. As such, information constitutes both the most valuable tool for attack and the most desirable object of attack, and is therefore also the most vital subject of defence. According to this view, information age war does not simply “affect adversary information systems” in the course of defending one’s own. Such an interpretation of information’s role in warfare is insufficient to account for the claims that the information age will produce a new paradigm of warfare. Rather, if one is to examine the assertion that information age war represents a new form of war - as this thesis does - one must consider warfare in the information age to be a mode of conflict which employs information and information age technologies in a very distinctive manner. For this reason, the present study defines war in the information age not merely as military actions involving information systems, but as a form of war which leverages a synergy¹⁹ of information and information systems to produce a decisive advantage at all levels of combat, beyond that available from firepower or manoeuvre alone. That is to say, true information age war should not only employ, but rely on a

¹⁸ Paige, Emmett, Jr. “Directive 3600.1 - Information Operations.” Arlington, VA: Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, 9 December 1996.

¹⁹ The emphasis on ‘synergy’ incorporates the US Department of Defense’s current thinking on the “system of systems” concept and its recognition of the importance of integration and coordination in information age war. Cf. Shalikhvili. Joint Vision 2010.

multitude of co-ordinated and complementary information systems that act in concert to provide information that multiplies the effectiveness of every military action, from planning to mobilisation to the application of force itself.

This thesis deliberately uses this particular definition of information age war in the belief that a careful and explicit delineation of the war form's characteristics is an essential prerequisite for the analysis of the information age's influence on warfare. Before considering the advantages this definition holds for such an inquiry, however, one should note that this conception of warfare in the information age is significantly different from those put forward by the two major schools (discussed below) currently dominating the information warfare debate. Consequently, though one is understandably leery to add yet another term to the IW lexicon, it is desirable to achieve a distinction between 'information warfare,' 'Conflict in the Information Age' or 'information operations,' and the information age's impact on war as it is understood here. The first term has been appropriated narrowly to describe attacks on information infrastructure, whereas the latter two are applied more broadly in reference to all aspects of conflict involving 'information;' both are to be differentiated from the focus of this thesis - warfare that specifically exploits information synergistically. For this reason, the thesis will use the terms 'war in the information age' and information age war²⁰ (IAW - as opposed to IW), and rely on the reader to attach the implied distinction to the semantic wordplay.

This semantic hair-splitting cannot hold any significance, however, until one recognises the distinguishing features that make the 'information age war'

definition a useful and effective foundation for the investigation into the information age's effects on warfare. First, crucial to the definition of information age war presented here is the premise that synergistic reliance on information systems provides the key to creating a decisive military advantage in the information age. In practical terms, this means that future militaries will not win information age wars merely by exploiting the latest information technologies. Instead, they must employ these technologies in systematic co-operation, with each other and with every activity of the military force, in order to create the decisive advantages information age war advertises. Individual information technologies, or even multiple information technologies applied to individual activities, will simply allow a military force to do what it has always done, but faster and more accurately. However, leveraging²¹ information systems in co-ordination on every level of war from planning to implementation - training, organisation, logistics, doctrine, strategy, operations, and tactics - should allow an information age military to act with an aggregate speed and accuracy without which an adversary cannot compete.

Consider, for instance, the advantages of an information age fighting force which goes into war with, among other assets: military strategies and doctrines tested exhaustively through computer modelling and war-games; soldiers who have augmented their conventional training with time in sophisticated, realistic simulators; supply lines which function smoothly and efficiently with minimal confusion; up-to-date, detailed intelligence which allows troops to implement plans with maximum effectiveness; precision

²⁰ To be used interchangeably.

munitions which enable soldiers to capitalise on the available intelligence,²² and fast, high-capacity, flexible communications which enable commanders and troops alike to discuss orders at a speed compatible with the fast pace of battle. The list could go on, but the above examples are sufficient to illustrate that one information system, or even several elements in one type of system, cannot compete with the advantages potentially available from the co-operative employment of many different types of systems that have widely differing functions, each of which augments and multiplies the benefits of the others. The synergy of these many and varied systems should create a pace - a level not only of speed, but of accuracy - in war which no opponent can equal without that same conscious, exacting co-ordination of information and actions.

Secondly, this study's definition of information age war is particularly useful for investigating information age military change because it explicitly emphasises the fact that the decisive role of information in IAW is its capacity to create efficiency. Manifested in the speed and accuracy made possible through the synergistic leveraging of information, efficiency is the factor upon which victory or defeat may depend in information age war. In this role, efficiency has come in large part to replace mass, the factor that proved so decisive in industrial age wars. This replacement is most famously exemplified by the fact that one or two precision guided munitions can in some cases destroy a target more effectively than scores of WWII-era bombs which could not

²¹ Employing an asset to multiply the gains from other assets, with the intent of creating advantage.

²² Such precision weaponry, in fact, not only enables the use of highly accurate intelligence, but demands it. These weapons could not be effective without the detailed intelligence required to target them. Some might argue that this creates a new vulnerability - and indeed it does, as does every aspect of IAW's reliance on synergised information efficiency - but the

reliably hit their intended targets.²³ More prosaically, information also replaces mass in the implementation of focused logistics, a system which integrates computerised information management to insure reliable delivery of supplies, thus necessitating smaller contingency surpluses and fewer support troops to manage logistic distribution.²⁴ Such replacements of mass with information are possible today because modern information technologies increasingly enable an actor to bring force to bear at the right place and time (that is, quickly and accurately), hence reducing the number of weapons, supplies, and soldiers a military force requires by increasing the likelihood that its strikes will succeed the first time.²⁵

This argument in no way attempts to claim that future militaries will not need firepower and manpower. Rather, the quantity of this power should matter less than the quality. In a true information age war, the quality of a fighting force will depend on its capacity for leveraging information in a synergistic manner (i.e. its capacity for employing information and information technologies in concert, in order to create advantages such as those achieved through co-ordinating training simulations and computer-managed logistics functions with precision weapons and versatile command and control systems, as detailed in the previous paragraphs)²⁶ that allows the force to attack with the

decision to adopt the methods of information age war is predicated on the assumption that the potential risks of such dependencies are outweighed by the benefits they should bring.

²³ Libicki, Martin C. Information and Nuclear RMA's Compared. Washington, DC: National Defense University Web page, July 1996.

²⁴ Both the delivery of bombs and of logistical supplies are familiar functions of war. It should be noted that the information age is also likely to improve efficiency by introducing new tools to war - such as EMP (electromagnetic pulse) weapons or cyber attacks against information infrastructure - that can be co-ordinated with airstrikes to reduce the utility of enemy air defences and decrease the likelihood of losses for the striking force. See also p.20

²⁵ The same is also true of supply and aid, because they are more likely to arrive where they are needed and where they were originally intended.

²⁶ See page 11.

requisite munitions at exactly the time and place that its opponent is most vulnerable.²⁷ The ability to strike this point of critical vulnerability can reliably be achieved only by depending on calculated information, not on the comparatively blind luck of numbers and probabilities as in past wars.²⁸

This role of information in warfare is unique to the information age. Although information has played a crucial part in wars since the beginning of history,²⁹ the dependable ability to use vast quantities of data proactively and expeditiously to *create* a decisive advantage emerged only with the explosion of sophisticated information technologies capable of collecting, processing, manipulating, and storing large amounts of complex information.³⁰ However, the creation of this advantage is dependent not merely on the use of these technologies, but on the ability to use them in concert. Information technologies maximise efficiency only when they are employed in every phase of an action from inception to execution, creating an effect that is greater than the sum of its parts. Efficiency cannot be maximised, that is, exploited to its fullest extent, if any one part of an operation is carried out with less accuracy and speed than it might otherwise be, as would be the case if available information were not utilised in each and every phase.

²⁷ Recognising the importance of this principle, the US military has begun to prepare for “dominant manoeuvre” and “precision engagement, both of which stress the ability to be at the right time and place, no matter where or when. Cf. Shalikashvili. Joint Vision 2010.

²⁸ This is not to say that military men of the past lacked military genius or creativity, merely that, without the technology to make and communicate the relatively more informed calculations that are possible today, these men had to rely more on intuition and probability than information age commanders theoretically should have to.

²⁹ Cf. especially Sun Tzu. The Art of War. Griffith, Samuel B., trans. London: Oxford University Press, 1963. This point will be dealt with in detail in chapter two.

³⁰ Cf. United States Department of Commerce. Report of the National Critical Technologies Panel. PB91-156869. Springfield, VA: National Technical Information Service, March 1991.

Consider, for example, the fact that a military force's capacity to hit the point of its opponent's most critical vulnerability depends on integrated information not only for the strike itself, but also throughout the course of military planning and implementation. In information age war, a strike against an opponent's command network, for instance, will not be decisive without capitalising on the vast array of available intelligence to know where and when the enemy is most assailable. Nor can such a strike achieve conclusive efficiency without utilising precision-guided munitions (with or without accompanying stealth) to deliver firepower at the correct point with minimum warning. For that matter, even information age operational techniques such as split-based or focused logistics, which enable a military to deploy to the field with the smallest possible support infrastructure and management force,³¹ are crucial in a war where an action may succeed or fail because of its efficiency. When deployed in concert these elements can bring force to bear with the speed and precision fundamental to the creation of a more efficient, and therefore more effective information age war machine.

The pivotal role of efficiency, and of information's part in creating efficiency, will be discussed further in chapter three.

³¹ Focused logistics, in the terminology of Joint Vision 2010, or split-based logistics in the words of TRADOC's General Frederick Franks, is a supply strategy which replaces extensive in-theatre logistics infrastructures and surpluses with remote computerised tracking of inventory and shipment information. This system drastically reduces the number of logistics managers and the size of the supply structure needed near the battlefield, leaving the majority based at home, hence Franks' use of the term "split-based." Shalikashvili. Joint Vision 2010. And Franks, Frederick M., Jr, Gen USArmy. "Winning the Information War." Vital Speeches. 15 May 94, Vol60, n15: pp.453-459. For more details, see chapter three, 'Efficiency's Rise to Power.'

Other Views in the Debate

One must remember, however, that this view of information age war falls within a larger debate over the nature of 'information warfare.' Since this work has been informed by that debate, and readers of these pages will no doubt carry with them assumptions derived from the positions of other authors, it is important to situate the view of information age war presented here within the larger school of information warfare.³²

To begin with, that school is but one component of a still greater dispute over the nature of war and its relationship to change. The military establishment as a whole remains divided not only over the issue of information age war and its significance, but, more fundamentally, over the question of whether significant change is even occurring. Those proclaiming that such a change, in the form of an information age revolution in military affairs - the result of concurrent technological, doctrinal, and organisational innovation³³ - is on the military's doorstep have perhaps received the most attention, and certainly the most hype, in this dispute. Other views, however, have vied for similar recognition. Principal among them is the notion that current developments in war result more from an evolutionary process than a revolutionary one. While this school suffers its own differences over the ultimate significance of that evolution (some propose moderate change will result, others recognise the possibility that evolutionary change could have revolutionary effects),³⁴ its

³² For the purposes of this thesis, the school of IW should be understood to include the literature on the RMA and MTR as well as information warfare per se.

³³ For further discussion of revolutions in military affairs, please see chapter two.

³⁴ Dunn, Martin. "RMA = Revolution in Military Acronyms? A Contrary View." Research and Analysis. Canberra, Australia: Australian Directorate of Army Research and Analysis Web page, March 1996. Lovelace, Douglas C., Jr. "The Evolution in Military Affairs: Shaping the Future US Armed Forces." Carlisle, PA: US Army War College Strategic Studies Institute Web page, 16 Jun 97.

members are unanimous in the belief that the shape of contemporary warfare results not from a sudden transformation in the fabric of war (or of society), but from a long, measured, and continuous process that has driven military progress throughout the modern age.³⁵

A related, and increasingly popular view offers still greater scepticism, questioning the validity of the assumptions upon which the views of the evolutionary, and particularly the revolutionary schools rest. Like the evolutionary school, this argument emphasises the continuity of warfare, noting that even change has been continuous, particularly during the 20th century. This third school, however, does not share the evolutionists' view that gradual change could also have significant effects. Rather, these sceptics see no great departure for warfare as a result of the information age, and caution against making more of current changes than they warrant.³⁶ In particular, subscribers to this school point out that the promises of modern military technology may not be fulfilled as enthusiasts expect. Many of these technologies still function far below the optimal levels projected for them. More significantly, they argue, many of these 'silver bullets' seem unlikely to prove useful at all in the conflicts the West is most likely to face - asymmetrical conflicts against non-peer competitors who avoid pitched battles and aim almost exclusively for their

³⁵ Cf. Biddle, Stephen. "The RMA and the Evidence." Institute for Defense Analyses. Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996. DiNardo and. Hughes. "Some Cautionary Thoughts on Information Warfare."

³⁶ Gray, Colin S. "The American Revolution in Military Affairs: An Interim Assessment." Camberley, England: Strategic and Combat Studies Institute, 1997. pp. 5-7, 33-34.

enemies' weaknesses.³⁷ These voices, however, are only some among the many who do see potential for significant military change in the information age.

However, even among those who agree that the information age seems to be introducing significant change to warfare, the case for IW is not particularly straightforward. In addition to the ongoing disagreement within the greater military community, the school of information warfare faces internal confusion exacerbated by the fact that two disparate and opposing sets of IW proponents have emerged in response to the Pentagon's signs of interest in the topic.³⁸ Each side champions the belief that information warfare presents the next great challenge for international security, yet they differ widely on how that challenge will manifest itself. The dissenting opinions fall loosely into two camps which can be characterised at opposite ends of the debate as narrow and wide views of information warfare.³⁹ This study's interpretation of information age war does not fit clearly into either camp, though it has drawn from both.

The narrow school - which includes such thinkers as Winn Schwartau and Roger Molander⁴⁰ - characterises information warfare primarily as attacks against the information infrastructure, as well as attacks directly on the

³⁷ Freedman, Lawrence. "The Revolution in Strategic Affairs." Adelphi Paper #318. London: Institute for International Strategic Studies, 1998. Matthews, Lloyd J., ed. "Challenging the United States Symmetrically and Asymmetrically: Can America be Defeated?" Carlisle, PA: US Army War College Strategic Studies Institute Web page, July 1998. It should be noted that this point is far from proven. In fact, Bennett, Twomey, and Treverton believe asymmetrical opponents are likely to exploit IAW strategies for their own gains. It seems unlikely, in this scenario, that information age militaries will be unable to develop information age defenses and counterattacks in answer to such strategies. See Bennett, Bruce W., Christopher Twomey, and Greg Treverton. "What are Asymmetric Strategies?" Santa Monica, CA: RAND, 1999.

³⁸ This conundrum exists without even taking into account the fact that there are still others who do not believe that war is significantly changing in the first place.

³⁹ Ronfeldt, David. Senior researcher, RAND Corporation. Interview with the author. 24 June 1997.

assumptions which that infrastructure upholds.⁴¹ This emphasis on infrastructure is the most prominent feature distinguishing the narrow interpretation of information warfare both from the interpretation presented here and from the rest of the school in general. A second distinguishing feature is the narrow school's position that IW is a war *on* information, as differentiated from the wide school's understanding of information warfare as a war with information, which will be elaborated below.⁴² Consequently, many of the narrow school's adherents champion the ideal of a future in which war will not necessarily be lethal. According to this view, information occupies its own realm - cyberspace - upon which the developed world has become so dependent that damage to this realm alone can be sufficient to coerce independent actors to bend to the will of another.

Among the myriad objections to the narrow school's argument⁴³ is the proposition that such infrastructure attacks can only be strategically significant when implemented in concert with other military operations. For example, the failure of a long-distance telephone system at the moment when a military force launches an air attack could indeed have a crucial impact on the outcome of a battle, whereas that failure by itself would likely cost only a few hours of inconvenience and confusion to repair.⁴⁴ Martin Libicki also offers a

⁴⁰ See also, Schwartau, Winn. Information Warfare. New York: Thunder's Mouth Press, 1994. and Molander, Roger. Strategic Information Warfare: A New Face of War. Santa Monica, CA: RAND, 1996.

⁴¹ The latter principally take the form of perception management efforts.

⁴² Libicki, Martin. National Defense University. Interview with the author. September 1997.

⁴³ For further arguments against this interpretation of information warfare, see also Freedman. Information Warfare: Will Battle Ever Be Joined?. Thompson, Mark. "If War Comes Home." Time. vol.146, n8. 21 Aug 95. p.2

⁴⁴ Cf. Freedman, Lawrence. Information Warfare: Will Battle Ever Be Joined?. London: International Centre for Security Analysis, October 1996. p.4 also Libicki in Morton,

compelling objection to the narrow school's emphasis on information infrastructure attack with his assertion that components of the information infrastructure will, in response to a credible threat, harden their security so rapidly that infrastructure attacks alone will be unable to have real strategic impact.⁴⁵ Yet despite widespread dissatisfaction with this narrow conception of IW, the narrow school has largely won claim to the term 'information warfare.' Their appropriation of the term is evident in the fact that, among the general public, the phrase 'information warfare' most typically evokes an image of the narrow school's information infrastructure attack-oriented interpretation of information age conflict.⁴⁶

Proponents of a wider interpretation of information warfare, on the other hand, have long held different ideas about what 'information warfare' means. As the narrow school's definition has taken over the popular understanding of IW, however, the wider school has largely abandoned efforts at changing the definition of the phrase 'information warfare.' Instead, many have begun to offer allegiance to other turns of phrase - from Information Operations to Information-Based Warfare to Conflict in the Information Age - in no small part to avoid confusion with ideas to which they do not subscribe.⁴⁷ The wide view,

Oliver. "The Information Advantage: Defence Technology Survey." *Economist*. v335, 10 Jun 95: 8-17. p.17

⁴⁵ Libicki. Interview with the author. Also Brown, Michael, (Senior Fellow, SAIC). Interview with the author. 16 Dec 1996.

⁴⁶ One might speculate that the appropriation of the term 'information warfare' by its narrow interpreters - a school with which even proponents of IW find considerable fault - has contributed to the widespread scepticism regarding the significance of information age changes in conflict.

⁴⁷ Or ideas which form only a part of the wide school's interpretation. Cf. Jeffrey Cooper, p.4. "...the multiplicity of legitimate perspectives suggests that we would perhaps be better adopting a different term than Information Warfare, one less burdened with baggage and confusion, with which to discuss this rich spectrum of diverse phenomena." Cooper, Jeffrey. "Understanding Information Warfare: Another View." Transcript of the Center for Information Strategy and Policy Inaugural Seminar. 30 Aug 95. In Arquilla, John and

a school which includes Jeffrey Cooper, Martin Libicki, Richard Szafranski, and the Tofflers,⁴⁸ considers IW (under its various new names) to comprise all elements of conflict which relate to information.⁴⁹ This interpretation espouses the idea that a Revolution in Military Affairs is at hand, and looks beyond information infrastructures to take into account all the innovations of the information revolution that affect war.

These include both improvements on old ways of operating, like enhanced communication capabilities, and introductions of utterly new tactics, like hacking false information into enemy targeting computers. Significantly, the wide school takes into account tangible products of the information age - e.g. Precision Guided Munitions (PGMs) or the Global Positioning System (GPS) - and intangible products like the rise of networked organisations. Attention to intangibles like organisation and doctrine is, in fact, a distinguishing feature of this school since, unlike their colleagues at the opposite end of the IW debate, members of the wide school acknowledge that the information age's impact on warfare goes beyond the mere introduction of new technology. To that end, the wide interpretation of information age conflict encompasses not only hacker attacks, electronic warfare, and physical destruction of information systems, but also the use of those information systems to enhance the capability to conduct intelligence, communications, command and control, targeting, logistics, and psychological warfare operations,

David Ronfeldt, eds. In Athena's Camp: Preparing for Conflict in the Information Age. Santa Monica, CA: Rand, 1998.

⁴⁸ See also Toffler, Alvin, and Heidi Toffler. War and Anti-War: Making Sense of Today's Global Chaos. Boston: Little Brown, 1993. Libicki. "What is Information Warfare?" Cooper. "Understanding Information Warfare." Szafranski, Col. Richard, USAF. "A Theory of Information Warfare: Preparing For 2020." Air University.

⁴⁹ Ronfeldt. Interview with the author.

as well as the organisational and doctrinal modifications necessary to exploit these new capabilities to their fullest.

In this respect, the view of information age war contained in the pages of this thesis could indeed be classed as a member of IW's wide school. Like the members of that school, the author contends that information age war will be distinguished as war *with* information, a form of conflict in which information is pivotal not simply as the target but also, indeed, primarily as the decisive tool with which military aims are achieved. The attentive reader may note that this interpretation carries with it not only a separate conception of information warfare but also a different understanding of the meaning of 'information' itself. Whereas 'information' in the narrow school's 'information warfare' refers primarily to the information infrastructure and the systems of information technologies which comprise it, the wide school's employment of the term 'information' (which here includes the present work) encompasses not only the physical technology, but also the know-how required to create the technology, and the information content made so much more accessible by this technology.⁵⁰

Yet the understanding of information age war in this study does not conform to the thinking of IW's wide school in all respects. This author agrees that the term 'information' should not be hijacked to refer only to information

⁵⁰ See also Arquilla, John and David Ronfeldt. Information, Power, and Grand Strategy: in Athena's Camp. Santa Monica, CA: RAND, 1995. Bially, Janice. Information: Conceptual Considerations for the Analysis of State Power. Santa Monica, CA: RAND, 1997. P-7998. Fogleman, Ronald R. And Sheila E. Widnall. Cornerstones of Information Warfare. Washington, DC: US Department of Defense, 1995. p.2-3. Paige. "Directive 3600.1 - Information Operations." While this distinction in the two schools' use of the term 'information' is not always so clear cut, the narrow school's emphasis on information technology over information is most readily evident in the school's focus on information infrastructure attack - attack which sometimes includes propaganda that exploits information (particularly in the use of 'netwar' - cf. Arquilla, John. The Advent of Netwar. Santa Monica, CA: RAND, 1996. And Arquilla, John, and David Ronfeldt. "Cyberwar Is

technology, and that the wide school has appropriately expanded the understanding of 'information warfare' beyond merely information infrastructure attacks. However, by including so much in their understanding of information warfare, members of the wide school have perhaps gone too far. Such statements as Oliver Morton's assertion that "all war is information war"⁵¹ highlight the principal flaw of IW's wide school: in attempting to encompass all forms of conflict which involve information, the wide interpretation of information warfare sheds little light on what is new and different about war in the information age.

The problem, as John Arquilla aptly notes, is that many contributors to the school say both too much and too little about what information warfare is:⁵² too much because members of the wide school tend to embrace every activity which attacks or defends information, and too little because they rarely stipulate how these activities rely on information. To be fair, the need to leverage information and information systems synergistically is increasingly becoming implicit in much of the wide school's literature. However, if information age war is to be understood as introducing profound changes to warfare, definitions of the phenomenon must offer distinct and explicit explanations of information's role in future wars. This is the wide school's principal failing, since many wide school writers leave readers for the most part to assume that some unspecified interaction between the innovations of the information revolution and the use of information in war has caused the emergence of

Coming!" Santa Monica, CA: RAND, 1992.), but most commonly targets information systems rather than information itself.

⁵¹ Morton, Oliver. "The Information Advantage: Defence Technology Survey." *Economist*. v335, 10 Jun 95: 8-18. p.18

'information warfare.'⁵³ The implication is simply that information has become vastly more crucial to wargaming since the information revolution's explosion of new information technologies. However, as chapter two discusses at length, soldiers have always depended on information, just as they have always enjoyed periodic advances in the tools of war. Thus, the wide school's treatment of IW offers meagre grounds for understanding information's present role in war, or the significance of the changes it may introduce to warfare. As a consequence, it has failed to build any meaningful consensus about the future of war.

This thesis aims at remedying that failing by specifically examining how the relationship between war and information has changed in the information age. It attempts to establish what is different about information's role in future war, and how these differences may affect the world's understanding about war. The following chapters also consider the nature of the change, seeking a resolution to the claims and counter-claims that information age war is a revolution or an evolution of war, a new paradigm or a meaningless justification for down-sizing. The ultimate goal is to establish whether the information age changes in war could mean new uses or aims for war, or even a new role for war in the international system. For if this is to be the case, an understanding of information age war is vital not only for those who wage war, but also for those whose lives and security may be shaped by war - that is, for the world in general.

⁵² Arquilla. Interview with the author. 21 Aug 97.

⁵³ Notable exceptions include Owens. The Emerging U.S. System-of-Systems. And Cooper, Jeffrey. "Dominant Battlespace Awareness and Future Warfare." in Johnson, Stuart, and Martin Libicki, eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University Web Page, 1996 Also, Mazarr, Michael J., Don M. Snider, and James A. Blackwell, Jr. Desert Storm: the Gulf War and What We Learned. Boulder: Westview

Paradigm Shift

The vehicle to this understanding is an inquiry into what kind of change the information age will introduce in the first place. Throughout the course of the information warfare debate, several phrases have been employed to label the information age's transformation of war, ranging in tone according to the image of change they intend to convey. The most conservative of these is the description of IW as the product of 'evolution,' used by those who argue that the current changes represent a simple continuation of the many incremental shifts which have affected war throughout history. This incremental view will be refuted in chapter two. Contradicting the evolution label, the term revolution,⁵⁴ used to describe a sudden, radical shift, is the most common of the change descriptors. The popularity of the term is testimony to the fact that it has a certain utility, particularly to the extent that it can be compared to a political revolution, which carries the sense of replacing inadequate methods with newer ones.⁵⁵ However, as chapter two demonstrates, the concept of a 'revolution' in warfare is widely understood to refer to a particular phenomenon of change,⁵⁶ one which does not by itself account for the full transformation IAW may entail. The most extreme of the terms applied to the emergence of information age war describes the changes in warfare as a 'paradigm shift.' In the information warfare literature, this term carries the sense of a transformation both more far-

Press, 1993. p.99, Although the synergy spoken of here does not explicitly apply beyond the battlefield.

⁵⁴ Often applied as part of Revolution in Military Affairs (RMA), Revolution in Political and Military Affairs (RPMA), Military Technology Revolution, or simply military revolution.

⁵⁵ Kuhn, Thomas. "The Structure of Scientific Revolutions." International Encyclopedia of Unified Science. Vol2, n2. Ed.2. Chicago: University of Chicago Press, 1970. p.92

reaching and more fundamental than the other terms imply. It is this classification of the significance of the information age war transformation that is under investigation in this thesis.

The present study, in fact, began as an attempt to prove that information age war constitutes a paradigm shift in warfare. The author chose this controversial proposition in no small part because the assertion that IAW will constitute a new paradigm of war represents the most radical claim about the information revolution's effect on warfare. Proving or disproving the appropriateness of the paradigm shift label is therefore a tempting goal because it seems to promise a greater contribution to the study of war, and to the understanding of the information age's effect on warfare. A still greater influence on the decision to study the paradigm shift argument, however, arises from the observation that certain factors in information age society and in the practice of war seem to point to the likelihood of such a fundamental transformation of war. As the following pages will explain, circumstances from the coalition's stunning victory in the Gulf War to the information revolution and its parallels to the industrial revolution seem to signify that the information age holds the potential to profoundly alter conventional conceptions of war.⁵⁷ These clues provide a strong inducement to investigate the many claims that information age war is a paradigm shift in warfare.

That investigation, however, presents a peculiar challenge: not only do participants in the information warfare debate lack consensus on the definition of their subject, they have also been unable to formulate a generally accepted

⁵⁶ See chapter two.

⁵⁷ See pp.29, 36

classification for the changes that subject embodies. In fact, although many writers have toyed with the claim that information age war represents a paradigm shift,⁵⁸ not a single author in the information warfare field has presented answers to such elemental questions as: What is a paradigm? What, then, is a paradigm shift? What are the criteria used to ascertain that such a transformation is taking place? Does information age war fulfil them? In fact, the field is so far from finding answers that to date no one has even *asked* these questions in print.

As a result, the author has turned to a treatment of paradigms outside the information warfare debate - outside, even, the canon of international relations - in the field of the history of science, namely Thomas Kuhn's *The Structure of Scientific Revolutions*.⁵⁹ Kuhn's efforts to explain radical shifts in science are particularly relevant to the present investigation of information age war, for science, like war, is defined by the beliefs, methods, and tools of its practitioners. Hence, radical shifts in the understanding of the scientific field do much to illuminate the same phenomena in the realm of war.

The term 'paradigm' plays a pivotal role in this illumination, as Kuhn uses it to label that which is overthrown in the course of a revolution.⁶⁰ A paradigm, in war as in science, describes the model used to understand the basic principles of the discipline. Paradigms set the standard for what can be

⁵⁸ Cf. Munro, Neil. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." *Washington Post*. 16 Jul 95. p.2, Lider, Julian. *Military Theory: Concept, Structure, Problems*. Aldershot, Hants: Gower Publishing Co. Ltd., 1983. p.67 James. "Information Warfare: A Phenomenon, an Innovation, or a New Paradigm?" As implied by his title, Lieut. James goes farthest toward investigating the idea of paradigm shift, but even this auspiciously titled paper never rigorously addresses what a paradigm of war is.

⁵⁹ Kuhn, Thomas. *The Structure of Scientific Revolutions*. 1970.

considered a relevant component of the discipline, as well as for what its behaviour is predicted to be.⁶¹ Kuhn identifies a scientific community's paradigms as the set of "recurrent and quasi-standard illustrations" of its various theories as they are applied conceptually, observationally, and instrumentally.⁶² That is, the paradigm explains why - for instance - light refracts, why refraction appears as it does to the human eye, and how we construe refraction as one of the characteristic behaviours of light. Likewise, a paradigm of war is the military community's set of standard principles that explain various doctrines as they are applied to strategy, operations, and tactics. The paradigm explains why a mobile strike of industrialised forces should prevail over cavalry with swords and shields, how that victory will manifest itself, and why this illustrates inherent advantages of industrialised forces over less advanced militaries.

However, it should be emphasised that while paradigms are models to explain and predict how the world should work, they do not dictate rules for proving said predictions. Kuhn stresses that the making of rules requires a step beyond that of establishing a paradigm. Rules, in fact, are "isolable elements abstracted" from paradigms in the attempt to define something more concretely than a paradigm itself can.⁶³ Yet, the very fact that rules classify a phenomenon more rigidly signifies that fewer practitioners will be able to agree with and subscribe to any given set. Thus Kuhn asserts that paradigms are "prior to, more binding, and more complete than any set of rules for research that could be

⁶⁰ It should be noted that the term 'paradigm shift' will be used here in place of Kuhn's 'revolution,' largely for the reason, stated above, that the term 'revolution' has already been appropriated to refer to a different sort of change in the military realm.

⁶¹ Kuhn. The Structure of Scientific Revolutions. p.103

⁶² *Ibid.*, p.43 Cf. Kuhn's textbooks, lectures, and laboratory exercises with military doctrine, training methods, and field operations

⁶³ *Ibid.*, p.43,47

unequivocally abstracted from them,” and as such they are the more appropriate unit for the investigation of change.⁶⁴

What, then, constitutes paradigmatic change? A paradigm shift occurs when an established model for understanding the world becomes unable to explain the realm it once defined. This state of affairs renders an old paradigm inadequate and often irrelevant, and necessitates that a new standard model be found.⁶⁵ Such shifts most commonly occur in response to the appearance of a factor which is both so anomalous that the existing paradigm cannot account for it, and so significant that it cannot remain unexplained. The coalition’s easy victory over Iraq in the 1991 Gulf War is a classic example of such a paradigm-challenging factor. In January 1991, Iraq’s army was the fourth largest in the world; after years of war with Iran its soldiers were exhausted, but also thoroughly trained and experienced.⁶⁶ Every industrial age understanding of war pointed to a very difficult war between Iraq and the coalition. Instead, the US-led forces drove Saddam’s troops back to Iraq after an air war of 40 days and a ground war that lasted a scant 100 hours.⁶⁷ Military models based on the industrial age understanding of war could not readily account for the ease of the victory, in part because the coalition utterly overwhelmed the Iraqis with quick, precise operations, relying on an efficiency of action which defied the traditional conception of war as an effort requiring a totality of mass. As a consequence,

⁶⁴ Ibid., p.46

⁶⁵ Ibid., p.23

⁶⁶ Hauss, Charles. *Beyond Confrontation: Transforming the New World Order*. Westport, CT: Praeger, 1996. p.27 This experience, while not up to the standards of the US, Britain, or many of their Western allies, was still expected to make the Iraqis more formidable enemies than they turned out to be in 1991. Of course, one must also take into account that experience can act against an army if it is experienced in fighting the wrong sort of war, as proved to be the case for the Iraqis in the Gulf War.

although the Gulf War did not yet represent a new paradigm of war, it certainly did not fit the old paradigm as it was expected to. This discordance has necessitated a reassessment of the old models for understanding war, sparking a flood of interest in revising old models and devising new ones to explain the information age's impact on warfare.⁶⁸

It is worth noting, though, that significant anomalies such as the Gulf War's easy victory may result from either revolutionary or evolutionary factors. Paradigm shifts may occur in reaction to the sudden introduction of something utterly new and revolutionary which shakes the very foundations of a model. Alternatively, they may also result from the gradual emergence of inexplicable deviations from the paradigm's predictions which accumulate over time until an incremental tilt of the balance finally challenges the coherence of the entire paradigm. Regardless of what sort of changes induce paradigm shifts, however, these shifts invariably produce revolutionary effects. As Kuhn himself asserts, the assimilation of a new theory always "requires the reconstruction of prior theory and the re-evaluation of prior fact, an intrinsically revolutionary process."⁶⁹ By definition, a paradigm shift necessitates the revolutionary transformation of a practitioner's view of the world because it requires him to abjure his former model of explaining that world and how it functions.

⁶⁷ Taylor, Philip M. War and the Media: Propaganda and Persuasion in the Gulf War. Manchester: Manchester University Press, 1992. p.152, 324

⁶⁸ In fact, the Pentagon ordered the first study of 'information warfare' in response to the paradigmatic anomalies that the Gulf War brought to the fore. Cf. Tyrrell, Patrick, OBE, Capt, Royal Navy. "Information Integrity: the Challenge of Cyberspace." Royal College of Defense Studies, 1996. p. 19, also Cohen, Eliot. "A Revolution in Warfare." Foreign Affairs. Vol75, n2: 37-54. p.39

⁶⁹ Kuhn. The Structure of Scientific Revolutions. p.7 By way of illustration, Kuhn points out that the discovery of oxygen did not simply add one additional element to the world, but required scientists to rethink experimental procedures, conceptions of molecular constituency, and other basic assumptions.

In light of the fact that paradigm shifts typically require scholars to change the assumptions on which they may base their life's work, it is not surprising that these sea-changes usually meet with considerable resistance. Where a discipline lacks a paradigm, such resistance can be sustained in debate and competition with other contending theories. Once a standard of understanding is established, however, resistance fades away. This occurs because the establishment of a paradigm in the first place rests on the consensus of its partisans that said paradigm is able to explain the principles of the field better than other available models. Once an area of inquiry has reached this 'mature' stage,⁷⁰ theories that do not conform to the paradigm and do not surpass the paradigm's ability to explain the field are simply rejected as irrelevant. Seen to offer no contribution to the understanding of the discipline, such ex-paradigm ideas are gradually "read out of the discipline."⁷¹

Therefore, when debate and resistance return to a mature field, it is normally a sign that some development has challenged the paradigm's utility as a model for understanding. This resurgence of debate is the first indicator that a paradigm shift may be at hand. The present proliferation of plausible explanations of information age war thus indeed seems a telltale sign that the current changes may represent a paradigm shift. If there were a sense that some universally acceptable model (either old or new) could account for information age war - as military revolutions such as nuclear deterrence, blitzkrieg, and even Air Land Battle are accounted for - then there would be no such multiplicity of

⁷⁰ At which point, Kuhn argues, it may first be termed a distinct 'discipline' or 'field.' Kuhn. The Structure of Scientific Revolutions. p.22

⁷¹ Kuhn. The Structure of Scientific Revolutions. p.19

widely-supported opinions.⁷² While it is plausible to expect some dissenting opinions within any field, the wide-spread support for these varied theories, and the utter lack of consensus about them, point to the conclusion that there is - at this stage at least - no model which can be said to explain the current developments in war better than any other contender. This is becoming an increasingly unavoidable indicator that military thinkers must either find some way to reconcile the new developments to the old ways of understanding war, or they must prepare to accept and work with a new paradigm of warfare.

Of these two prospects, investigation of the latter is at first glance the more compelling. If proven, a paradigm shift of war would be a radical new development in strategic studies, and thus also a fascinating subject of study. More prosaically, investigation of this proposition is enticing because several signs indicate that information age war might indeed constitute a paradigm shift. The most telling of these indications is the fact that old ways of explaining war are failing not only in theory - as evidenced by the debate discussed above - but also in deed. Although no true information age war has yet occurred to provide empirical evidence of a paradigm shift, as previously argued the Gulf War offers significant testimony to the inability of the old paradigm, under its present interpretation, to account for new information age developments. The failure of the industrial age military paradigm adequately to predict - and, especially, to explain afterwards - the routing of Saddam's not inconsiderable military forces

⁷² While it is plausible to expect some dissenting opinions, the wide-spread support for these varied opinions, and the utter lack of consensus point to the conclusion that there is at this point no model which can be said to explain the current developments in war better than any other contender.

is a conspicuous sign that the paradigm itself may be failing, and might soon give way to a new model of understanding.

Understanding Paradigm Shift in Context

Anomalies that challenge an old paradigm's power of explanation do not, however, constitute grounds for declaring a paradigm shift in and of themselves. There must also be some reason to believe that such a profound change could occur now, some cause capable of transforming the way the world understands war. Yet the roots of such a fundamental shift in warfare must certainly lie deeper than the simple introduction of new ways of doing things, deeper than the innovation of new weapons and other tools for the war machine. Such changes have occurred countless times and are most commonly accommodated within the framework of existing paradigms,⁷³ whereas the overthrow of a paradigm is a truly rare occasion. In fact, such a profound transformation occurs only when it becomes clear that established military wisdom is unable to account not simply for changes in the methods of warfighting, but for more fundamental changes in the very principles governing warfare.

One might ask then, if the logical sources of change in war - the introduction of new weapons and/or new methods - do not account for paradigm shift, what could possibly affect war so deeply as to alter the very principles of war? And why might one suspect that such a transformation could be occurring now? The answer, this thesis argues, is not one sought by most theorists of military change, for the source of such fundamental shifts in the understanding

⁷³ See chapter two, particularly the sections 'Historical Manifestations of Information Warfare' and 'Military Revolution.'

of war lies outside war itself. It is, instead, rooted in the context within which war occurs.

Military paradigm shifts occur as the result of extensive and profound societal transformation. Context is a crucial barometer of this phenomenon, because such a transformation affects not only the power contests of warfare, but all of the relationships that hold a civilisation together. Thus, the phenomenon that requires the paradigm for understanding war to be rewritten also alters the stage upon which war is played. That stage, moreover, has historically begun to change before the new script for war first emerges - a fact evidenced by the advent of the industrial revolution and its subsequent effect on warfare.⁷⁴ For these reasons, extensive shifts in the context of war constitute a powerful foreshadowing that a similar transformation in the content of war may follow.

This assessment of context's role in understanding military paradigm shift draws heavily on the work of Alvin and Heidi Toffler. The Tofflers, futurists, social theorists, and self-described 'post-Marxists,' began writing about the rise of the information age in the late 1960s. They first achieved real fame, though, when they captured the imagination of the US military⁷⁵ with 1993's *War and Anti-War*. So enthralled were elements of the military with the Tofflers ideas that works as significant as the Army Focus 94: Force XXI doctrine position paper trace a direct and evident influence back to the book.⁷⁶ This heyday, however, was short-lived. Critics of the Tofflers quickly proliferated, citing

⁷⁴ Similar parallels between the industrial age and the information age will provide significant illustrations throughout the thesis.

their irrationalism, their blatant lack of familiarity with subjects as fundamental to the books as military history, and, above all, their general lack of rigour.⁷⁷ Almost as quickly as they had risen to prominence, the Tofflers fell out of favour.

Despite the many and valid criticisms of their work, however, the Tofflers' ideas have left a lingering impression on the field of information warfare studies. They may have taken their enthusiasm for the Third Wave too far (and their research not far enough), but the Tofflers broke valuable ground with their books and, perhaps most importantly, they popularised a vocabulary and methodology⁷⁸ for thinking about the information age that still holds currency today.⁷⁹ For this reason, it is still useful to understand the Tofflerian thinking about information age context and its role in understanding the potential for military paradigm shift.

According to the Tofflers and their proponents, the cause for believing a change as profound as a paradigm shift might be occurring now is the societal transformation sparked by the information revolution. The hallmarks of the resultant information age constitute the changes in context that lead one to

⁷⁵ Newt Gingrich is also a noted long-time fan. Judis, John B. "Newt's Not-So-Weird Gurus." The New Republic. Vol213, 1995: 16-18. Gingrich, Newt. To Renew America. New York: Harper Collins Publishers, 1995. p.52

⁷⁶ DiNardo and. Hughes. "Some Cautionary Thoughts on Information Warfare." p.2

⁷⁷ DiNardo and. Hughes. "Some Cautionary Thoughts on Information Warfare." p. 2 Cohen, Eliot A. "War and Anti-War Book Review." Foreign Affairs. Vol73, n3. May-June 1994. p.156. Jablonsky, David. "The Owl of Minerva Flies at Twilight: Doctrinal Chance and Continuity and the Revolution in Military Affairs." Carlisle, PA: US Army War College Web page, May 1994. pp.7-10.

⁷⁸ Mayfield, Terry; Senior Fellow, IDA. Interview with the author. 17 December 1996. Judis. "Newt's Not-So-Weird Gurus." p.16

⁷⁹ Cf. Security Policy Board. "White Paper on Information Infrastructure Assurance." Federation of American Scientists, Project on Government Secrecy. Dec 95. p.7, Jensen, Owen. "Information Warfare: Principles of Third-Wave War." Airpower Journal. vol. 8. 1 Jan 94: 35-44. p.35, Szafranski, Col. Richard, USAF. "A Theory of Information Warfare:

suspect that information age war may require a new paradigm for understanding warfare. Since the information revolution and its impact on the context of warfare will be treated in depth in the first chapter, suffice it to say here that, unlike that of its military progeny, the significance of the information revolution is a subject of relatively little debate. Evidence of its profound impact is everywhere one turns: in the speed with which long-distance telephones make it possible to speak to someone on the other side of the world, the wealth of information available on the internet, the accessibility of political leaders via e-mail, the competitive edge of corporations which integrate the advantages of information management, the education potentials of multi-media and of long-distance collaboration, the vast sums of money transferred electronically, and even in the danger of crippling vulnerability should we lose the information systems that support all of these transactions on which we have come to depend so much.

The pervasiveness of these changes arises from the fact that the information revolution not only alters technology and its uses, but in so doing, it is shifting the configuration of power.⁸⁰ While information has always been an important component of power (indeed, Francis Bacon asserted that “knowledge is power” over three hundred years ago) it is becoming exponentially more important in the information age. Information technologies now enable people to direct the collection, management, and use of information with high precision, allowing the information-savvy to create advantages on the basis of

Preparing For 2020.” Air University Web page, 1995. p.2, Burton, Daniel F., Jr. “The Brave New Wired World.” *Foreign Policy*. No 106, Spring 1997: 23-38. p.23.

⁸⁰ Cf. Fast, William R. Lt. Col. “Knowledge Strategies: Balancing Ends, Ways, and Means in the Information Age.” National Defense University Sun Tzu Art of War in Information

information with unprecedented reliability. As a result, access to and control over information is increasingly playing a much more regularised role in the accrual of power.⁸¹

Again, examples from everyday life in the information age provide the best illustration of information's power. The economic realm furnishes an optimal source for such testimony, since it is here that the methods of the information age have become most entrenched. Consider that a company can use such information technologies as computer-assisted design and manufacturing (CAD-CAM) to plan precisely what resources and tools it needs to produce a good or service; this should allow the company to purchase only those resources it requires, which costs less than stocking surpluses for contingencies. If the company then moves from this planning stage to a production system which integrates information management to insure that all systems operate in optimal co-ordination, the company should be able function on a production cycle⁸² considerably faster than that of its competitors. Such an abbreviation of production time confers a natural advantage on the open market.⁸³

Moreover, if the company then employs computer tracking (such as bar codes, for example) in its inventory management, it can carefully monitor its

Warfare Prize. Washington, DC: National Defense University Press, 1997. p.3, Levi, Werner. The Coming End of War. Beverly Hills, CA: Sage Publications, 1981. p.90

⁸¹ Fogleman, Ronald R. Gen., Chief of Staff, USAF. Horizon. Washington, DC: US Air Force Web page, August 1995. p.1, Nye, Joseph S. Bound to Lead: the Changing Nature of American Power. New York: Basic Books, 1991. p.196

⁸² The period of time required to create a finished product from a prototype.

⁸³ Cf. also Herrera, Geoffrey L. "New Information Technologies and the Future of State Security." Monterey, CA: Proceedings of the Security Studies Conference on Revolutions in Military Affairs, Naval Post-graduate School, August 1996. p.14 Cf. also Nichiporuk, Brian and Carl Builder. Information Technologies and the Future of Land Warfare. Santa Monica, CA: RAND, 1995. p.22

supply of goods, which ought to cut down on the need to maintain stockpiles for contingencies and drastically reduce inventory wasted through misplacement. The same system can also enable the company to track customer demand for particular products, which can help it tailor supply patterns to reduce waste further. In this way information can replace both monetary and physical resources to a significant extent by enabling a company to produce goods cheaper, faster, and more easily than it could have before the information revolution.⁸⁴ If the company also combines these advantages of efficiency with information-intensive marketing techniques, its market edge may become still more difficult to surpass. Vast computer data-bases of consumer preferences and buying practices should allow companies to custom-design advertising and target their markets where they will reach the most consumers with a demand for their product. Using this information, a company may be able to increase its market share - even if it does not increase its supply of its product - simply by insuring that the customers who would want their product have access to it.

Such grand-scale leveraging of information technologies represents a distinctly new way of creating economic advantage. Any competitor who does not employ information as well - or does not rely on information at all - is likely to be simply unable to match the pace, the targeting, the cost, or the level of resource-reliance of a leading information age company. Moreover, each additional information technology the latter employs serves to multiply further the company's benefits from information integration, a factor which could propel fully information age companies not geometrically, but exponentially

⁸⁴ Fast. "Knowledge Strategies." p.7. and Drucker, Peter F. "The Economy's Power Shift." Wall Street Journal. 24 Sept 92: A16.

ahead of their less advanced competition. With this decisive advantage over the competition, the more successfully information age-integrated companies gain the means of influencing the market in which they compete. That influence represents a new form of power of which information is a calculated, critical, and decisive component.

As the information age progresses and permeates successive areas of life, information's pivotal role in power will likely extend beyond the economic realm to affect all forms of power relationships. The Tofflers have been prominent among those who argue that this expansion can be predicted with reasonable certainty on the model of historical example.⁸⁵ When the industrial revolution began to transform the agricultural age into the industrial age, its first effects were also felt in the economy. Just as information age technologies now render physical resources less important to manufacturing by making production cheaper, faster, and easier, so industrial machines introduced by the industrial revolution diminished the importance of land by increasing the speed, ease, and quantity of food that could be produced on each unit of land.⁸⁶ As a consequence, economic power shifted from those who had land to those who possessed the modes of production.⁸⁷ Moreover, political power also gradually shifted from the landed aristocracy to the merchant class as land (and the amount of crops and vassals it could support) declined as a source of influence. Social relationships likewise changed as nuclear families more easily

⁸⁵ Cf. especially Toffler, Alvin. The Third Wave. New York: Bantam, 1980.

⁸⁶ Peter Drucker predicts that, by 2010, the proportion of the labour force in blue collar work will equal that in agricultural work. This prediction rests on the assumption that the rising significance of knowledge workers will largely replace the importance of industrial workers, just as the latter once supplanted the primary role of agricultural workers. Coates, Joseph F. and Jennifer Jarratt. What Futurists Believe. Mt Airy, MD: Lomond Publications, 1989. p. 139.

maintained in urban life - where many jobs were in factories - replaced the multi-generational families that had dominated society when more family members meant more hands to work the land. Signs that the information revolution will have similarly pervasive effects are discussed at length in chapter one.

The historical parallel between the impact of the information revolution and that of the industrial revolution supports the argument that the effect of such profound societal transformations on the context of war is a prelude for their effect on war itself. The industrial revolution not only industrialised economic, political, and social power relationships, but by introducing mechanised warfare, it industrialised military power as well. This is a logical progression, for if the hallmark of such extensive social transformations is the fact that they alter the configuration of power, they must necessarily affect war, since war represents the supreme contest for power. The argument for understanding IAW's claims to the title of military paradigm shift through the contextual changes of the information age will be the subject of chapter two.

With the establishment of the understanding that war's context is currently in transformation, and that this transformation signifies the possibility of a similarly significant transformation in warfare, the bulk of the remaining chapters focus on determining whether or not information age war actually will fulfil the multiplying expectations for a new paradigm of war. Each chapter deals with a separate barometer of paradigm shift, investigating the extent to which IAW satisfies the various criteria that delineate the significance of the current transformation. These criteria entail fundamental shifts in the standards

⁸⁷ Toffler and Toffler. War and Anti-War. Ch. 3

for how wars proceed, at what and where war is directed, who can and will wage war, and why wars are waged. They have been chosen as the most salient measurements of military paradigm shift because changes in each of these may affect not only the waging of war, but the way in which the world understands war. The study of information age war's potential to bring such changes should therefore illuminate whether the information age's influence on warfare necessitates the establishment of a new model for explaining war.

The Interplay of Context and Content

The ultimate significance of this investigation into the possibility of an information age military paradigm shift, however, lies beyond a mere academic interest in the models for explaining warfare. It lies beyond curiosity in the information revolution's parallels to previous paradigmatic shifts, and beyond the desire to prove the most radical claims about IAW's significance as well. Rather, the real significance of the investigation lies in the fact that, if a paradigm shift truly is occurring, the world would need to revise the way it thinks not only about war, but also about how war affects the world. New principles of warfare might mean that war in the information age would have a different role in the international system, a new position among the interactions between states, and new implications for the involvement of individuals. These wider effects of paradigm shift result from a second link between the content and context of warfare: changes in the context of warfare not only illuminate paradigmatic changes in war's content, but also result from these very content shifts. The link between context and content is therefore neither strictly parallel nor strictly causal, but rather an interplay of both.

On the one hand, changes in the context of warfare are the first indication of the emergence of a societal transformation radical enough to alter the models for understanding warfare. Such contextual changes result directly from the societal transformation itself, and both forecast the character of a coming military paradigm shift, as well as influence the manner in which that paradigm shift manifests itself. For example, the industrial revolution produced an industrial age that revolved around mechanisation and massed resources; looking at history with the benefit of hindsight, the introduction of this age also foreshadowed the rise of mechanised warfare centred on attrition of numbers. Moreover, the existence of mechanisation and the emphasis it created on mass allowed the industrial age war form to leverage mass-produced mechanical tools of war, for without the factories and the transferral of power to those who controlled the means of mass production, industrial age war could not have emerged as it did.

On the other hand, in cases of paradigm shift some changes in the context of warfare result from the very content changes first foreshadowed by shifts in context. As direct products of the new content of warfare, such contextual changes are indirect products of societal transformation, and represent a further shift in context beyond that which first forecasted the military paradigm shift. To expand on the above assertion, consider the fact that industrial warfare led to the emergence of total war, which changed the way states viewed war as a tool of politics. The devastation of the world wars created a fear of war which led first to the policy of appeasing Hitler - designed to avoid a return to war after World War I - and later to the centrality of nuclear deterrence, a strategy in which the main purpose of the superpowers' most

devastating arsenals was to insure that war never erupted. This fear of the totality of industrial age war, and the accompanying reluctance to use war as a tool for shaping the anarchical affairs of the international system, lay behind the Kellogg-Briand Pact, the League of Nations Charter, and the United Nations Charter, all of which were state-sanctioned attempts to outlaw war (to one extent or another) for the first time in history. By introducing such levels of devastation to warfare, industrial age war not only altered war, it influenced the system in which such war was waged.

In this manner a paradigm shift in the content of warfare represents not only the culmination of changes in war's context, but also the source of further contextual change. This interlinked relationship between the context and content of war is perhaps the most urgent reason for studying the information age's potential to produce a military paradigm shift. Because, if the information age war form truly does alter the way the world understands war, it may also change the way the world uses war, as well as the way war affects the world - consequences which strategists and scholars alike should recognise and prepare for before launching such a war. This is a theme hinted at throughout the body of the thesis, but it will be dealt with most directly in the seventh, and concluding, chapter.

A Word about Format

Chapter one is concerned particularly with the context of information age war. The chapter examines what the information revolution is, and how it has already begun to affect developed societies, especially with respect to the roles of man (individuals) and the state in those societies. Chapter two

examines the reasons for studying the information age military paradigm shift argument through the lens of context. The chapter investigates two of the arguments most commonly used to explain the emergence of IAW - the claims that information age war is an extension of information's historical role in war, and that the war form is a revolution in military affairs - and determines that both fail to account for the myriad assertions of IAW's significance. The contextual reading of the paradigmatic shift offered in this chapter attempts to provide a more appropriate foundation for the further investigation of these claims.

Chapters three through six consider in greater detail whether or not today's profound contextual changes really do point to a paradigm shift of war in the information age. Each chapter deals with one of the barometers of paradigm shift: changes in the how, what, who, and why of warfare. Chapter three investigates how information age war will likely be waged, detailing how the means of war seem to have taken on a new imperative for efficiency. Under this imperative, the speed and accuracy of military action provide the key to victory. Chapter four discusses what information age war may target, arguing that a new 'civilianisation' of war is at hand. This phenomenon may increasingly blur the distinction between civilian and military both in the tools and the targeting of information age war.

Chapter five deals with why information age war will be waged, examining the manner in which changes in how war is waged may further affect the choice to wage IAW, and the reasons why actors might make that choice. This chapter also addresses whether information age shifts in the context of war will affect the motivations and objectives over which actors wage war, and

considers the extent to which new actors could introduce new objectives for war in the information age. Chapter six looks at who can wage war in the information age, examining IAW's dual widening and weakening influences on the two principal sets of actors in war: states and non-state actors. Information age war's paradoxical influence on these actors comes closest to fulfilling the criterion for paradigm shift because, by shifting the balance of relative military advantage between states and non-state actors, this widening and weakening effect holds the potential to alter the conventional perception of who can wage war. The seventh, and final, chapter discusses the thesis's conclusions. It assesses whether or not information age war fulfils the criteria for paradigm shift, and what this means for the way the world understands war. After identifying how IAW is likely to change war, the concluding chapter also examines the implications of this change for man, the state, and the international system, and discusses directions for future research to deepen our understanding of information age war and its consequences.

Chapter 1

CONTEXT: Man, the State, and the Information Revolution

This is the dawn of the information age. Compared to the continuing confusion over the nature and impact of information age war, relative consensus exists about the significance of the information age itself.¹ The information revolution drives the emergence of this age with the introduction of new information technologies, as well as new methods and organisational forms designed to exploit the advantages of these technologies to the utmost.² Such innovations have already clearly begun to induce profound changes in business, education, government, and even society in general. Yet the effect of the information revolution on war remains considerably more ambiguous. This dissertation aims to address that ambiguity and to elucidate not only what information age war is, but how it differs from previous manifestations of war as a result of the information age's influence.

Before one can even begin to investigate how the information age will affect war, however, one must first establish an understanding of the information revolution, since it is the vehicle of all information age change. To that end, this chapter will examine the information revolution both as a general

¹ This comparative agreement owes primarily to the existence of tangible and increasingly measurable evidence that attests to the emergence of this age and hints, at least, to the significance of its eventual impact. Cf. Drucker, Peter. The Frontiers of Management. New York: Dutton, 1986. Bell, Daniel. The Coming of Post-Industrial Society: A Venture in Social Forecasting. New York: Basic Books, 1973, Freedman, Lawrence. Information Warfare: Will Battle Ever Be Joined?. London: International Centre for Security Analysis, October 1996. p.2 (Freedman is himself an IW sceptic), Bankes, Steve, & Carl Builder. "Seizing the Moment: Harnessing the Information Technologies." The Information Society. Vol8, 1992: 1-59. p7, Szafranski, Col. Richard, USAF. "A Theory of Information Warfare: Preparing For 2020." Air University. p.3, Wriston, Walter B. "Technology and Sovereignty." Foreign Affairs. Vol 67, n2, 1988-89: 63-75. p.65, and Jensen, Owen. "Information Warfare: Principles of Third-Wave War." Airpower Journal. vol. 8. 1 Jan 94: 35-44. p.2

transformative force, and as a specific influence on the shifting roles of 'man' (i.e. the individual) and the state in the coming age. These two elements play a crucial part in the prelude to understanding how the information revolution will affect war for two reasons. First, as relatively obvious and concrete examples of the information revolution's transformative potential, the prospective shifts in the status of man and the state are useful because they provide readily grasped evidence of the information age's impact on the world. More importantly, man and the state, with the international war system itself, form the three levels at which social scientists - most famously Kenneth Waltz - commonly locate the causes of war.³ These three levels of analysis thus form the most relevant context of warfare. That context, as the introduction notes, plays a vital role in understanding changes in war itself, since the concept of information age military paradigm shift under consideration in the following chapters draws close links between the context and the content of war.⁴ Comprehending shifts in the context of war, therefore, is in its own right a necessary prerequisite for understanding information age war and the nature of its changes.

² Ronfeldt, David F. "Cyberocracy Is Coming." Information Society. Vol8: 243-296, 1992. Santa Monica, CA: RAND Reprints, 1996. p.245

³ Cf. Waltz, Kenneth N. Man, the State, and War: A Theoretical Analysis. New York, Columbia University Press, 1954. Also Rapoport, Anatol. The Origins of Violence: Approaches to the Study of Conflict. New York: Paragon House, 1989. Brodie, Bernard. War and Politics. New York: Macmillan Publishing Co., Inc., 1973. Brown, Seyom. The Causes and Prevention of War. New York: St Martin's Press, 1994.

⁴ See also this chapter's section on the context of IAW, particularly p.47, and chapter two's section "Taking IAW in Context."

The Information Revolution

What is the information revolution, that it is capable of introducing a new era? In its modern incarnation,⁵ the term 'information revolution' encompasses the explosion of information technologies (or ITs) over the course of the last several decades. The phrase most commonly refers to the recent advances in computing and network capabilities which have yielded such impressive developments as: the proliferation of personal computing, the increasing miniaturisation and sophistication of processing capabilities, the improvement of random-access memory capacity and modem baud rates, as well as the introduction of new developments like cd-rom information storage and retrieval, electronic mail and, particularly, the internet. In addition, the information revolution also incorporates such inventions as mobile telephony, facsimile machines, direct broadcast satellite communications, and even video recording, which involve the collection, storage, and/or transfer of information though they do not strictly fall under the rubric of computing or networking technology.

The information revolution is not, however, only a technological phenomenon: Webster defines "revolution" as "a sudden, radical, or complete change."⁶ The information revolution is so named not simply because it introduces radically different technologies, but because the influx of these technologies dramatically alters the way the world uses information, and what

⁵ The introduction of phonetic writing systems and of the printing press were themselves also 'information revolutions,' but only the modern information revolution will be under discussion here. For discussion of earlier information revolutions, cf. Dewar, James A. The Information Age and the Printing Press: Looking Backward to See Ahead. Santa Monica, CA: RAND, 1997. Eisenstein, Elizabeth L. The Printing Press as an Agent of Change. New York: Cambridge University Press. 1979. Beniger, James R. The Control Revolution: Technological and Economic Origins of the Information Society. Cambridge, MA: Harvard University Press, 1986. p.2.

people use information for.⁷ The revolution's innovations in information technology make more information available more quickly and easily than ever before, a trend which is encouraging people to rely on information in entirely new ways. From the use of computer integrated manufacturing to speed and streamline production, to the leveraging of networked databases cataloguing consumer preference to heighten the effectiveness of advertising campaigns, to the employment of Global Positioning System satellites to maximise the military's operational effectiveness, members of information age societies have already begun to depend on information-based advantages across many diverse areas of human activity. This revolutionary reliance on information will culminate ultimately in the revolution's most radical change of all: a shift in the recipe for power which renders information the most important ingredient in the equation.

In the information age, Francis Bacon's adage that "knowledge is power" will become more true than ever before. Power, which Hans Morgenthau defines as "man's control over the minds and actions of other men,"⁸ has always relied to some extent on the ability to control information. The scope of that extent, however, is changing dramatically. As the information age spreads, information-based forms of power increasingly eclipse more traditional power conceptions (commonly based on economic and military

⁶ Merriam-Webster Dictionary. New York: Pocket Books, 1985.

⁷ Laughridge, Gene. "Recent and Not-so-recent Thinking on Information Operations and the Knowledge War." Army Communicator. Vol20. 1 Apr 95: 32-39. p.38, also The 21st Century Army: Roles, Missions, and Functions in an Age of Information and Uncertainty. Ann Arbor, MI: Vector Research, 1995. p.x Arquilla and Ronfeldt even go so far as to predict that the innovations of the information age may "change how people spend their time and what and who they know and care about." Arquilla and Ronald. "Cyberwar Is Coming!" p.3.

might) as the most important manifestations of influence.⁹ Not only is information itself more influential - from education, to the influence of the news media, to civil activism over the internet - but force and wealth depend more and more on knowledge as the root of their influence. Modern military and economic giants would be lost without computers to guide their missiles or regulate their stock markets; they would be crippled without sophisticated, knowledge-intensive technologies to run their communications or to aid the manufacture of their goods. As a result of this new dependence, information's role in the power equation has shifted from that of playing adjunct to the other components, to serving instead as the most decisive (though still not the only) element of the equation.¹⁰ Since power relations influence and govern almost every aspect of human interaction, such a profound change in the composition of power necessarily holds considerable implications for the conduct of human relationships on every level from individual, to state, to global system.

Recognising this as a fruitful - and profitable - ground for investigation, forecasters predicting fundamental social changes resulting from the information revolution have multiplied at an alarming rate since the early 1990's. Among the most prominent of these are the futurists Alvin and Heidi Toffler,¹¹ who maintain that the information revolution is the third great societal

⁸ Morgenthau, Hans J. Politics Among Nations: The Struggle for Power and Peace. Thompson, Kenneth W., revised. New York: McGraw-Hill, Inc., 1985. p.32

⁹ Alvin Toffler identifies a 'power triad' of knowledge, wealth, and force. While he makes a distinction between information and knowledge, the two are simply different levels of the information hierarchy, which ranges from raw data to refined wisdom. Toffler, Alvin. Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. New York: Bantam Books, 1990. p.19

¹⁰ Toffler. Powershift. p.18

¹¹ Cf. Toffler, Alvin. The Third Wave. New York: Bantam, 1980. Toffler. Powershift. Toffler, Alvin and Heidi. Creating a New Civilization. Turner Publishing, 1995. and Toffler, Alvin and Heidi. War and Anti-War: Making Sense of Today's Global Chaos. Boston: Little Brown, 1993.

transformation of its kind, following the agricultural revolution and the industrial revolution.¹² For this reason, the Tofflers dubbed the information revolution, and the resultant rise of the information age, the “Third Wave” of radical civilisation change.¹³ The imminence of this new era, they assert, is evident in current “shifts in the way we make wealth,” since such shifts are the hallmarks of a transition from one wave to the next.¹⁴ As the agricultural revolution transformed nomadic hunter-gatherers into farmers tied to their lands, and the industrial revolution shifted the farmers into cities dependent on manufacturing, so the information revolution is poised to change human civilisation at its roots. Though the Tofflers attained national prominence only in the 1990s, they first predicted such information age transformation as early as 1970.¹⁵ These predictions, with those of Daniel Bell, Peter Drucker, Marshall McLuhan (who forecasted the rise of a knowledge class, the transition from mechanised work to knowledge work, and the emergence of a ‘global village’ based on the connectivity of global communications, respectively), and others, were among the earliest claims that information was attaining a new significance with the coming of the post-industrial age.¹⁶

¹² Though the world has seen systemic change outside these transitions (e.g. in the invention of the printing press in the 15th century, or the atomic bomb in the 20th century) the Tofflers argue that only these three movements have revolutionised the very sources of both wealth and power.

¹³ Toffler, Alvin and Heidi. War and Anti-War: Making Sense of Today’s Global Chaos. Boston: Little Brown, 1993. p.8

¹⁴ Toffler and Toffler. War and Anti-War. p.21

¹⁵ Alvin Toffler’s first prominent book on the subject, Future Shock was published in this year.

¹⁶ McLuhan, Marshall. Understanding Media: The Extensions of Man. London: Routledge, 1964. Drucker. The Frontiers of Management. Bell, Daniel. The Coming of Post-Industrial Society: A Venture in Social Forecasting. New York: Basic Books, 1973.

While the Tofflers may overstate their argument to a certain extent,¹⁷ the agricultural and industrial ages are useful precedents from which to understand the rise of the information age. One might compare today's changes to the industrial revolution's transformation of the agricultural age in order to illustrate the revolutionary new role which information will play in everything from the running of individual lives to the maintenance of the international system. The industrial revolution introduced machines that negated the leverage of possessing an advantage in land and agriculture by making farming cheaper, faster, and easier. Industry then replaced farming as the chief method of securing prosperity and a better standard of life. During this transition from agricultural to industrial age, power shifted from those who had land to those who possessed the modes of production; the state and loyalties of nationalism replaced the feudal system and loyalties to land and lord; and warfare changed from a contest between a skilled few with horses and swords to a battle of masses armed with machines.¹⁸

If the predictions of the futurists are correct, the changes introduced by the information age will do to manufacturing what manufacturing did to agriculture, rendering the methods and advantages of industry as irrelevant to power as agriculture has become.¹⁹ Just as today no one would consider a lack

¹⁷ See the introductory chapter, 'Understanding Paradigm Shift in Context,' for critiques on the Tofflers' work.

¹⁸ Toffler and Toffler. War and Anti-War. Ch. 3 The 'skilled few' of the feudal age is, of course, relative. Medieval armies were composed not only of knights, but of massed infantry drawn from feudal levies of the peasantry. The size of that feudal massed infantry, however, was dwarfed by the numbers raised by the Napoleonic *levée en masse*.

¹⁹ Wriston, Walter B. "Technology and Sovereignty." Foreign Affairs. Vol67, n2. 1988-89: 63-75. p.65

of farmland as a detriment to the massing of economic or political power,²⁰ in the future, factories and production may matter little to people who use knowledge-intensive technologies to do their work more cheaply, quickly, and efficiently. Their power will stem from their command of information systems, with which they will build more sophisticated weapons, create more efficient means of production, and organise more orderly societies. Like farming, manufacturing will be far from obsolete and unnecessary in the information age, but as it increasingly rules the success of manufacturing, information will eclipse the significance of industry in power.

One might ask, however, why many are predicting the recurrence of such systemic change in our own time. Not surprisingly, the advent of the information age, and the changes it brings, owes a great deal to the technological side of the information revolution, that is, the recent explosion of increasingly sophisticated innovations in information technology. Specifically, the development of computers since the discovery of the binary system and the invention of the silicon chip has opened the door to entirely new horizons of information processing.²¹ While one might argue that the information revolution actually began long before these innovations,²² it only really started to gather steam in the early 1970s with the introduction of silicon

²⁰ Consider Japan, which uses machines to maximise production on its farmlands, and relies on the air and shipping industries to import the rest of what it needs. The country can afford this practice because it has dominated industrial production and amassed significant leverage from economic power. Toffler. Powershift. p.432

²¹ Szafranski, Col. Richard, USAF. "A Theory of Information Age War: Preparing For 2020." Air University. p.3

²² Cf. James Beniger, who saw the beginning of a "control revolution" with the introduction of such industrial age information technologies as the telegraph and the telephone. Beniger, James R. The Control Revolution: Technological and Economic Origins of the Information Society. Cambridge, MA: Harvard University Press, 1986.

microprocessor chips.²³ From then on computing capacity has grown exponentially, doubling every two years since the early 1980s.²⁴ Further innovations in telecommunications have converged with the rise of computers to truly revolutionise information systems and pave the way for a revolutionisation in the use of information in turn.²⁵ Though far from determining the rise of a new age, the combination of these technologies for the first time enables the creation of that age. The information age is thus emerging now in part because the transformation has only just become technically possible.

The mere existence of the new information technologies cannot, however, transform the world all on its own. In fact, the technological significance of the information revolution owes, in large part, to the unprecedented accessibility of information age innovations and the power they make available. In the words of Steve Bankes and Carl Builder, "it is the world-wide spread of cheap, reliable, and powerful information devices that is truly revolutionary."²⁶ This distribution of information technology began innocuously, independent of any intention to spark global change. Instead, the increasingly global reach of the information revolution was driven primarily by the market forces behind the world-wide sale of computers and other sophisticated ITs. In a trend evident in the introduction of virtually every invention from the walkman to the laptop computer, once on the transnational market, global competition over the production and sale of a new technology

²³ Nichiporuk, Brian and Carl Builder. Information Technologies and the Future of Land Warfare. Santa Monica, CA: RAND, 1995. p.8. Also Beniger. The Control Revolution. p.6

²⁴ Ronfeldt. "Cyberocracy Is Coming." p.257

increases. Suppliers' attempt to undersell each other to gain a greater share of the new market, which drives the product's price down, and the increases the obtainability of the technology.²⁷ As access to these information technologies (and thus to resources like the internet and the information found there) becomes more universal, information, and the power it conveys in the information age, will likewise become more widely, and potentially also more evenly distributed.²⁸

Yet the spread of new information technology is not in itself a force significant enough to spark the rise of a new age. The factor which most directly lays the foundation for the information age is the emergence of significantly new practices, methods, and organisational forms designed specifically to exploit the advantages of information - advantages now made readily available through the spread of modern information technologies with their heightened capacities for collecting, storing, processing, and communicating information.²⁹ These practical changes, in combination with the global distribution of sophisticated IT advances, provide the missing catalyst for the emergence of an age defined by its decisive leverage of information.

Principal among these new developments in information use is the growing popularity of network organisational patterns over traditional hierarchical institutions. Throughout much of history, hierarchical

²⁵ Wriston, Walter B. "Technology and Sovereignty." Foreign Affairs. 1988-89. p.65

²⁶ Bankes and Builder. "Seizing the Moment." p.4

²⁷ Vogler, John. "Technology and Change in International Relations: on the Independence of a Variable." Change and the Study of International Relations: The Evaded Dimension. Buzan, Barry, and R.J. Barry Jones, eds. London: Frances Pinter Ltd., 1981. p.149

²⁸ The equality of information dissemination is, however, by no means assured. Daniel Bell predicted the rise of a knowledge elite and the division of information age society into information "haves" and "have-nots" as early as 1973. Cf. Bell. The Coming of Post-Industrial Society. p.426 also Ronfeldt. "Cyberocracy Is Coming." p.270

organisational structures have governed every part of human life from family, to job, to government and security.³⁰ Hierarchies traditionally maintain themselves through a rigid structure of information distribution, often monopolising certain information in the uppermost tiers of the organisation to establish a *de facto* advantage over the lower tiers by leaving them out of the information loop. However, the information revolution's widespread distribution of ITs - and the information to which those technologies provide access - challenges that capacity for information monopolisation and contributes to a gradual erosion of many (though, as will be seen, not all) hierarchical structures.³¹ Increasingly these crumbling hierarchies have begun to be replaced by networks. This organisational form, usually composed of autonomous cells linked horizontally rather than vertically, is uniquely suited to information age activities because it thrives on the 'pull' system³² of horizontal information dissemination, a system which the information revolution naturally encourages. In addition, networked organisations characteristically promote fast and precise action by allowing each node to perform the task for which it is best suited, unencumbered by the need for successive layers of approval from superiors. As a consequence, networks are also singularly able to maximise the information age's cardinal advantage of efficiency.

²⁹ Arquilla and Ronfeldt. "Cyberwar Is Coming!" p.2

³⁰ As Ronfeldt notes, networked organisational forms have also appeared in history, in tribal and clan-based societies. The hierarchy has, however, virtually eclipsed these organisational types in the West throughout the 350-year existence of the westphalian state system. Ronfeldt, David. Tribes, Institutions, Markets, Networks: A Framework About Societal Evolution. Santa Monica, CA: RAND, 1996.

³¹ Bankes and Builder. "Seizing the Moment." p.1

³² In such a system the user, not the overseer, decides which information he or she needs.

The rapidly growing popularity of such networks in business and civil activism³³ is one of the most obvious and tangible signs that the developed world is currently experiencing not only an information revolution, but the beginning of an information age. One should not, however, overestimate the implications of even this seminal shift. While networks are in many ways perfectly tailored to exploit the opportunities of the information age, they will not entirely replace hierarchical institutions. Indeed, the hierarchy remains the most appropriate form of organisation for activities that require high degrees of regulation and leadership, such as military and governmental operations.³⁴ The success of these institutions in the information age will, however, depend to a significant degree on their ability to adapt to the imperatives of that age. In many cases, including those of the military and government, hierarchies will benefit from mixing hierarchical principles with those of networks, establishing a degree of autonomy and flexibility among the middle and lower levels of their organisations, yet maintaining a recognisable chain of command as well as valuable topsight.³⁵

³³ Cf. the recent successes of networked businesses like Microsoft over those, like IBM, employing more hierarchical models. Likewise on the level of civil society, petitions circulated by networks of individuals in cyberspace to protest the enactment of the US' "Clipper Chip" legislation, played a significant role in defeating the government's attempts to establish a backdoor into encryption programs. Whittle, David B. Cyberspace: The Human Dimension. New York: W.H. Freeman and Company, 1997. p.370 and Fogleman, Martin. "Freedom and Censorship in the Emerging Electronic Environment." in Alberts, David S., and Daniel S. Papp. Information Age Anthology. Volumes 1-4. Washington, DC: National Defense University Press, 1997. p.408

³⁴ Ronfeldt, David F., and Cathryn L. Thorup. North America in the Era of Citizen Networks: State, Society, and Security. Santa Monica, CA: RAND, 1995. p.5

CONTEXT

As a new bout of information revolution fever began to grip the developed world in the early 1990s, RAND's Steve Bankes and Carl Builder wrote a think-piece examining the possible implications of the coming information age. In it, they predicted that age will "not only be new but new in entirely new ways."³⁶ This prediction goes a long way towards explaining why more concrete attempts at forecasting the information age have proved difficult, since divining prospective changes becomes much more challenging when one cannot even conceptualise those changes. As a consequence, analysts of the information age, uncertain of the future, often tend to become caught up in a tidal wave of enthusiasm for the new world ahead. Those that are not entranced by new possibilities usually tend to the opposite extreme of scepticism, expecting dire, Orwellian consequences from the explosion of new information technologies and practices. The truth is that both possibilities exist. Information technologies themselves cannot dictate how the information revolution will affect the world; rather, only the choices people make in applying these technologies can determine what impact the information age will have.³⁷ Therefore, in attempting more closely to examine the implications of the information revolution and the emerging information age, this section will investigate both positive and negative potentialities.

³⁵ Ronfeldt and Thorup. *North America in the Era of Citizen Networks*. p.11 This mixing of old and new practices and methods should serve as a caution against succumbing to the rising tide of predictions claiming that the information age will transform the developed world beyond recognition within decades. While the information age does certainly seem set to affect modern society profoundly, in many significant ways life will continue as it has always done.

³⁶ Bankes and Builder. "Seizing the Moment." p.5

³⁷ Whittle. *Cyberspace*. p.xi, Cf. Also Vogler. "Technology and Change in International Relations." p.144

The implications under consideration are those the information age holds for man and the state. Establishing an understanding of the information age's possible impact on man and the state is a useful prelude to the examination of information age war, in part because it offers an opportunity to flesh out more concretely the effects of the shifts outlined in the previous section. More importantly, these particular examples are apt for this study because man, or individuals, and the state are two elemental building blocks of the international system within which war takes place. Following Kenneth Waltz's classic paradigm, these two elements, with the war system that encompasses them, form the immediate context for war. That context plays a pivotal role in the subsequent examination of information age war's claim to the status of military paradigm shift. That pivotal role derives, firstly, from the fact that the same force that alters the context of war also influences shifts in war's content. If IAW fulfils the criteria of paradigm shift, the historical precedent of the industrial revolution augurs that the pattern of contextual changes should foreshadow not only similar, but parallel shifts in war's content. Secondly, to the extent that a paradigm shift reflects shifts in the causal relationships between man, the state, and war, changes in the first two elements of this triad should signal further changes in the third if IAW's claim to the title of military paradigm shift are justified. Thus, establishing an understanding of the context of information age war is a necessary first step for investigating the nature of changes in that war form's content.

Man

According to the optimists' view of the information age world, individuals face a significant potential for empowerment as a result of the

explosion and global dissemination of sophisticated information technologies. This empowerment is the product of two information age trends: the growing correlation between information and power, and the horizontal dispersion of information to everyone with access to modern ITs. The convergence of these two trends may create a shift not only in the nature of power, but in the nature of those who possess it. For, "as knowledge is redistributed, so, too, is the power based on it."³⁸

This redistribution may hold particularly favourable implications for the empowerment of the individual. Indeed, many optimists believe the diffusion will potentially offer considerable benefits for "what may be considered weaker, smaller actors."³⁹ These benefits are already becoming evident in the fact that even the smallest information age actor, that is, an individual, can use information resources from fax machines and direct broadcast satellites to telephones and the World Wide Web to reach other individuals on the opposite side of the globe. With this connectivity they can promote awareness of human rights abuses or disseminate racist propaganda, disrupt the secure financial transactions of international banks or raise money for world hunger, attack a country's information infrastructure or warn a government of an outside threat. Such capabilities grant everyday individuals in the information age more access to power than any of their agricultural or industrial age counterparts ever imagined.

The new dispersion of information that empowers the individual in many cases gives him (or her) virtually the same resources as those possessed by the

³⁸ Bankes and Builder. "Seizing the Moment." p.8

people in power over him. US President Ronald Reagan recognised the significance of this shift in power distribution as early as 1988: "Linked by a network of satellites and fibre optic cable, one individual with a desktop computer and a telephone commands resources unavailable just a few years ago to even the largest governments, and can reach out to the entire world."⁴⁰ As a result, some elements of global-scale power - to influence trade, to create conflict, to promote peace - that once belonged exclusively to the state⁴¹ are now accessible to ordinary individuals. Inevitably, the new availability of such far-reaching power affects not only the individual, but also the role of the individual within the system.

Furthermore, the information age's dispersion of information and information power may mean not only that more individuals will have access to the power of knowledge, but that that access will be more equally distributed. Some have foreseen a danger that, as the information age progresses, an "information elite" dividing the information 'haves' from the 'have-nots' may emerge to prevent the more equal distribution of information and the power it conveys.⁴² Given the nature of modern information technologies, however, it seems likely that this danger can be avoided, especially in the long run. Many information technologies are becoming increasingly accessible - both because their prices are plummeting and because the rising "user-friendliness" of programming and other user-interfaces fosters ease of use even for the

³⁹ Wehling, Jason. "RAND Warns US Against CyberWar from the Left." *Cy.Rev.* vol3, Sep 95. p.24

⁴⁰ Alleyne, M.D. "Thinking About the International System in the Information Age." *Journal of Peace Resolution*. Vol31. Nov 94. p.409

⁴¹ Recently, large non-governmental institutions like Multi-National Corporations and transnational organisations have shared in some of states' global-level power. This too is an indication of the redistribution of power that marks the waning of the industrial age.

technically disinclined.⁴³ If liberal-minded governments then further encourage the equality of IT distribution through funding and support of public access and training for computer network users,⁴⁴ a relatively equitable dispersion of the power of information should certainly be possible.

If the information age's potential for a more equal dispersion of power is eventually achieved, such equity could feasibly challenge the long-standing practice of concentrating influence among a limited number of elite groups while depriving the majority. First of all, the distribution of information erodes the authority of outside forces to dictate an individual's choices, because that authority - once based upon the claim that privileged leaders and elites knew what was best - crumbles under the heightened ability of informed individuals to act for themselves. In the information age, each individual has access to information which allows him to decide for himself which doctor, which car, which diet, which job, which government is best for him.⁴⁵ Secondly, since information is "increasingly required for competitiveness in nearly all human activities,"⁴⁶ the relatively equal diffusion of information power will also contribute to equalising access to forms of power which have traditionally relied more obviously on non-information components to build advantage. Notably, in business, information can improve competitiveness by employing efficiency -

⁴² In Bell 1977, Cf. also Ronfeldt. "Cyberocracy Is Coming." p.270

⁴³ Whittle. Cyberspace. p.15

⁴⁴ Cf. Anderson, Robert H., Tora K. Bikson, Sally Ann Law, and Bridger M. Mitchell. Universal Access to E-Mail: Feasibility and Societal Implications. Santa Monica, CA: RAND, 1995.

⁴⁵ The benefits of this access have become increasingly tainted by the growing commercialisation of cyberspace, which threatens to constrain consumer choice through advertising and other means of perception manipulation. However, the greater accessibility of information - from advertising influences to consumer interest - and the consequent encouragement of informed decision-making, should to a certain extent outweigh the disadvantages arising from this commercialisation.

through waste-free computer integrated manufacturing, computer tracking of inventories, and information intensive marketing techniques⁴⁷ - to supplement or replace physical resources. This practice may thus allow smaller businesses to compete more feasibly against the economies of scale and other resource advantages enjoyed by large corporations. The same information efficiency should, moreover, also improve small actors' ability to compete against the great powers in warfare, as chapters three and six will illustrate. Through these means and others, the information revolution holds significant potential to shift the disparity between the influence of the strong and that of the weak, realigning (if still not equalising) the balance of power between individuals and large conglomerate actors in the world system.

In addition, the information revolution's potential to distribute information - and information power - should empower individuals not only in relation to traditional elites, but also in relation to their own previous standing. For example, the globalisation of information technology should provide more impartial access to power by granting more people access to a better quality of information. Direct broadcast satellites, fax machines, and the internet carry news farther, faster, and in higher quantities as a result of the information revolution. Since more information about events in the headlines will be available from multiple sources, there is greater likelihood that individuals will be able to compare the veracity and reliability of the different versions of events, and will develop their own truer, more complete understanding of the issues.

⁴⁶ Banks and Builder. "Seizing the Moment." p.5

⁴⁷ Such techniques include, for instance, relying on databases of consumer preferences or demographics to determine both where to sell one's products, as well as what kind of advertising will sell them most effectively.

Although the proliferation of information channels may also jeopardise the quality of available information by facilitating the spread of disinformation as well as that of true information, the net result should still favour the truth, since the great volume and speed of information possible on modern information nets will facilitate the countering of such false reports almost as soon as they appear.⁴⁸ Armed with the true stories behind media headlines or politicians' rhetoric, concerned individuals will be empowered to make more educated choices which will affect not only their own lives but also their participation in the state and the international system around them.

The potentially far-reaching effect of these informed choices owes itself to the fact that the connectivity of the information revolution presents opportunities not only for individuals to form educated opinions, but also to act on those opinions. The increasing linkage of telecommunications expedites individuals' efforts to make themselves heard because it opens the door to new modes of interaction and collaboration, even between people separated by thousands of miles. This connectivity improves opportunities for co-operation not only within business and education, but also in the realm of grassroots civil activism. The linkage of information networks enables individuals to contact others with similar concerns, thus facilitating the co-ordination of group action, the recruitment of support, and the raising of public awareness, despite challenges of time or distance. Such collaboration across cyberspace promotes

⁴⁸ Watson, Russel, et al. "When Words Are the Best Weapon. How Rebels Use the Internet and Satellite TV." *Newsweek*. 27 Feb 95: 36-40. p.39. For example, e-mails warning against viruses have been a fixture of on-line communication almost as long as such communication has been accessible to the mainstream. In recent years however, these e-mail warnings have increasingly been greeted by an informal barrage of counter-attacks assuring users that such warnings are hoaxes. Often these are accompanied by reasoned accounts of how viruses actually work, proof that 'e-mail subject header' viruses and the like are merely shams.

the emergence of epistemic “virtual communities,” a new set of actors which create an opportunity for smaller, geographically dispersed groups to make a greater impact on civil society in the information age.⁴⁹

One of the potential implications of this empowerment and the effect it has on individuals’ roles in the world is the possibility of wider democratic participation in the information age. RAND’s David Ronfeldt has put forward a concept of information age government that he calls “cyberocracy.” The term (which, literally translated from its roots, means “rule by way of information”) describes Ronfeldt’s conceptions of how bureaucracy may change to accommodate the information age. These conceptions include visions of political systems in which information is a key source of power, and governments organised around the exploitation of information networks.⁵⁰ While Ronfeldt himself cautions that cyberocracy may not necessarily “make democratic societies more democratic, [n]or totalitarian ones impossible,”⁵¹ the form’s relatively flattened hierarchy, and its reliance on a mix of information from both the public and private sectors, could render the cybercratic state more amenable to the involvement of individual citizens in the political process.

Designed more like an interactive, parallel network, a cybercratic government could reduce the need to burrow through bureaucratic channels and red tape in order to reach legislative representatives and senior civil servants, increasing their accessibility to the proverbial ‘man in the street.’ Furthermore, cyberocracy may not only enable individuals to reach the government more readily, but may also create incentives for the government to reach out to every

⁴⁹ Bankes and Builder. “Seizing the Moment.” p.9

⁵⁰ Ronfeldt. “Cyberocracy Is Coming.” pp. 244, 255

day individuals as well. According to Ronfeldt, successful governance in the information age may increasingly rest on leaders' ability effectively to tap the wide variety of available information resources. If the government is to remain competitive, this spectrum of resources should necessarily include information sources outside traditional government circles, from large group components of the private sector down to individuals themselves.⁵² Both of these aspects of cyberocracy could advance the empowerment of the individual by facilitating the creation of a truer democracy which allows all citizens to have a voice - not just in educated voting, but in the possession of their own input in the policy-making process. Because of this potential, the term cyberocracy (despite warnings to the contrary⁵³) has come to evoke popular images of an information age government predominantly characterised by a cyberspace grassroots democracy in which individuals will hold greater influence over governmental affairs than they have for centuries.⁵⁴

Cyberocracy may seem no more than a utopia of the distant future, but aspects of the phenomenon have already begun to emerge in the developed world. The World Wide Web even now gives citizens unprecedented access to information about the issues before their government, as well as records of how

⁵¹ Ibid., p.278.

⁵² Ibid., pp.268 and 274, 256

⁵³ Whittle. Cyberspace. p.382. Cf. also Ronfeldt. "Cyberocracy Is Coming." p.280. Both Whittle and Ronfeldt caution that, rather than bringing information age societies together, the proliferation of highly tailored information could instead have a splintering effect. Whittle, in fact, posits that information age may be characterised less as a democratic melting pot than as a "boiling cauldron of tribes and special interests." p.382

⁵⁴ Fogleman. "Freedom and Censorship in the Emerging Electronic Environment." p.402, also Fast, William R. Lt. Col. "Knowledge Strategies: Balancing Ends, Ways, and Means in the Information Age." Sun Tzu Art of War in Information Warfare Prize. Washington, DC: National Defense University Press, 1996. p.11

their representatives voted.⁵⁵ Local civil action networks like Santa Monica, California's PEN (Public Electronic Network) and Blacksburg Virginia's BEV (Blacksburg Electronic Village) offer information on government services as well as candidate profiles in election years. On a national scale, information about political candidates is also becoming increasingly available through private official web sites - in fact, every major candidate in the 1996 US Presidential election had his own web site.⁵⁶ Along the lines of more active participation in information age governance, "virtual community" interest groups, maintained via telecommunications and computer networks, have sprung up across North America, and have begun spreading internationally as well.⁵⁷ By allowing borderless collaboration with others who have similar interests, such computer-coordinated groups could someday wield as much influence over the government as America's Israel lobby and its gun lobby. Furthermore, the increasing e-mail accessibility of legislative representatives and other government officials is an indication that information technologies may, in the not so distant future, compel governments to open up direct lines of communication with their citizens. Fax, e-mail, and internet could all readily facilitate more direct popular input into the decision-making process.⁵⁸

In light of the many changes which should empower the individual in the information age, Bankes and Builder have observed that, "it seems not

⁵⁵ Anderson, Bikson, Law, and Mitchell. Universal Access to E-mail. p.138

⁵⁶ Whittle. Cyberspace. p.397. Ironically, information-savvy incumbent President Bill Clinton was the last candidate to establish a web site, though according to Whittle, once eventually established, Clinton's site was the most sophisticated.

⁵⁷ The international collaboration of the Neo-Nazis is one rather pernicious example of such a virtual community.

⁵⁸ RAND Research Review. Fall 1995. p.12 If this begins to sound fantastic, consider the fact that the President of the United States already has a public access e-mail address, which at least one of his aides reads.

improbable that the power of information in the hands of individuals will come to be seen as a rival to that of the nation-state; that information can be used effectively to prevent war or to wage it; and that information can be exploited to perfect or destroy entire societies.”⁵⁹ Yet this enumeration of the simultaneously constructive and destructive nature of information power brings to light the fact that few, if any, of the information revolution’s changes will be entirely positive. Just like the proverbial coin, there is also a negative side to the innovations of the information age and their implications for individuals.

The primary challenge to the information age’s potentials for individual empowerment lies in the Orwellian scenario that information technologies in the hands of those who wish to control and monopolise information present a considerable potentiality for the repression of individuals and small groups. Consider the fact that, as more and more of our life histories are stored in computer networks, those with access to the networks will possess a frightening new capacity for monitoring everything from health records and credit histories to video rentals and electronic correspondence.⁶⁰ Such monitoring capability poses a disturbing challenge to the right of individual privacy, which becomes further convoluted by the argument that electronic monitoring has positive uses (e.g., in helping to track criminals) as well.

Alternatively, the information age’s potential for empowering individuals may be countered not by the overt use of information to control others, but by a more subtle, even voluntary form of control. Rather than empowering individuals, the wealth and complexity of information may instead

⁵⁹ Bankes and Builder. “Seizing the Moment.” p.4

⁶⁰ Vogler, John. “Technology and Change in International Relations.” p.141

overwhelm them. An overflow of unfiltered information could cause individuals simply to shut out all but what immediately interests them and succumb to the sophisticated niche marketing that will target consumers with tailored information in addition to more tangible products and services. This urge to block out the increasingly wide world may even be encouraged and facilitated by the proliferation of virtual communities which can provide the disaffected with a cyberspace support network of others who share similar beliefs. Such a retreat away from the complexity and diversity of larger society and into the arms of narrow-minded yea-sayers could have disastrous consequences for the individual and his role in society, fostering the rise of new prejudices based not on where people come from or what colour their skin is, but on what they think. Richard Neustadt gave voice to these concerns as early as 1985, asserting that:

...the greatest impact [of the information age] may be to fragment our politics, narrowing people's perspectives, shifting more power into special interest groups, and weakening the glue that holds our system together.⁶¹

In addition to the possibility of societal fragmentation, information may serve to overwhelm rather than to empower by tempting individuals to become slaves to the wealth of available information. Rather than shutting out the overabundance of information, some individuals may instead take too much in without questioning it. This could encourage the undiscerning to act on the idea or opinion of the moment, flitting from one cause to the next without ever really accomplishing anything. More frighteningly, a tendency to absorb but not question the information age's vast information flows might also facilitate

⁶¹ Neustadt, p.561 in Ronfeldt. "Cyberocracy Is Coming." p.280

Orwellian-style brainwashing of information-overloaded individuals. David Ronfeldt includes these potential unfavourable outcomes among his cautions about cyberocracy's possible negative side. In a disturbing litany he asserts that, far from fostering a truer form of democracy, the information age may instead promote:

...increased susceptibility of the individual to outside manipulation, a rise in the number and diversity of ad-hoc interest groups and social movements, increased fragmentation and fractionalisation of society and politics, greater stratification and centralisation of society around information resources, and greater efforts by some policy-makers to control access to information and use it to manipulate the public.⁶²

Thus, as the above examples illustrate, many of the information age's implications for the individual level of analysis remain uncertain and ambiguous. There will likely be both new benefits and new dangers for individuals in the information age, but although positive effects currently seem to predominate, the question of which will ultimately prevail must remain unanswered until the era develops further.

The State

The information revolution's impact on the state level of analysis is no less ambiguous than its effect on individuals. However, since the state currently represents the highest source of order and governance in human society, the information revolution's impact on that institution is significantly more likely to affect the way the rest of the world works as well. The state system is, moreover, the arena within which war presently takes place. As such, shifts occurring on this level of analysis potentially represent the most direct changes in the context of future conflict. Deciphering information age changes in the

state system - whether on balance good or ill - is therefore essential to understanding information age war and the content of future conflict.

Broadly, the dual impact of the information revolution is manifested on this level of analysis through the simultaneous "widening and weakening" of the state's role in the international system.⁶³ Hotly disputed across the spectrum of international relations theory, each trend can be assessed as both positive and negative. For the purposes of this paper, however, it is necessary only to judge how both trends may affect the context of future conflict.

Weakening

The "weakening" of the state refers to a looming erosion of the state's role as the principal actor in the international system, and as the only entity capable of wielding power on a global scale. This shift is a consequence of a number of both geographical and information age trends, from the growth of interconnectedness and the collapse of boundaries, to the spread of interdependence and the rise of non-state actors as significant players in the international system. Each of these developments begs the question, what role will statehood play in the information age?

At the root of states' shifting status is the expansion of interconnection within the state system. From long-distance telephone networks and international air travel to transnational trade and foreign diplomacy, the activities of individual states cannot help but touch, and affect, those of others in the modern world. As these links increasingly allow international activities to

⁶² Ronfeldt. "Cyberocracy Is Coming." p.280

⁶³ Smith, Michael. "Modernization, Globalisation, and the Nation-State." Global Politics: Globalisation and the Nation-State. McGrew, Anthony G., Paul G. Lewis, et al., eds. Cambridge: Polity Press, 1992. p.259

flow through and across borders, interconnection in turn sets the stage for the collapse of boundaries and the growth of interdependence. Yet interconnection has always been a factor in the state system, for it is impossible to have a system that does not interact.⁶⁴ Thus it is not merely the existence of interconnection that transforms the system, but the exponential growth in that interconnectedness sparked by the information revolution. That explosion of sophisticated information technologies has added considerably to the linkage begun with the industrial revolution, producing numerous technologies that make the world today a smaller place than it was even half a century ago. Aeroplanes and cars, telephones and televisions have connected people all over the world, allowing the creation of economic, social, and political networks on a global scale. These connections have been further speeded and facilitated by the information age's introduction of nearly real-time communications in the form of fax machines, e-mail, video conferencing, and satellite broadcasting, to name only a few. As a result, human interaction - whether for business, friendship, criminal activity, or otherwise - has become increasingly able to ignore the political and geographical boundaries that once kept the world compartmentalised within separate states. Thus multi-national corporations, internet web pages, and international drug smuggling all now operate in a global arena, all but oblivious to old borders of space, time, and law.⁶⁵

This globalisation seems certain to spread still more as the information age progresses, since technological innovations have a tendency to act as "a

⁶⁴ Holsti, K.J. Change in the International System: Essays on the Theory and Practice of International Relations. Aldershot: Edward Elgar, 1991. p.56

⁶⁵ Arquilla and Ronfeldt. "Cyberwar Is Coming!" p.3

global force which recognises no national boundaries.”⁶⁶ Already, industrial age technological developments have imposed a certain global interconnection on isolationists and integrationists alike.⁶⁷ For example, the pollution from modern industrial technologies poses a world-wide threat to the environment regardless of states’ policies towards environmental protection or non-involvement. Still more deadly are nuclear weapons, which can not only reach anywhere in the world in a matter of moments, but can kill friend as well as foe with fallout carried in global weather patterns. In the face of these threats, borders and citizenship become irrelevant, because every state is equally dependent on the maintenance of global environmental integrity.

Interconnection, of course, does not necessarily create interdependence. However, the resultant muddling of boundaries encourages collaboration, whether for trade, politics, or academia. As people and states become more and more accustomed to this collaboration, they increasingly come to depend on it. Consciously or not, many states have linked themselves right out of self-sufficiency, subscribing themselves to interdependence before they even considered voting on the policy.⁶⁸ The global economy, for instance, has already become integral to the prosperity of almost every state, so much so that any government wishing to separate itself from the international market could

⁶⁶ McGrew, Anthony G. “Military Technology and the Dynamics of Global Militarisation.” Global Politics: Globalisation and the Nation-State. McGrew, Anthony G., Paul G. Lewis, et al., eds. Cambridge: Polity Press, 1992. p.104

⁶⁷ This is not to be interpreted as support for “technological determinism.” In no way does the author believe that man did not have a choice in, for example, the development of atomic weaponry. Vogler. “Technology and Change in International Relations.” p.143

⁶⁸ Smith. “Modernization, Globalisation, and the Nation-State.” p.259

do so only at great cost to itself.⁶⁹ Thus, for perhaps the first time since the modern state system was de facto formalised by the Treaty of Westphalia in 1648, interdependence constrains nation-states by a force that does not bow to their sovereignty.⁷⁰ This force does not take the form of rules, or of international government, but rather of states' own reliance on other states.

This trend towards interdependence has become a source of great debate between those uncertain whether the trend marks a positive or negative change in the state system. Many thinkers - most notably those from the Pluralist and Modernist camps - contend that interdependence will reduce conflict, and claim that the trend is the best hope for peace in the information age.⁷¹ Even the Realist Karl Deutsch, in his earlier years, wrote, "if the entire world were integrated into a security community, wars would eventually be eliminated."⁷² Nor are these optimistic assertions entirely groundless, for history has shown that integrated peoples who share common identities and common political loyalties tend to quarrel less often and less lethally.⁷³ However, even the highly interdependent world of the information age will be far from reaching a point of integration total enough to rule out conflict.

⁶⁹ Though this seems impossible today, Burma is an example both that separation from the global economy can be done, and that it carries a high price. Holsti. Change in the International System. p.65, also Johnson, Jeff. "The Information Highway from Hell: A Worst-Case Scenario." Computer Scientists for Social Responsibility Web page, 1996. p.5

⁷⁰ Some might contend that the power-balancing system of alliances that dominated Europe during the 19th century was more accurately the first great example of interdependence's challenge to state sovereignty. Yet this system was, arguably, voluntarily (if not always with open eyes) entered into, and thus at least theoretically was not a force entirely beyond states' ability to control.

⁷¹ Smith. "Modernization, Globalisation, and the Nation-State." p.261

⁷² Holsti. Change in the International System. p.59

⁷³ Ibid., p.60 In contradiction of this point, many analysts have cited the fact that "civil" wars tend to be the bloodiest kinds of wars. However, the division of a state into warring factions reflects a fundamental difference in belief or practice, which itself implies that such a society was never truly integrated in the first place.

Meanwhile, the current period of transition toward full interdependence poses as much threat of upheaval and conflict as the final stage offers potential for peace. In this transitional phase, the old system will exist alongside the new, and the dichotomy will add its own tensions to the problem of change. The old state system is ill-equipped to deal with new, transnational challenges: for example, the questions of how to control multinational corporations, organise common resources, or establish jurisdiction for international communications networks are "inherently beyond the management capabilities of a decentralised and fragmented states system."⁷⁴ The information revolution will not follow the old state-centric rules of interaction; if the state cannot accept and adapt to this, the information age may well render the classic anarchical system an anachronism as information age politics increasingly transcend sovereignty.

Just as the transition from anarchical society to global integration will not happen overnight, not all states (or, more accurately, regions) will experience that transition in the same way. Interdependence will reach different areas at unequal rates, and to varying extents. Many states (for instance, the less developed, especially those who have barely entered the industrial age) will suffer from "asymmetrical interconnectedness" in which they depend more - for trade, security, guidance, etc. - on the advanced states than those states are "interdependent" on them. In this scenario there is only a fine line between the opportunities for integration and the opportunities for absorption that are both inherent in the concept of interdependence.⁷⁵ This narrow division between the positive and negative sides of interdependence indicates a strong likelihood that

⁷⁴ Vogler. "Technology and Change in International Relations." p.141

asymmetry will possess the same potential for inciting conflict in the information age as it did at the end of the colonial age.

Even ignoring the potentials for conflict intrinsic to the transition to interdependence, the phenomenon itself holds a number of challenges to the future stability of the state system. First, by linking states to other equally sovereign actors, interdependence constrains the choices open to each. As states' concerns become more and more intertwined, they will increasingly be unable simply to act in their own interest if that action conflicts with the good of others in the system. In short, by joining states politically, economically, and even socially, interdependence "erodes the effectiveness of [domestic] policies and hence threatens national autonomy in the determination and pursuit of [national] objectives."⁷⁶ Second, and more ominously, interdependence presents a threat to system stability that is inherent in the very nature of the phenomenon. For, the linkage that may define the successor to the present state system entails that a challenge to any point in the network will necessarily affect every other element of the system.⁷⁷ As such, the interdependent global system, unless it eliminates all strife, will be especially vulnerable to future conflict.

Interdependence, however, is not the only possible future for the international system. K. J. Holsti predicts a rise of fragmentation concurrent with, if not in reaction to, the trend toward interdependence.⁷⁸ He maintains that there will be as many voices against interdependence as there are for it, and the former will not be without recourse to challenge the trend. Holsti foresees

⁷⁵ Holsti. Change in the International System. p.62 Cf. also Levi, Werner. The Coming End of War. Beverly Hills, CA: Sage Publications, 1981. p.115

⁷⁶ Holsti. Change in the International System. p.56

⁷⁷ Szafranski. "A Theory of Information Age War." p.8

that interdependence may itself become a source of conflict by inducing isolationist states or groups to cut themselves off from the system and build 'national moats' around themselves in a struggle against integration and its consequent loss of identity and autonomy.⁷⁹ While such isolationism is not without cost in a highly interdependent system, the bloody nationalism of the war in Bosnia and the violent secessionist movements pursued by Basques, Chechens, and Irish Republicans provide ample evidence that some groups are indeed willing and even eager to pay the price fragmentation requires.

The Implications of Weakening

Interdependence, fragmentation, and other geopolitical forces whose weakening of the state may be magnified by the information age, challenge the traditional role of statehood in the international system and beg the question of the state's place in the information age. In light of the changes introduced by the information revolution, as well as those brought to light by the end of the Cold War, it seems dubious that states can maintain their role as the sole legitimate practitioners of organised conflict, and thus as the primary shapers of the international system.⁸⁰ Yet to many, the existence of an international system without states seems inconceivable. And indeed, the world is as far from abrogating the institution of statehood as it is from reaching true integration. However, the ambiguous forces of the information revolution do hold the potential to shift fundamentally the relationship between states, their people, and the international system. In light of this potentiality, it is necessary to re-

⁷⁸ Holsti. *Change in the International System*. p.54

⁷⁹ *Ibid.*, p.55

⁸⁰ This point will be elaborated further in chapter six.

examine the nature of statehood in order to understand the altered role of the state in the information age.

However, after three and a half centuries, one might understandably have difficulty with this revaluation of the state, difficulty in imagining any global system other than the institutionalised anarchy of sovereign nations balanced against each other under no higher law than national interest and war. However, the world has survived without states in the past, and may do so again. At the present stage of modernisation, it is more than doubtful that the current system could be succeeded by its feudal predecessor, but this precedent for such a fundamental change provides important perspective for the present reassessment of the state and the state system.

Before that assessment of information age change can begin, however, one must first establish an understanding of that which is being changed, that is, the industrial age conception of statehood. Though international relations theorists differ widely on the role of states in the international system, they seem to have a consensus on the fundamental characteristics of statehood, agreeing that a "state" is an independent political entity which possesses a form of government and exercises sovereignty over a people and a territory. Implicit in this is the principle that states are obligated to maintain order among their people and to preserve security within their territory.⁸¹

The information revolution primarily strikes at the state system by challenging the nature of the territoriality and sovereignty that have

⁸¹ Rothgeb, John M., Jr. Defining Power: Influence and Force in the Contemporary International System. New York: St Martin's Press, 1993. p.23 See also Herrera, Geoffrey L. "New Information Technologies and the Future of State Security." Monterey, CA: Proceedings of the Security Studies Conference on Revolutions in Military Affairs, Naval Post-graduate School, August 1996.

characterised the building blocks of that system. First, territoriality has changed because the information revolution has eroded the significance of geography, tearing down barriers of time and space required for communication even across great distances.⁸² In the information age, e-mail, mobile phones, and reliable, almost universal telephone networks will render long-distance communication cheaper, faster, and easier than ever before. Such connectivity has already begun to encourage people to confer, collaborate, and conspire with others anywhere in the world. As a consequence of this international idea sharing, what people identify with, what they include in their spheres of comprehension, is likely to shift from the village, city, or even state, to encompass the entire world. This may cause the state to lose its significance as the logical delineation of territory within which people feel commonality.⁸³

States face a further challenge to territoriality - and its status as the natural division of government - from the absence of boundaries in cyberspace. Information, whether carried by messenger, post, radio, or fax machine, has long been able to penetrate borders. The rise of the World Wide Web further facilitates the trans-border dissemination of information, and highlights a number of questions about states' rights and abilities to control access to information across political boundaries.⁸⁴ For instance, what happens if a Frenchwoman sends information openly available in France to someone in China, where the possession of such information is illegal? Or if a computer hacker in Estonia penetrates a restricted American database and uses the

⁸² Arquilla and Ronfeldt. "Cyberwar Is Coming!" p.3

⁸³ Loader, Brian D., ed. The Government of Cyberspace: Politics, Technology, and Global Restructuring. London: Routledge, 1997. p.9

⁸⁴ Whittle. Cyberspace. p.383

information he found there to commit an act regarded as criminal under US law, but legal under Estonian, can the American authorities prosecute him? And if they are not allowed to uphold US law, does that not undermine the US' sovereignty over its own territory? Information's imperviousness to physical and political boundaries means states will have to re-evaluate not only their international information policies, but also their jurisdiction over territory itself.

In this way the shrinking of the world and the devaluation of borders have converged to undermine territoriality as a basic characteristic of statehood. James Rosenau sees this devaluation of territory as evidence "that human loyalties are increasingly transcending national frontiers and that governments have lost their ability to control transnational processes and to command the unalloyed obedience of their citizens and subjects."⁸⁵ This assertion, moreover, also highlights the fact that information age changes hold significant implications not only for territoriality, but for traditional conceptions of sovereignty as well. These implications are particularly noteworthy, for sovereignty is the one characteristic that most epitomises the concept of statehood. Since the 1648 Treaty of Westphalia, states have characteristically been sovereign entities, entities whose actions, in the words of Grotius, "are not subject to the control of any other power, so that as to be annulled at the pleasure of any other human will."⁸⁶ By definition, sovereign states have

⁸⁵ Holsti. Change in the International System. p.206

⁸⁶ Grotius. The Rights of War and Peace. p.62

heretofore acted only in accordance with their own will and interests, and could only be forced to act against those interests through defeat in war.⁸⁷

Information age technologies, however, pose a growing challenge to state sovereignty. In deepening the interdependence begun in the industrial age, these technologies have extended states' links not only in commerce and collaboration, but also in vulnerability.⁸⁸ The more interconnected states become, the more vulnerable they are to adverse affects from disturbances anywhere within the linked system. This vulnerability puts constraints on states' sovereignty by forcing them to consider not only the immediate effect of their actions, but also the longer-term, systemic effect. For example, consider 1997's financial crisis in Southeast Asia. In a less connected system prosperous states would no doubt take advantage of economic struggles in South Korea, Indonesia, Thailand, and elsewhere. Instead, with requisite consent from the prosperous, the International Monetary Fund approved a \$17 billion bail-out of the Thai economy, followed by a \$40 billion shore-up of the Indonesian economy, and a further \$58 billion for the struggling South Koreans. These actions were not purely philanthropical, but intended to stave off the threat of global recession which might have easily spread from Southeast Asia to blanket the globe.⁸⁹ The developed world's reaction to this possible threat is testimony that states are becoming so susceptible to outside pressures that they cannot act

⁸⁷ That is to say, though states may be persuaded or coerced to act outside their national interests through the tools of diplomacy, there is no higher entity to dictate that they *must* act otherwise. For this reason, war has been a primary instrument in shaping the character of the international system since the advent of statehood. For further discussion of this point, see chapter five.

⁸⁸ See also p.77 and p.73

with total sovereignty, but must instead temper their national interests to harmonise with interdependence and avoid unnecessary disturbances in the system.⁹⁰ As noted above, this susceptibility is not unique to the information age, but has been an obvious constraint on state sovereignty since the development of aeroplanes and nuclear bombs. The increasing interlinkage of the information age's proliferating international computer networks and telecommunications, however, is likely to impose ever greater constraints on the choices and methods open to states, calling into question the very sovereignty upon which state government is predicated.

Moreover, information itself presents a problem for sovereignty, to the extent that it does not readily conform to government regulations. Even in closed societies where the government restricts the dissemination of the most prosaic information, the state cannot monitor every letter and phone call, every fax and e-mail.⁹¹ In open societies where citizens regard privacy and freedom of information as basic rights, the state wields even less control over information.⁹² Since rules are as permeable to information as boundaries are, states may never claim complete control over information. However, by definition, sovereignty entails the right to claim the highest jurisdiction, the ultimate control, over all within a state's power. Because of protections for privacy, confused jurisdiction

⁸⁹ CNN Interactive. August, November, and December 1997. Cf. Fischer, Stanley. "The Asian Crisis: A View from the IMF." Address at the Midwinter Conference of the Bankers' Association for Foreign Trade. Washington, DC. International Monetary Fund Web page. 22 January 1998.

⁹⁰ Fast. "Knowledge Strategies: Balancing Ends, Ways, and Means in the Information Age." p.6. See also Holsti. Change in the International System. p.55

⁹¹ Cf., the fact that even George Orwell's 'Big Brother' was not all-seeing, but could monitor only about 10% of the population at any one time. Ronfeldt. "Cyberocracy Is Coming." p.277.

⁹² This is unavoidable, as any democracy that attempted to increase its control over information would threaten the democratic nature of its government.

over knowledge, and the lack of boundaries in cyberspace, governments simply cannot be fully sovereign over information.⁹³ Yet as the information revolution places an exponentially higher emphasis on the power of knowledge, the unchecked flow of information becomes an ever greater threat to the state's control of power.

Widening

Just as the erosion of territoriality and sovereignty point to the weakening of the state, however, some aspects of the information revolution indicate a possible increase in the power of the state, as well as a widening of its role in the international system. In fact, interdependence and fragmentation, the two cardinal phenomena behind the weakening of the state, can stand as evidence for the widening role of statehood as well. For example, as Robin Brown points out in defending the nation-state, the present stage of interdependence is predicated upon the interaction of *states*. "It is the globalisation of the state that has done more than anything else to create the modern world."⁹⁴ Interdependence would be impossible under conditions of total anarchy, but the relative order imposed by the system of sovereign states allows groups to learn co-operation within that framework. Thus, rather than negating the role of the state, the interdependent system may actually rely on states to continue as the building blocks of international order.

Similarly, the move toward fragmentation may contribute to the widening of states' significance in the system, because the trend is largely

⁹³ Morton, Oliver. "The Information Advantage: Defence Technology Survey." Economist. Vol335, 10 Jun 95. p.19

driven by the desire of separatists to secede and create their own states.⁹⁵ Since the information age renders information a more valuable component of power than physical resources, smaller states are likely to be more viable than ever before, allowing secessionist governments to claim true statehood.⁹⁶ Although this increasing practicability of fragmentation could certainly alter circumstances for individual states, it would not, aside from slight disruptions in power balances, significantly alter the state system as such. In fact, fragmentation, by promoting conflict over who has the right to be called a state, may increase the prestige of statehood. A shift to a new form of system certainly would stir up a great deal of instability, but eventually fragmentation may give rise to a more stable system of homogeneous state actors whose national interests reflect true consensus.

Beyond these wider trends of system change, information age technologies themselves may aid the continuing importance of statehood. Innovations in ITs may help states perform their duties and exercise their prerogatives as much as they empower individuals within the state. The information revolution can enable governments to become more streamlined, more efficient, and more effective, just as it is already helping to reshape business and commerce.⁹⁷ In addition, as administration and government increasingly move “on-line,” the process of monitoring threats and maintaining

⁹⁴ Brown, Robin. “Globalisation and the End of the National Project.” Boundaries in Question: New Directions in International Relations. Macmillan, John and Andrew Linklater, eds. London: Pinter Publishers. 1995. p.56

⁹⁵ Ibid.

⁹⁶ Toffler and Toffler. War and Anti-War. p.27

⁹⁷ David Ronfeldt notes that “[t]he government world lags behind the business world in feeling the effects of the information technology revolution and related innovations in organisation. But government may change radically in the decades ahead.” Ronfeldt. “Cyberocracy Is Coming.” p.243

order should become easier.⁹⁸ The internet, for instance, can aid state functions from catching criminals to gathering political intelligence.⁹⁹ Likewise, news management may become a powerful tool for shaping public opinion and moulding consensus as capabilities for manipulating the media converge with the public's increased reliance on media information.¹⁰⁰ In these ways and more, information technologies may help transform the state into a better and even more vital institution in the information age.

Thus, the forces of interdependence, fragmentation, and technological change also hold varied potentials for increasing both the power of the state and the role of that institution in the international system. The more positive influences of these forces led one author to claim that, although "their significance may have changed to reflect the realities of increasing interconnectedness and coexistence,... states remain a vital and vigorous force in global politics."¹⁰¹ This is certainly true for the immediate future, and seems likely to remain so for years to come. As the previous section demonstrated, however, one should not forget that the coins of interdependence, fragmentation, and technological change all have a flip-side, and could also undermine the institution of statehood and perhaps even render it anachronistic in a distant-future global system. The coincidence of these contradictory trends points to the paradoxical conclusion that "the widespread application of science-based technology to industry (and, incidentally, to warfare and weapons), the growth of global markets, and the politicisation of ever growing areas of human

⁹⁸ Loader, Brian D., ed. The Government of Cyberspace. p.130.

⁹⁹ Vogler, John. "Technology and Change in International Relations." p.141

¹⁰⁰ Ibid.

¹⁰¹ Smith. "Modernization, Globalisation, and the Nation-State." p.257

activity, have led to a global transformation which has simultaneously extended and undermined the authority of the nation-state.”¹⁰²

Conclusion

The ambiguity of the information revolution’s effect on the state reflects its contradictory impact on men, for the dispersion of information power simultaneously increases and constrains the power available both to the individual and the state. Only time will tell which trend will prevail. For the present, the immediate significance of these trends lies in the fact that their impact on the context of conflict is driven by information. Despite their ambiguities, these contextual shifts provide important evidence about the consequences of information age change, because the fact that the information age can alter the roles of man and the state (even though the result of these shifts remains unknown) is a strong sign that the same forces of change may similarly transform war in the information age. Moreover, the pattern of the information age’s contextual changes may also provide a useful indication of how such a transformation of war might manifest itself. This evidence is of course not sufficient to prove that information age war will represent a fundamental, paradigmatic change in warfare but, as the following pages will examine in greater detail, it is a necessary precondition for that proof. The next chapter will take this evidence of information age contextual change - and its testimony to the potential for military paradigm shift - a step further by establishing that information age war’s claim to the title of paradigm shift could only be valid in the context of a society moulded by such prevalent, systemic information power.

¹⁰² Ibid., p.259

Chapter 2

WAR and INFORMATION: Understanding How the Information Age Affects War

Historical examples clarify everything and also provide the best kind of proof in the empirical sciences. This is particularly true of the art of war.

- Carl von Clausewitz¹

The information age, in altering the context of warfare, seems to hold the potential to transform war itself. In light of the far-reaching, if ambiguous, changes the information age has already begun to introduce in society, many in fact believe this transformation is underway even now. Among these enthusiasts, one can differentiate three predominant modes of explaining how the information age is affecting warfare. The more sceptical of the adherents maintain that information age war is not a significantly new phenomenon at all, but the culmination of a long evolution in military technology and strategy.² Others, more enthusiastic but still cautious, take a middle ground, explaining IAW's influence on warfare as a military revolution. They recognise that the information revolution will likely introduce important changes in waging war, but argue against the claim that these changes will affect the principles of war. Instead, these cautious enthusiasts typically view the introduction of information age war as one among a long progression of military revolutions which

¹ Clausewitz, Carl von. On War. Michael Howard and Peter Paret, eds., trans. Princeton: Princeton University Press, 1976. p.170

² E.g. Biddle, Stephen. "The RMA and the Evidence." Institute for Defense Analyses. Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996. p.3 Freedman, Lawrence. "The Revolution in Strategic Affairs." Adelphi Paper #318. London: Institute for International Strategic Studies, 1998. Gray, Colin S. "The American Revolution in Military Affairs: An Interim Assessment." Camberley, England: Strategic and Combat Studies Institute, 1997. Pp.5-7. Jablonsky, David. "The Owl of Minerva Flies at Twilight: Doctrinal Change and Continuity and the Revolution in Military Affairs." Carlisle, PA: US Army War College Web page, May 1994. O'Hanlon, Michael E. "Beware the RMA'nia!" Washington, DC: Brookings Institution Web page, September 1998.

transform war without markedly affecting the understanding of war nor the context within which it is waged.

Neither of these conventional explanations for the changing relationship between information and war, however, accounts for the greatest extreme of IAW enthusiasm. Proponents of the third and most radical view of information age war blanket the field of information warfare studies with sweeping claims that the information revolution will profoundly transform the content of conflict. They hold that the information age will alter not only how the world makes war on a superficial level, but also on a more fundamental level, affecting even the way the world understands the very principles of warfare.³

This chapter will investigate each of these opinions on information age military change in turn, endeavouring to establish how each explains the relationship between information and war in the information age, and the extent to which that relationship represents a change in warfare. The following pages will demonstrate that both the school treating IAW as an evolution of information's historical role in warfare and the school approaching IAW as a military revolution hold a certain degree of explanatory power. However, neither argument sufficiently accounts for the context within which the emergence of information age war is occurring, nor for the assumption that changes in this context are somehow linked to changes in war itself. Both the

³ Cooper, Jeffrey. "Understanding Information Warfare: Another View." Center for Information Strategy and Policy Inaugural Seminar. In Arquilla, John and David Ronfeldt, eds. Society and Security in the Information Age. Baltimore: Johns Hopkins University Press, 1998. p.14, Libicki, Martin C. The Mesh and the Net: Speculations on Armed Conflict in a Time of Free Silicon. Washington, DC: Institute for Strategic Studies, National Defense University, McNair Paper 28, March 1994. Ch.2, p.9, Mayfield, Terry; Senior Fellow, IDA. Interview with the author. 17 December 1996., Everett, Charles D., Moss Dewindt, and Shane McDade. "The Silicon Spear: An Assessment of Information-based

conventional views treat information age war as an extension (to one degree or another) of a historical pattern, all but ignoring the profound shifts which the information revolution is concurrently causing in almost every other aspect of human interaction. The school that treats information age war as a military paradigm shift, on the other hand, is particularly concordant with the information age's far-reaching societal changes, because its argument is based on the assumption that the information age will produce similarly profound changes in warfare. Unfortunately for those wishing to understand information age war's claims to the title of paradigm shift, however, proponents of this third view rarely offer viable explanations for how or why their predicted transformation of warfare will come about.

This chapter therefore endeavours to establish a reasonable explanation for the information age's potential to produce a new military paradigm, a justification for the widespread belief - and indeed, for this dissertation's investigation of this belief - that information age war constitutes a paradigm shift of war. It argues that the information age's changes in the context of war are not only consonant with the paradigm shift view of IAW, they are the key to understanding this school's myriad predictions that the information age will bring a fundamental transformation in war's content. In fact, this most radical interpretation of the information age's affect on warfare can only really be understood in context. That is to say, the claims that information age war constitutes a paradigm shift only make sense in light of the far-reaching changes the information age is introducing to human society, the context within which

Warfare and US National Security." Art of War in Information Warfare Prize. Washington, DC: National Defense University Press, 1997. National Defense University Web page. p.5

war is waged. These contextual changes provide a more adequate backdrop for the investigation of the information age's potential for military paradigm shift because, as the following pages will illustrate, similar shifts have presaged, and perhaps contributed to the emergence of new military paradigms in the past.

However, before this investigation can return to the issue of information age context and its role in military paradigm shift, it is necessary first to examine the two more conventional explanations for the changing relationship between information and war. Establishing an understanding of these schools' successes and failings in accounting for IAW is a necessary foundation for the inquiry into the contextual reading of information age war. It is necessary for the simple reason that, if either the historical interpretation of IAW or the military revolution interpretation succeeded in adequately explaining the emergence of information age war and its changes in warfare, there would be little need for a third, incompatible explanation. The shortcomings of the two more popular views of IAW's origins must therefore be identified before the investigation of the third, contextual account can be meaningful.

Historical Manifestations of Information Warfare?

The school that employs historical manifestations of information warfare⁴ to explain the current relationship between information and war depicts the development of information age war as simply a logical extension of historical information warfare principles under the influence of new, sophisticated information technology. Proponents of this explanation for the

emergence of IAW view information age military principles as little differentiated from the historically vital application of information in war. To such thinkers, information age war is only separated from past instances of information warfare by the sophisticated tools it employs. The emergence of these tools - with their unprecedented speed, efficiency, and pervasiveness - is the primary factor behind information's exponentially increased importance to warmaking. By categorising IAW as nothing more than the product of evolution, this interpretation of the modern relationship between information and war stands in emphatic opposition to the idea that IAW introduces a new paradigm of warmaking.⁵ Such an account is patently inappropriate as an explanation for the claim that information age war will require a new model for understanding warfare, since the historical argument considers the possibility of change only in the tools of war, utterly ignoring any potential for concurrent changes in the targets, objectives, and actors in information age war. In so doing, the historical account for IAW dismisses possible changes that would be definitive to an information age military paradigm shift, if one is indeed occurring. Furthermore, the evolutionary account not only fails to explain how and why such a profound shift might occur, but does not even acknowledge that information age war might represent a radical departure from the past.

To a certain extent, of course, the proponents of this historical interpretation are correct. Information age war is expanding the role which information has played in warfare since conflict began. Far from being unique

⁴ Throughout this section, the term 'information warfare' will be used to refer to the intensive exploitation of information in war, rather than to the 'information infrastructure attack' concept discussed in the introduction.

to the information age, several pivotal elements of IAW - notably command and control, intelligence, and psychological operations - are very old indeed. In fact, "in the sense that war is about strategies, command, and morale, it has always been about information."⁶ Soldiers have always needed timely intelligence in order to determine a plan of action; they have always needed well-organised command and control systems to disseminate the orders for implementing that plan; and they have always needed news from the battlefield to maintain the troops' *esprit de corps*. Moreover, the military has always attacked intelligence networks to blind their enemies and cripple their strategies; they have always targeted command centres to create undirected chaos on the battlefield; and they have always levied propaganda against troops and civilians to undermine war efforts. Thus, in both offensive and defensive manifestations, the intelligence, command and control, and psychological operations so crucial to IAW are all as old as conflict itself.

Today's information age war, however, is much more than simply a hi-tech descendant of its tactical ancestors. A cross-section of cases from history holds two important lessons about the current relationship between information and warfare: First, it illustrates the long-standing importance and prevalence of information tactics across many phases of warmaking. The foundations of information age war do lie in history, and the examination of these alone highlights the significance of current changes in the relationship between information and war, even regardless of today's increasingly information-rich

⁵ Libicki, Martin C. "What is Information Warfare?" Washington, DC: National Defense College, 1995. p.1

⁶ Morton, Oliver. "The Information Advantage: Defence Technology Survey." *Economist*. v335, 10 Jun 95: 8-17. p.18

context. Secondly, the investigation of information age war's foundations illustrates by comparison the distinctiveness of strategic IAW from its predecessors.

The first, and most legendary, evidence of information's importance in warmaking is found in the writings of Sun Tzu. Sun preached the importance of leveraging information almost twenty-five centuries ago, yet, amazingly, some of his advice on the use of intelligence is even more relevant now than it was then.⁷ According to Sun, "the reason the enlightened prince and the wise general conquer the enemy whenever they move and their achievements surpass those of ordinary men is foreknowledge."⁸ The leader who sent scouts to discover what the army should expect - where his enemy's army was, how prepared it was, what the terrain was like - held a great advantage, because the scouts' information told him where his troops were most needed, and allowed him to avoid wasting manpower on uncertainties or unexpected obstacles. Sun held intelligence to be the most crucial ingredient in warmaking, and believed that if a military force could "know the enemy, know yourself; your victory will never be endangered."⁹

Several centuries later and several leagues to the West, the Huns, in their battles against the Romans, also proved themselves masters of manipulating information for military advantage. The forte of the Huns, however, was not intelligence but propaganda. They employed this tactic to great effect in levelling the Romans' advantages of superior military training and organisation.

⁷ Morton. "The Information Advantage." p.10

⁸ Sun Tzu. The Art of War. p.144

⁹ Asprey, Robert B. War in the Shadows: the Classic History of Guerrilla Warfare from Ancient Persia to the Present. London: Little, Brown, and Company, 1994. p.23

Even in the ancient world, word of the Huns' ferocity spread far, enabling them to intimidate their enemies by reputation alone. Thus, according to Robert Asprey, the Huns defeated their neighbours less by having larger armies, than "by the terror of their looks, inspiring them with no little horror by their awful aspect and by their horribly swarthy appearance."¹⁰ Added to this was the fact that their leader Attila was famous for being the "scourge of God;" the combination lent the Huns a potent information weapon.¹¹

No less terrifying than Attila the Hun, Genghis Khan used information to strike not at his enemies' fears, but at their command systems. The Mongol commander recognised that his opponents' command systems were vulnerable through their reliance on correct and timely information. The Khan and his Mongol hordes exploited this reliance by depriving their enemies of intelligence: sending swift, skilled Mongol horsemen to waylay their opponents' scouts, capturing them and, more importantly, the information they carried. By depriving their opponents of information about everything from the terrain and the receptiveness of the local people to the Mongols' own deployments and preparedness for battle, the Mongols effectively blinded the enemy army. At the same time, the Mongols employed their own network of scouts on fast horses to keep themselves apprised of their enemy's location. Then, like the classic example of the sighted man playing chess with the blind man, they simply

¹⁰ Gilbert, Felix. "Machiavelli: the Renaissance of the Art of War." in Paret, Peter, ed. Makers of Modern Strategy: from Machiavelli to the Nuclear Age. Oxford: Oxford University Press, 1986. p.25

¹¹ Asprey. War in the Shadows. p.28

circled around behind the opposing army and defeated their enemy's undefended cities.¹²

If Genghis Khan personified military genius in the late agricultural age, his nearest counterpart in the early industrial age was Napoleon Bonaparte. Like the Khan, Napoleon understood the importance of information to command and control; Napoleon's greatness, however, lay not in exploiting faults in his enemy's command and control practices, but in the innovations he introduced in his own command system. The emperor instituted historic changes in French military command structures by centralising strategic planning, but decentralising tactical decision-making and allowing his subordinates to use an unprecedented degree of initiative. This approach eliminated the practice of disseminating operational information to headquarters, thus freeing information channels for the strategic information Napoleon needed and delegating the short-term planning to the field generals who were better informed to deal with it. At the same time, by centralising strategic planning, Napoleon's system provided a clearer focus of the bigger picture since it allowed all the information important to long-range planning to be concentrated at one level. Such selective centralisation helped to ensure that the information necessary for strategic decision-making was available at the right time to the right person. This command system proved a decisive factor in Napoleon's initial conquering of

¹² John Arquilla and David Ronfeldt. "Cyberwar is Coming!" Santa Monica, CA: RAND, 1992. Also in Comparative Strategy. vol2, 1993: 141-65. p.10

the Continent, and it owed its success to the continuous flow of information that alone maintained the balance between centralisation and decentralisation.¹³

In the twentieth century, another leader with hopes of controlling Europe recognised the importance of leveraging information in war. Like the Huns, Adolf Hitler primarily prized information not for its value to intelligence or to command and control, but for its use as propaganda. By manipulating information from Nazi party ideology to nationalist rhetoric, from radio news stories to myths of the *Vaterland*, Hitler forced national consensus on Germany. He (and, not to be forgotten, his propaganda minister Joseph Goebbels) stole from the lore of German culture to manufacture a quintessentially “German” cause fit to Nazi ends. This manipulated information proved so compelling that Germans from all walks of life succumbed to it - a fact which is perhaps more understandable when one recognises that every story and bit of news available to the people of Nazi Germany underlined the *rightness* of the Nazi cause, and emphasised that the Nazis only worked to bring Germany what she deserved. Hitler and Goebbels fostered this terrifying unity of the German people to create a daunting opposition against the enemies of National Socialism, and to bolster Germans’ will to continue the war well past the point at which many societies would have conceded defeat.¹⁴ So effective was the Nazi’s manipulation of information that remnants of it survive to blight the world’s view of German nationalism to this day.

¹³ To support his innovations in command, Napoleon instituted a practice of issuing regular reports from the army’s headquarters, and organised a staff specifically to deal with an expanded traffic in information. Van Creveld. *Command in War*. p.62

¹⁴ Earl, Edward Mead. “Hitler: the Nazi Conception of War.” In Earl, Edward Mead. *Makers of Modern Strategy: Military Thought from Machiavelli to Hitler*. Princeton: Princeton University press, 1943, 1971. p.510

However, perhaps the ultimate example of decisive information dominance can be found not in the propaganda, but in the exemplary use of intelligence during World War II. The decisive Battle of the Atlantic, which hinged on the Allies' shifting intelligence advantage, provides the clearest foreshadowing of the pivotal relationship between information and warfare in the information age. During that long battle, Britain relied on intelligence from the Ultra Project's decryption of German Enigma machine codes. When their supply of intelligence was steady and reliable, the British handily avoided Germany's U-Boat wolfpacks, and took over the initiative in the battle. However, both at the outset of the war and during a ten-month period in 1943, the Ultra project was unable to decrypt the U-Boats' codes. During this blackout the Allies suffered huge losses, and very nearly conceded victory to the Germans, only to find their fortunes utterly reversed by the return of Ultra's information supply.¹⁵ The Allies ultimately won the Battle of the Atlantic (and therefore, arguably, the war) on the strength of their superior intelligence.¹⁶

Thus history ably illustrates the importance of mastering information in war. These examples, ranging across twenty-five centuries of warmaking and encompassing information-intensive military activities as widely varied as command and control, intelligence, and psychological operations, illuminate the possibilities for creating strategic advantage from information in any age. In so doing, military history underlines the established importance of the relationship

¹⁵ Calvocoressi, Peter. Top Secret Ultra. London: Cassell, 1980. p.86. Winterbotham, F.W., C.B.E. The Ultra Secret. London: Weidenfeld and Nicolson, 1974. p.84. and Rohwer, Jürgen. "The Operational Use of 'Ultra' in the Battle of the Atlantic." in Andrew, Christopher, and Jeremy Noakes, eds. Intelligence and International Relations, 1900-1945. Exeter: University of Exeter Press, 1987. p.291; Cf. McPherson, March 1996

¹⁶ Strachan, Hew. European Armies and the Conduct of War. London: George Allen and Unwin, 1983. p.177

between information and warfare. Furthermore, by enumerating what soldiers have accomplished with information in the past, the historical account of information's role in war hints at the increased applicability of information to war in the information age. While examinations of historical information tactics elucidate how information age war is possible, however, historical precedents neither offer an explicit rationale for the exponential increase in information's importance in war, nor a satisfactory explanation of the information age's contextual changes and their relationship to the emerging changes in war. As subsequent pages will explain in greater detail, the historical account for IAW can therefore not feasibly be applied to account for the expectation, established in the introductory chapter,¹⁷ that information age war could constitute a paradigm shift with profound implications both for war and the society that wages it.

Military Revolution

While the historical account for IAW attempts to explain the emergence of information age war through information's traditional role in conflict, the second major interpretation of the current military changes seeks instead to explain the shifting relationship between information and war by focusing on periodic manifestations of change and innovation in warfare. This account views information age war as a military revolution, explaining the emergence of the war form in light of historical innovations in the art of war evidenced by military revolutions in the past. Similar to those who view IAW as an extension

¹⁷ This expectation was established by the dual evidence of the Gulf War's significant anomaly and the historical precedents set by previous societal revolutions on the scale of the

of historical applications of information warfare, proponents of the military revolution account for IAW see the phenomenon as an important innovation in warmaking, but a change not unlike thousands of previous military revolutions which have reshaped weapons - as well as strategy, doctrine, and organisation - since war began.

The military revolution account, then, represents an improvement over the historical explanation for IAW to the extent that it acknowledges that information age war introduces revolutionary changes. This argument, however, still fails to provide a sufficient explanation for the claim that IAW will be a paradigm shift. It categorises the explosion of information technologies that fuels information age war as no more significant than the rail-rifle-telegraph or tank-long-range aircraft-radio revolutions, and certainly not as a cause for introducing a new model for warfare. Moreover, like their colleagues who explain IAW historically, proponents of the military revolution explanation focus too much on how the changing tools of war will affect warmaking, and ignore the very factor which would distinguish information age war as holding unique implications for warfare: the potential that the current shifts in the tools of war may not simply affect how militaries conduct war, but also what they target, why they fight, and whom they fight for.

Again, however, the military revolution characterisation of information age war is not entirely wrong. Change has always affected war. So familiar is this fact that the phenomenon has even acquired two separate catch phrases: both the terms 'military technology revolution' (MTR) and 'revolution in military affairs' (RMA) have been widely used to describe radical military

information revolution. See the Introduction's section entitled "Paradigm Shift."

change. The former refers primarily to the introduction of new weapons and other physical tools for war, including non-weapon technological innovations like railroads and radios. The latter phrase, revolution in military affairs, more explicitly acknowledges that military revolutions do not entail changes in technology alone, but affect also doctrine, strategy, and organisation - the other tools of war without which weapons innovations may be useless.¹⁸ Since few who use the term 'military technology revolution' would argue that a technological innovation could truly transform war without a corresponding shift in doctrine, strategy, etc., the two terms are to a certain extent interchangeable. For the purposes of this paper, they are regarded as having the same denotation, if different connotations. The following pages therefore employ the term MTR to emphasise a focus on technological change, and the term RMA to underscore a focus on non-technological change. The two aspects of change are not only complementary, but also equally important to the phenomenon of military revolution. However, the non-technological aspect of radical military change is considerably less recognised, especially outside specialist circles. This section will therefore focus on the technological and the non-technological, 'military affairs' aspects of military revolution in turn, in order to emphasise the interdependent influence of both.

The MTR - Technological Innovation and Military Revolution

As with the established role of information in war, history illustrates the impact of military technology revolutions in every period of warmaking: from the introduction of gunpowder to the development of ballistic missile delivery systems, from the telegraph to tanks, MTRs have long affected the practice of

¹⁸ See also p.109

war. Military technology revolutions have been responsible for decisive advantages from the age when the Greeks beat the bronze-wielding Egyptians with sturdier iron weapons, to the battles when the British defeated the French with farther-ranging longbows, to the present day. In fact, military technology has never stood still. The tools of war have been steadily evolving as long as people have used violence as a means to political ends. Until the mid-1800's, this evolution was relatively gradual; fundamental changes like the shift from oared ships to sail-driven vessels were intermittent at best. During the latter half of the 19th century, however, warfare caught up to the industrial revolution.¹⁹ Radical change in the tools of warmaking became so fast and frequent that navies of 1900 resembled those of 1880 less than the latter resembled navies of 80 years previous.²⁰ The rate of change has continued to accelerate during the twentieth century, to the point that by 1960, according to Herman Kahn, a complete military revolution was occurring once every five years.²¹

Although even a rapid succession of military technology revolutions do not necessitate the institution of new principles for warfighting or a new paradigm for understanding warfare, any change sufficiently radical to be termed a "revolution" in military technology will have a noticeable impact on the methods of warmaking available within each paradigm. This impact primarily manifests itself through the capacity of military technology revolutions to act as force multipliers, as sources of superior destructive power,

¹⁹ Buzan, Barry. An Introduction to Strategic Studies: Military Technology and International Relations. London: Macmillan Press, 1987. p.18

²⁰ Parker, Geoffrey., ed. The Cambridge History of Warfare: the Triumph of the West. Cambridge: Cambridge University Press, 1995. p.243

²¹ Baylis, John, Ken Booth, John Garnett, and Phil Williams. Contemporary Strategy: Theories and Concepts. New York: Holmes and Meier, 1987. p.96

as enhancers of military cost-effectiveness, and as surprise advantages. These effects of MTRs are evident throughout the history of military technology.

The MTR as Force Multiplier

The most noticeable impact of many advances in military technology is their function as force multipliers. Military forces going into battle with a new tool of war commonly accomplish more per number of troops and per unit of effort. Such force multipliers are typically conceived primarily in the form of improvements in technologies which enhance the effectiveness of the weapons available to each soldier - like, for instance, the increased range and accuracy offered by the introduction of the breech-loading rifle. The force multiplying effect of an MTR does not, however, necessarily mean only that the same number of soldiers will be able to kill more of the enemy. Militaries have historically achieved 'more bang for the buck' by exploiting technological innovations which emit no bang whatsoever. Improvements in military mobility, for instance, act as force multipliers: the introduction of the stirrup allowed the Huns to manoeuvre more readily about the battlefield than their opponents, enabling each soldier to reach, and therefore defeat more opponents.²² Centuries later, the Prussian army exploited the invention of railroads to mobilise troops faster than ever before. The practice lent them a significant logistical advantage in the speedy supply of their troops, and allowed them therefore to field more soldiers in each campaign.

Non-weapon force multipliers also manifest themselves as improvements in communications capabilities. The introduction of the

²² Laughridge, Gene. "Recent and Not-so-recent Thinking on Information Operations and the Knowledge War." Army Communicator. vol. 20. 1 Apr 95: 32-39. p.33

telegraph in the mid-1800's revolutionised the practice of command and control (C2). Using this invention, commanders could co-ordinate plans and movements across great distances, bridging in moments separations which messengers on horseback took days to cover. The use of the telegraph thus greatly facilitated communication between headquarters and their troops, as well as among various armies in the field. This capacity for long-distance co-ordination acted as a force multiplier because it allowed traditionally unitary armies to disperse and cover more territory. As a result, armies could be in more places - and meet more of the enemy - at once.²³

The development of radio technology during the first half of the 20th century further contributed to commanders' ability to position their troops for maximum effectiveness: both the use of radio and of radar allowed the Allies to avoid defending areas that would not be targets. Radio, for its part, represented a significant improvement on the telegraph's long-distance co-ordination capabilities, allowing further dispersion and still faster co-ordination of planning. Radar, on the other hand, proved to offer a completely new advantage, creating a critical transparency of military operations. In its early days, radar famously acted as an effective force multiplier against the Luftwaffe in the Battle of Britain by providing information about the direction of attacking German planes and thus allowing Britain's Royal Air Force to concentrate its smaller fleet exactly where it was needed most.²⁴

²³ Van Creveld, Martin. Command in War. Cambridge: Harvard University Press, 1985. p.57

²⁴ Buzan. An Introduction to Strategic Studies. p.25

The MTR as Augmentation of Destructive Power

A second common product of military technology revolutions is an increase in destructive power, a factor that usually amounts to the improvement of available firepower. One notable such innovation occurred before Western conceptions of firepower had anything to do with burning gunpowder, in a time when the command to shoot produced not a gunshot, but a deadly barrage of arrows. This was the introduction of the longbow, a weapon which archers could fire five times faster than the cross bow, and whose missiles flew further and more accurately to pierce even chain mail.²⁵ At the Battle of Agincourt during the Hundred Years War, longbows created such an advantage in firepower that they enabled an outnumbered Henry V to defeat the French decisively. His English archers shot their enemy down before the Frenchmen could even reach the English line. The heightened destructive power of longbows proved so devastating that it continued to influence wargaming for the next century and a half.²⁶

The advantages of the longbow, however, were eventually superseded by the introduction of firearms. Almost from the first, destructive power became increasingly synonymous with the capacity to burn gunpowder and project missiles. As firearms became more and more entrenched in the practices of war, improvements in gunpowder-driven technology came to alter both the way soldiers fought, and what kind of soldiers did the fighting. The evolution of guns - from matchlock musket to flintlock to bayoneted rifle - gradually

²⁵ Parker. The Cambridge History of Warfare. p.92

²⁶ *Ibid.*, p.95, 92

increased the importance of infantry relative to that of cavalry.²⁷ With their armour-piercing bullets, firearms first rendered mounted knights outmoded,²⁸ then, as their accuracy and range increased, guns allowed the infantry to appropriate the domination of the battlefield which had traditionally been the purview of the cavalry charge.

The development of firearms, in a race against technology, also altered tactics at various points of military history. Early use of gunpowder nullified the defender's advantage in medieval sieges, temporarily interrupting the popularity of siege warfare until the advent of gunpowder resistant fortifications like multi-bastioned Italian traces shored up the position of the defender in the late 15th century.²⁹ During the mid-19th century, the breech-loading rifle's replacement of the slower, less powerful musket caused a tactical shift from the use of shock to that of attrition. The rifle's greater range lengthened battlefields, and prompted commanders to give up tactical formations in favour of long front-lines which allowed each soldier to do his part in slowly and steadily wiping out enemy forces and materiel.³⁰ Further development of machine guns in World War I led to that war's infamous reliance on trench warfare. The stalemate which ensued owed much to the fact that the unprecedented firepower that machine guns made available allowed both sides to remain sequestered behind impregnable defences and fend off their opponents almost indefinitely.³¹

²⁷ Guerlac, Henry. "Vauban: the Impact of Science on War." in Paret. Makers of Modern Strategy. p.65; Cf. also Clausewitz. On War. p.343

²⁸ Asprey. War in the Shadows. p.36

²⁹ Laughridge. "Recent and Not-so-recent Thinking on Information Operations and the Knowledge War." p.32

³⁰ Van Creveld. Command in War. p.53

³¹ Weigley, Russell F. "American Strategy from its Beginnings through the First World War." in Paret. Makers of Modern Strategy. p. 419; Parker. The Cambridge History of Warfare. p.266

The MTR as Enhancer of Cost-Effectiveness

A third consequence of military technology revolutions is their capacity to enhance the efficiency and cost-effectiveness of warmaking. To a certain extent, this factor is a corollary to MTRs' force multiplying and firepower advantages: if each soldier and each weapon individually can accomplish more, then the military receives more value for the cost of each. The 1906 launching of the HMS Dreadnought and others of its class illustrates the cost-effectiveness of innovation, since, according to contemporaries, the ship's firepower equalled that of three older ships combined.³² Even if building the dreadnought³³ were twice as expensive as building 19th century battleships, manning and maintaining one ship would certainly have been more cost-effective than running three separate ships.

The appearance of the Dreadnought also illustrates a fourth common effect of military technology revolutions: they often indirectly increase cost-effectiveness by clearing the slate of military advantage, thus adding to the value of new investments. In the case of dreadnoughts, since the new ships were both more cost-effective and more powerful, they rendered older ships obsolete. As the older ships became irrelevant to the reckoning of naval might, Britain's own innovation virtually erased her historical advantage as the greatest naval power. This allowed Germany, who had only begun seriously developing naval power during the mid-1890's, to compete as an equal for domination of the North Sea. Although Germany could not hope to match Britain's fleet of conventional battleships or her store of seafaring wisdom, Admiral von Tirpitz could nearly

³² Buzan. *An Introduction to Strategic Studies*. p.22

³³ The proper name Dreadnought came to encompass all the ships of this type, and, used thus as a general term is given in lower case.

equal Britain's production of dreadnoughts.³⁴ Each investment the German *Hochseeflotte* made in the new class of ships was therefore worth more than its cost, since it gave Germany an ability to challenge Britain's naval supremacy which, in the absence of the new technology, the Germans could not otherwise have hoped for. Other military innovations have wiped the slate of military advantage clean in a similar way. From the first use of iron swords against softer bronze to the dropping of the atom bomb on Hiroshima, military technology revolutions have altered the balance of advantage in war by nullifying old patterns of supremacy in the face of new means for predomination.

The MTR as Surprise Advantage

Lastly, such new means to military superiority often hold the additional advantage of surprise over the enemy. If a military technology revolution is truly unexpected, it may prove to be not only a cost-effective, firepower-enhancing force multiplier, but also a powerful tool of surprise. An enemy who does not anticipate a new tool or weapon will not know how to defend against it.³⁵ The longbow was so effective at Agincourt not only because it offered added 'firepower,' but also because the French did not know how to defend themselves against a weapon they did not have.³⁶ Rifles, poison gas, and torpedoes all had a similar impact when they first came into use. Likewise the

³⁴ By 1914 Britain had 19 dreadnoughts at sea and 13 under construction; Germany had 13 at sea and seven under construction. Palmer, Alan. Penguin Dictionary of Modern History. Hammondsworth, Middlesex: Penguin, 1985. p.102

³⁵ Cf. Krepinevich, Andrew F. Jr. "The Coming Military Revolution." Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996. p.13

³⁶ Despite the fact that the longbow had been in common use in England since about 1300, the French were still relying on crossbowmen at Agincourt. Delbrück, Hans. History of the Art

early use of tanks was especially effective because no one knew how to react to them. Tanks, however, are an unusual case of technological surprise, because both the surprisers (Germany) and the surprised (France and Britain) possessed the technology and the vehicle itself. The surprise lay in the fact that the former developed a doctrine specifically to exploit the advantages of tanks, while the latter simply added tanks to their arsenals as if they were just another weapon³⁷ like all the others. Britain and France fell to the Panzer divisions in 1940 not because the technology surprised them, but rather because Germany's innovative use of tanks was revolutionary.³⁸

The RMA - Military Revolution not by Technology alone

The adversaries' divergent use of tanks in 1940, in fact, provides the classic illustration of the axiom that changes in technology alone are not sufficient to transform war-making. Though technological innovation is a significant driving force behind military change, a true alteration of warfare occurs only when innovation on the physical plane combines with various other factors, from strategy to organisation, tactics to doctrine.³⁹ For this reason, many current strategic thinkers refer not to a military technology revolution, but to a revolution in military affairs (RMA), thus de-emphasising the role of technology in military innovation and encompassing the various other elements required to revolutionise warfare.

of War, Within the Framework of Political History. Vol. 4, "The Modern Era." Renfroe, Walter J., Jr., trans. Westport, CT: Greenwood Press, 1975. pp.465-6

³⁷ The Allies' abysmal failure to exploit the new technology in its own right serves as a lesson against the adoption of information weapon systems without a concurrent adjustment of doctrine and organisation.

³⁸ Arquilla, John. "The Strategic Implications of Information Dominance." Strategic Review. Vol22, n3. Summer 94: 24-30. p.29

One such element involves the recognition of an invention's particular advantages and limitations, and the adaptation of strategy, doctrine, and organisation to exploit them. As the French ably illustrated in 1940, employing a new tool of war without understanding how it can influence the course of a battle or implementing corresponding revisions in the art of war can be worse than useless. Conversely, Germany, by organising specifically trained units of soldiers into Panzer divisions and deploying these divisions according to tactics particularly formulated to capitalise on the tank's strengths, created a decisive advantage with the same tool. Germany's ability convincingly to defeat the Allies with the Panzer divisions is a prime example of the need to adopt military practices to new military tools, particularly because the Allies actually possessed better tanks. This, however, proved to be an empty advantage in the face of the Panzer units' superior deployment of the inferior German tanks.⁴⁰ Thus France's defeat by Germany dealt the French a difficult lesson in the cost of failing to develop a doctrine and tactics specifically designed for tank warfare.

The danger of using outmoded methods with updated technology is, moreover, still more evident when neither side makes the necessary revisions in strategy and tactics. In the case of the US Civil War, the North and South were locked in stalemate for years because neither knew how to turn the new firepower of the breech-loading rifle into a winning edge. Both sides possessed the technology which nullified the strategic advantage previously held by the

³⁹ Aftergood, Steven. "Monitoring Emerging Military Technologies." Federation of American Scientists, Public Interest Report. Vol48, n1. January/February 1995. p.4, Arquilla. "The Strategic Implications of Information Dominance." p.29

⁴⁰ Cohen, Eliot. "A Revolution in Warfare." Foreign Affairs. Vol75, n2: 37-54. p.46 The Germans also had fewer tanks in many situations, but this advantage was decisively mitigated by Germany's use of superior tactics, as well as their incorporation of the radio into the tanks themselves as well as in tactical deployment.

defender, but neither Union nor Confederate army immediately realised that they needed to change the way they used the new rifle technology in order to translate the defender's new disadvantage into an advantage for the attacker. For much of the war, therefore, political progress remained negligible while thousands of men lost their lives in battles that changed little of the strategic picture.⁴¹ This was a bitter lesson on the fact that no RMA can occur if no one recognises and adapts to the uniqueness of the innovation.

Recognition of the need for a new approach to a new tool is thus necessary if a revolution in military affairs is to occur, but it is not sufficient. In order for an RMA truly to take hold, there must also be some impetus to recognise and adapt to new techniques. To return to the case of the interwar tank RMA, Eliot Cohen has argued that the Germans - and to a lesser extent the Soviets - developed Panzer divisions and tank warfare doctrine because they had a goal toward which to direct the new weapon. Both Germany and the Soviet Union aimed to regain old lands and conquer new territory while France and Britain remained stubbornly convinced that appeasing the German dictator's increasingly greedy demands would preserve peace in Europe and avert repeating the devastation of world war.⁴²

Without such impetus, an army may never capitalise on weapons potentials, even if it possesses the means to build them. For example, neither the United States nor the (now former) Soviet Union have chosen to develop prompt radiation weapons, though both have had the technology and the capability to do so since 1960. Despite the tension of the Cold War, the

⁴¹ Weigley. "American Strategy from its Beginnings through the First World War." p.419

⁴² Kissinger, Henry. *Diplomacy*. London: Simon and Schuster, 1994. p.310

political and moral arguments against employing a weapon designed specifically to cause the slow and agonising death of civilians have proved decisive factors in prohibiting their development.⁴³ This is only one very clear-cut instance out of many where the cost in lives, treasure, and even political standing may outweigh the benefits of developing available technologies for new weapons. Consequently, as a rule even a recognised innovation will only be adopted for an RMA if there are compelling political, strategic, and moral arguments in its favour.

Lastly, in emphasising the non-technological aspects of military revolution, one should of course remember that non-technical innovations not only play an important role in adapting the art of war to new inventions, but that the innovations which spark a revolution in military affairs may themselves be non-technological developments. For instance, France's introduction of the *levée en masse* in 1793 was made possible by the social reordering of the French Revolution,⁴⁴ yet its impact on warfare was profound. Mass conscription - by allowing states to field armies 10, 20, even 50 times larger than ever before - dramatically increased the scale of battle, thus transforming warfare as significantly as the breech-loading rifle, the railroad, or any other mechanical invention of the 19th century.⁴⁵

⁴³ Baylis, Booth, Garnett, and Williams. Contemporary Strategy. p.93

⁴⁴ In 1793 France was still in crisis after the upheaval of the Revolution, and had little hope of ensuring security without mobilising *all* the manpower and resources at its command. France justified this dramatic departure from traditional military practice by claiming that the new Republic meant not only new rights and freedoms for its citizens, but new obligations as well. Epstein, Robert M. Napoleon's Last Victory and the Emergence of Modern Warfare. Lawrence, KS: University Press of Kansas, 1994. p.13

⁴⁵ So significant was the impact of the *levée en masse* on warfare that many strategic thinkers view it - along with the operational level of war and Napoleonic organisation - as one of the hallmarks of modern war. Epstein. Napoleon's Last Victory and the Emergence of Modern Warfare. p.3

The list of non-technological factors which contribute to the revolutionisation of war therefore extends from the obvious revisions in strategy, tactics, doctrine, and organisation requisite for incorporating innovations throughout warfare, to the recognition of the need for such wide-ranging changes and the impetus to implement them, to some of the very innovations behind the revolutions. Since all of these patently non-technological factors have played important roles in military revolution, this phenomenon of radical change in war is most aptly categorised not as a mere revolution in military technology, but, more comprehensively, as a revolution in military affairs.

IAW as Military Revolution

Having established the many and various characteristics of military revolution (whether one wishes to describe the phenomenon as a military technology revolution or a revolution in military affairs), it is now possible to examine the extent to which this classic model of change does account for the emergence of information age war. It is, of course, also possible to analyse how information age war, if it truly is a paradigm shift, would introduce changes in warfare which transcend the patterns of both MTRs and RMAs.

Proponents of the military revolution explanation of IAW predict that the information age's influence on war will alter conflict in much the same way that revolutions in military affairs have reshaped warmaking for centuries. Indeed, the RMA analysis is perhaps the most widely supported explanation for the changes that IAW is introducing in warfare. Especially in the warform's initial phases of development, where information age military techniques appear alongside the tactics of conventional war (as was the case during the 1991 Gulf

War),⁴⁶ the effects of introducing the new war form should, in fact, correspond closely to those of traditional RMAs. That is to say, the changes in technology, doctrine, organisation, strategy, and tactics that mark the emergence of IAW should initially serve as force multipliers which enhance firepower and augment cost-effectiveness as well as the advantage of surprise.

Most notably, several information age military innovations could act as valuable force multipliers. IAW's great advances in intelligence, for instance, should multiply available force by leveraging sophisticated sensor meshes, high magnification surveillance satellites, and networks of smart weapons to enable information armies to collect more and better intelligence than ever before. Moreover, improvements in communications should be better able to disseminate this information to the right people at the right time, allowing commanders to lead battles with real-time decision-making.⁴⁷ In addition, precision guided munitions (PGMs) and stealth technology will facilitate increasingly surgical strikes that, because of their precision, can optimise the effectiveness of each shot fired. Just as in past revolutions in military affairs, these elements multiply the force projected by information age soldiers by enabling them to attack and defend where and when action is most needed, thus amplifying the utility of each soldier and each activity.

Information age war enthusiasts also tout the dramatic increase in cost-effectiveness made possible by the adoption of IAW's tools and methods. First, since many technologies used in information age war - notably computers and telecommunications - are mass-produced on the open market, militaries will not

⁴⁶ Cf. p.119

⁴⁷ Aftergood. "Monitoring Emerging Military Technologies." p.4

have to support as much expensive research and development.⁴⁸ Consequently, the main cost of certain components of IAW attacks - such as hacking into enemy command systems at a crucial moment before an aerial bombardment - will arise not from the price of munitions or troop deployment, but from the relatively minuscule price of a specialist's computer expertise. While such attacks must be supported by traditional military force to be effective, shutting down an enemy's radar systems as an attack begins, for instance, could produce significant benefits for a relatively insignificant price. Secondly, the cost of producing even many formerly expensive weapons systems is predicted to become comparatively inexpensive due to the rise of computerised production. Leveraging information to facilitate production cuts costs by increasing the efficiency of industry and reducing waste.⁴⁹ Thirdly, computer integrated information management can be similarly employed to decrease logistics costs since computerised tracking and streamlining of the supply process can reduce the chronic problem of wasted, mis-delivered supplies as well as cut down on the infrastructure and number of people required to manage logistical concerns.⁵⁰ Fourthly, the same augmented intelligence which acts as a force multiplier could also reduce deployment costs. If troops have more precise information on where to attack and defend, military forces should be able to decrease their expenditure of wasted munitions, fuel, and effort.

Fifthly, and perhaps most notably, information age developments like virtual reality simulation can greatly help to reduce costs by training troops both more effectively and more cheaply. In virtual reality, soldiers can experience

⁴⁸ Morton. "The Information Advantage." p.14

⁴⁹ Krepinevich. "The Coming Military Revolution." p.17

situations much closer to battle conditions than traditional simulators have achieved without the expense of munitions or fuel.⁵¹ Furthermore, full strategic simulators like the Synthetic Theater of War (STOW), by allowing militaries to test new weapons in virtual reality, spare the cost of putting an expensive prototype in the field and limit weapons acquisition to only those weapons which have proven effective.⁵² This opportunity to train and test is especially valuable at the end of the 20th century, not only because defence budgets have shrunk since the end of the Cold War, but also because war now changes so quickly that many innovations have never been tested in real combat.⁵³

Another, less publicised, result which information age war shares with military revolutions is the advantage of surprise. Information age military forces derive this benefit principally from the pace at which they should be able to prosecute war. That pace is unlikely to stun any opponent completely, since the coalition's performance in the 1991 Gulf War effectively gave notice that the capacity for unprecedented speed and accuracy already exists. However, the comprehensive integration of information which will characterise mature IAW has not yet been applied to full-scale war; it is therefore not unlikely that the first true information age war will exhibit yet more surprising advances in pace. Even failing further advances, the pace of IAW should hold another, indirect surprise-related advantage for information age militaries. Like the French who

⁵⁰ See the introduction's note 13, also 'Efficiency's Rise to Power' in chapter three.

⁵¹ Steven Aftergood cites the fact that teaching a soldier to drive a real tank costs \$55 per mile, whereas driving a virtual reality simulator costs only \$2.50 for 'virtually' the same experience. Aftergood. "Monitoring Emerging Military Technologies." p.10

⁵² Aftergood. "Monitoring Emerging Military Technologies." p.9

⁵³ Buzan. An Introduction to Strategic Studies. p.30 Cf. also Campen, Alan D., ed. The First Information War: the Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1992. p.xi, Everett

did not understand how to defend against the longbows they did not themselves employ,⁵⁴ military forces who have not adapted to IAW's changes will not only be physically un-equipped to function at the pace of their more advanced counterparts, but are likely also to be conceptually unprepared to fight at this pace. Lacking the information systems or, more likely, the recognition of the need to leverage these systems in synergy throughout all levels of military activity, non-information age militaries will be ill-qualified to formulate adequate tactics and strategy to drive off the fast, accurate attacks of their information age opponents. As a result, information age militaries may be able to surprise some of their adversaries even with capabilities of which the world has already become aware.

Those championing the view that information age war is a revolution in military affairs can also point to the fact the current changes in war, like those historically evident in RMAs, have resulted not only from the introduction of new technology, but also from innovations in doctrine, strategy, organisation, etc. Military publications like the Air Force's *Cornerstones of Information Warfare* and the Navy's *Copernicus Forward*, as well as organisational shifts like the institution of an information-intensive squadron of Air Force servicemen or the Pentagon's own establishment of an office for Information Operations provide ample testimony that such innovations are already underway.⁵⁵ Moreover, the implementation of these changes owes itself to a growing recognition of the need to adapt warfare to the information age, as well as a practical impetus to do so. Though information technologies fuel the

⁵⁴ See also p.108

information age RMA, forward-minded military forces have already perceived the need to look beyond technology to the development of strategy, doctrine, and organisation designed to accommodate the new capabilities of information age technologies.⁵⁶ The present heated debate in the US military over the development of a suitable doctrine for information age war is evidence that strategic thinkers have recognised that new weapons alone are not sufficient factors to revolutionise war.⁵⁷

Further evidence that militaries have recognised the importance of incorporating both the technologies and the practices of information age war is ample in the annals of the Gulf War. The United States and its allies used nascent IAW principles at the heart of some of its most decisive offensives: stealth bombers led the all-important first strike which, significantly, targeted Iraq's information infrastructure of air defence radar, computerised command, and general electrical grids. Catching the Iraqis by surprise, the strike proved so effective that it disrupted Iraqi air defences and secured the coalition's information dominance for the duration of the war.⁵⁸ Furthermore, the use of sophisticated intelligence systems employing networked sensor meshes as well as surveillance and communications satellites helped to insure that the allies' information superiority nullified a great deal of Iraq's home field advantage of

⁵⁵ The 609th IW Squadron. Scott, William B. "Information Warfare Policies Called Critical to National Security." *Aviation Week and Space Technology*. 28 Oct 96. p.62

⁵⁶ James, Lieut. Shawn D., USN. "Information Warfare: A Phenomenon, an Innovation, or a New Paradigm?" US Naval Post-Graduate School Web page. 24 Mar 95. p.2

⁵⁷ Cf. Jensen, Owen. "Information Warfare: Principles of Third-Wave War." *Airpower Journal*. Vol.8. 1 Jan 94: 35-44. p.35, Aftergood. "Monitoring Emerging Military Technologies." p.4

⁵⁸ Mazarr, Michael J., Don M. Snider, and James A. Blackwell, Jr. *Desert Storm: the Gulf War and What We Learned*. Boulder: Westview Press, 1993. pp.93-95.

knowing the desert terrain.⁵⁹ These methods, and the tools with which they were implemented, indicated a budding acceptance and application of information age tactics.

The military success of 1991, moreover, also served as an important impetus for the further development of full-fledged information age war doctrines, tactics, and strategy.⁶⁰ By affording a preview of what might be possible with information tactics, the Gulf War “crystallised awareness” among US military planners that the adoption of IAW’s tools and practices could offer valuable advances in warmaking.⁶¹ The evidence of unexpectedly easy victory also provided a strong incentive to investigate the potential of information age war more thoroughly in the years that followed. This impetus has been further augmented by IAW’s particular attractiveness as a post-Cold War military investment. In an era of diminishing Great Power threats and down-sizing defence budgets, the relative cost-effectiveness of information age war, in addition to its promising potential for creating decisive military advantage, has made the emerging war form a popular choice for maintaining traditional military superiority amidst military spending cuts.⁶²

Information age war, therefore, seems to possess all the hallmarks of a military revolution. Like a military technology revolution, the radical changes that IAW has already begun introducing to warfare incorporate technological

⁵⁹ Laughridge. “Recent and Not-so-recent Thinking on Information Warfare. p.3

⁶⁰ James. “Information Warfare: A Phenomenon, an Innovation, or a New Paradigm?” p.3

⁶¹ Cohen, Eliot. “A Revolution in Warfare.” p.39

⁶² Johnson, Stuart, E. “DBK: Opportunities and Challenges.” in Johnson, Stuart, and Martin Libicki, eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University World Wide Web Page, 1996. Ch.2, p.1, see also Wirtz, James J. “RMA: Caveat Emptor.” Monterey, CA: Naval Postgraduate School RMA Conference Proceedings, August 1996.9, For further elaboration of this topic, see ‘First Order Reasons for Waging IAW’ in chapter five.

advances like the introduction of stealth and precision guidance technologies, as well as the explosion of improvements in communications and surveillance satellite technologies. Moreover, the recent proliferation of information age-minded doctrine like the US Army's FM100-6 on Information Operations and Joint Vision 2010⁶³ illustrates that IAW also meets the prerequisites for categorisation as a revolution in military affairs - in that it enjoys the recognition and impetus for incorporating information age innovations throughout military strategy, tactics, and organisation. One can, consequently, characterise the shifts behind the emergence of information age war as representing at the least a military revolution.

The concept of military revolution thus holds demonstrable explanatory power for the current changes in warfare. Yet is this concept able to account for the expectations of information age paradigm shift? Again, the answer is no - or at least, not entirely. If IAW is actually a military paradigm shift, the changes it introduces to warfare should be the result of more than a common revolution in military affairs. History has shown that even a rare, radical military technology revolution like the development of air power is insufficient cause for rewriting the very principles of war. Witness the fact that, despite enthusiasm to the contrary, airpower was largely absorbed into the traditional methods of attrition and manoeuvre in conventional modern war.⁶⁴ More pragmatically, one can also infer from the rarity of paradigm shifts that a military revolution cannot alone transform the paradigm of war. Military revolutions have occurred scores

⁶³ United States. Department of the Army. US Army Field Manual 100-6: Information Operations. Washington, DC: ATSC-Army Worldwide Web page, 27 August 1996, Shalikhshvili, John, M. Chairman, Joint Chiefs of Staff. Joint Vision 2010. Washington, DC: United States Department of Defense, 1997.

of times since the beginning of warfare, but, according to the criteria used here,⁶⁵ military paradigm shifts have occurred only twice - at the beginning of the agricultural and the industrial ages.

More significantly, the concept of military revolution cannot account for information age war's potential to cause a paradigm shift because military revolutions - even revolutions in military affairs - account for changes only in the tools of war. Shifts in the weapons, tactics, strategies, and even organisational forms that are decisive in war will affect only how militaries wage war, confining their impact within the realm of war itself. As this thesis illustrates, however, a paradigm shift of war should witness transformations not only in how militaries wage war, but also in who wages it, at what, and why. Only a transformation profound enough to alter these factors external to war could be sufficient to transform the very model through which the world understands warfare. Thus, although the military revolution explanation for the emergence of IAW does much to elucidate how and why that war form is changing the tools of war, the inability of this argument to account for shifts in any other aspect of conflict proves it finally to be an inadequate model for explaining the expectation that information age war could constitute a paradigm shift of war.

Taking IAW in Context

Claims that information age war will introduce a military paradigm shift can therefore no more be fully explained by the military revolution analysis than

⁶⁴ Arquilla. "The Strategic Implications of Information Dominance." p.26

⁶⁵ See the 'Paradigm Shift' section of the introduction.

by the historical information warfare analysis of the changing relationship between information and war. Both explanations have certain explanatory powers, but critical failings. The military revolution interpretation of IAW's emergence has an advantage over the historical IW interpretation in that the former accounts for how radical change affects war, but it lacks the latter's ability to explain how information came to be the critical element behind the military revolution. Yet, while the historical interpretation can explain the role of information in information age war, it lacks the military revolution version's ability to account for the occurrence and character of the changes IAW brings. Any hybrid of these two explanations would combine the advantages of both, but it would also share the principal failings of its components. By characterising IAW as a military revolution which augments information's traditional critical role in war through newly sophisticated information age technologies and practices, a hybrid explanation is valuable to the extent that it accounts for information's crucial part in war, as well as for the revolutionary changes IAW is introducing. Yet, this composite analysis paints the emergence of information age war as a continuation of long-standing historical patterns of revolution and evolution. That interpretation is patently at odds with the claim that IAW, as a paradigm shift, should represent a departure from the past so profound that it requires a new model for understanding war. Moreover, like its two component arguments, the hybrid explanation is also unable to account for shifts beyond the means level of warfare - that is to say, shifts not only in the question of 'how' war is waged, but in the what, why, and who of information age war. By ignoring these questions, the hybrid explanation, like the historical information warfare and the military revolution arguments that compose it, fails

even to consider the very factors that are the hallmarks of military paradigm shift.

Ultimately, the insufficiencies of these explanations are traceable to the fact that none of them acknowledges the role which the changing context of the information society plays in today's transformation of war. The belief that information age war could represent a paradigm shift of war is, however, predicated largely on the idea that the information revolution, having already profoundly influenced modern society, might have a similar effect on war. Thus, any attempt to explain information age war as a paradigm shift must take into account the context in which these changes are occurring.

Significantly, such a contextual reading of IAW's emergence, unlike the historical and military revolution arguments, does hold the capacity to explain the emergence of information age war as a paradigm shift. The changing context of warfare - the individuals, states, and other actors who wage war, as well as the international system within which it is waged - could plausibly account for fundamental, paradigmatic shifts in warfare because such shifts in war should occur either as a result of the same forces which have affected war's context, or secondarily, in reaction to the pervasive shifts in its context. If the information revolution is extensively transforming modern society, it may have the same impact on warfare - that most violent of societal interactions - by creating an imperative for information efficiency in conflict as in business, government, and other realms of social activity. Alternatively, the products of the information revolution's transformation of society - for instance, the information age's empowerment of individuals, its newly credible challenge to the primacy of the state, and its erosion of the hierarchical organisation form -

may themselves spark shifts in warfare, since the means and objectives of war tend to mirror the societies which wage it.⁶⁶ Such a contextual reading of the emergence of IAW therefore not only accounts for both the fundamental nature of the predicted shifts in information age war, and for information's role in those shifts, but also offers a means of understanding changes in the what, why, and who, as well as the how of IAW, thus finally providing a more thorough explanation for information age war's claims to the status of paradigm shift.

War is, in fact, particularly vulnerable to such contextual changes. Clausewitz characterises war as a non-linear phenomenon, one in which an input may yield a totally disproportionate output.⁶⁷ As such, the "very nature or definitions of the system can change" quite rapidly. According to Michael Handel's reading of Clausewitzian non-linearity, such transitions usually depend less on the variables within the system (which in any case cannot be meaningfully isolated for analysis) than on the parameters that set the boundaries of the system; i.e., on the context in which the system occurs.⁶⁸ War is thus highly sensitive to changes in its context due simply to the nature of warfare itself. This argument underscores the claim that conflict will change more radically now in the changing context of the information age than it has throughout all the content-shifting military revolutions of the past two centuries.

Perhaps the most compelling evidence for the pertinence of the contextual reading of military paradigm shift, however, derives from historical precedent. Again, the transition period between the agricultural and industrial

⁶⁶ Libicki. *The Mesh and the Net*. Ch6. p.1, Cf. also Clausewitz. *On War*. p.709

⁶⁷ Clausewitz. *On War*. p.139. This is a factor inherent in Clausewitz's famous ideas about friction in war. Cf. also Beyerchen, Alan. "Clausewitz, Nonlinearity, and the Nature of War." *International Security*. Vol17. Winter 92-93: 59-90. p.67

ages provides a valuable point of reference for the shifts occurring today.⁶⁹ Warfare began the transformation from an agricultural to an industrial age phenomenon not because new weapons emerged, nor because of new tactics, new doctrine, or new organisation. Instead, agricultural age warfare ended with the crumbling of the feudal social institution. The decline of feudalism in the waning years of the agricultural age transformed warfare by reordering society and therefore altering the context in which conflict occurred. The contextual shift produced new standards for how, why, and by whom conflict was waged, creating a uniquely new industrial age warform long before the first mass production of war machines.

Compare, for instance, the actors and their reasons for fighting before and after the industrial revolution. Agricultural age feudal warfare was typically fought by knights under a liege lord who engaged in battle out of a sense of duty and honour. The knights took up arms because they owed the service to their liege in return for the lands granted them by that lord. Lords, in turn, owed their vassals protection and security under the code of *noblesse oblige*. Both viewed war as a religious and moral duty to the Church, which at the time reigned supreme over feudal politics throughout Western Europe.⁷⁰ By contrast, the crumbling of the manorial system of obligation (vassal to liege as well as liege to vassal) upon the decline of the agricultural age led to the rise of a money economy and, consequently, of a new kind of army as well. Under this new system, soldiers began to fight for pay and plunder, rather than for honour and

⁶⁸ in Beyerchen. "Clausewitz, Nonlinearity, and the Nature of War." p.65

⁶⁹ Cf. also the 'Understanding Paradigm Shift in Context' section of the introduction and the 'Information Revolution' section of chapter one.

duty. As more and more such mercenaries emerged, it became possible to establish professional armies. Feudal lords who were eager to free themselves from dependence on the donated service of their vassals (which generally held a time limit of 40 days) enthusiastically encouraged this trend because it allowed them to build up a more permanent base of power.⁷¹

At the same time,⁷² the Reformation challenged both universal Catholicism and the political power of the Pope, thus paving the way for the emergence of nation-states bound by secular loyalties and politics.⁷³ States soon replaced feudal lords as the main actors in war, making warfare a matter of national interest rather than of personal glory or gain. These new entities, with money and professional standing armies at their disposal, enjoyed a new liberty to experiment with the tools of war. The nation-states, more highly centralised and formally organised than their feudal predecessors, were able to invest more money in warfare. The comparatively regular and abundant flow of money allowed post-feudal militaries to purchase more and better weapons, and to take risks on new inventions. Likewise, the ability of the nation-state to salary full-time soldiers and administrators encouraged the establishment of a much larger core of thoroughly trained, professional soldiers who were equipped - or had ample time to be trained - to handle more innovation and greater complexity in their weapons and in their battles. It was in this context that gunpowder

⁷⁰ Devries, Kelly. Medieval Military Technology. Peterborough, Ontario: Broadview Press, 1992. p.96. Gilbert. "Machiavelli." p.12

⁷¹ Gilbert. "Machiavelli." p.14 Cf. also Clausewitz. On War. p.709. Delbrück. History of the Art of War. p.224

⁷² Feudalism in Europe crumbled during the 13th-15th centuries, depending on where one was.

⁷³ Der Derian, James. On Diplomacy: a Genealogy of Western Estrangement. Oxford: Basil Blackwell, 1987. p.110

weapons took root in the West as popular tools of war.⁷⁴ Thus conflict's new actors, with their new reasons for fighting, also altered the art of war itself, yet the importance of these alterations remains not with the technological innovations, but with the context in which they occurred.⁷⁵

Still more significantly, the new context of the industrial age also caused a shift in the nature of power itself. As discussed in chapter one, the progression of industrialisation caused production and money to replace land as the primary source of both wealth and power. The new power base in turn altered the traditional ends of war: with the growing primacy of industry over agriculture, the principal motivation for war increasingly shifted from the agrarian goal of capturing surplus wealth and land for its own sake to the conquest of land bearing resources crucial to industrial production.⁷⁶

⁷⁴ The Renaissance historian J.R. Hale notes that, "Changes in weaponry and tactics [attendant with the popularisation of gunpowder] called at least for a core of trained men who could help recruits to adapt to methods no longer part of quasi-folklore behaviour." This training function became increasingly important as new recruits became more and more numerous, owing to the fact that firearms both increased the usefulness of infantry, and raised the demand for foot soldiers. The core of professional soldiers who provided this training was the forerunner of the modern standing army. Thus, the adoption of firearms - with their need for a permanent coterie of craftsmen and administrators to keep militaries supplied with the new weapons - helped establish the idea of "consistent annual military expenditure." However, the increased bureaucratic and financial capacity of the post-Westphalian state played a significant role in allowing this change in military methodology to become standard practice. Hale, J.R. War and Society in Renaissance Europe, 1450-1620. Leicester: Leicester University Press, 1985. Pp. 65, 67, 64, 47. Cf. also Delbrück. History of the Art of War. p.224.

This state of affairs stands in stark contrast to that during the earlier Middle Ages, when armies, often hastily cobbled together to meet whatever challenge was at hand, were comprised of a small core of trained, privileged knights and a large collection of peasants who knew little of the art of war.

⁷⁵ Gilbert. "Machiavelli." p.14

⁷⁶ In the agricultural age, land was a goal of war 'for its own sake' because the land itself was the key to economic, strategic, and even status-based power. In the industrial age, the resources extractable from the land became the more important keys to the various manifestations of power. Lynn, John A., ed. Tools of War: Instruments, Ideas, and Institutions of Warfare, 1445-1871. Chicago: University of Illinois Press, 1990. p.238 See also the 'Understanding Paradigm Shift in Context' section of the introduction and the 'Information Revolution' section of chapter one.

Consequently, warfare at the end of the industrial revolution was a fundamentally different art from that practised during the agricultural age. Not only did soldiers have new tools and methods for warring, the soldiers themselves were different kinds of people, with different reasons for fighting, different goals to achieve, and different institutions to fight for. The transition from agricultural to industrial age was itself largely responsible for the emergence of the new war paradigm, since altering the context of conflict produced a chain reaction throughout the many variables of warfare. Once the contextual parameters of this non-linear system shifted, war's content had to adapt accordingly if warfare was to remain a relevant instrument of politics. In light of this historical example of the impact of contextual change on the content of warfare, it is easy to understand how proponents of the paradigm shift argument have come to expect the information age to introduce similar paradigmatic transformations to warfare under similar conditions of widespread contextual change.

Yet while the evidence of historical precedent does successfully explain the potential for causing paradigmatic change, this precedent alone does not prove that the present information age contextual shift has the capacity to foster changes in warfare as fundamental as those of the industrial age. Two factors from the present augment the evidence of the past to complete the argument that the information age indeed holds at least the potential to introduce a paradigm shift of war.

The first revolves around the nature of the information revolution and the changes it is capable of introducing. The meteoric rise of computers and the internet, the success of networked organisation in business, and the popularity of

niche markets are all testimony to the already extensive influence of the information revolution on the global economy. Advances in information technology have, moreover, pervaded virtually aspect of life in advanced societies, as testified by the profusion of government services on-line, academic collaboration in cyberspace, and even internet romances. While the ultimate consequences of these shifts are not yet fully evident, the changes, as the previous chapter illustrated, have already inaugurated distinctly information age trends toward widening and weakening both individual and state power.⁷⁷ The profound impact that the information revolution has already had upon individuals and states illustrates that the present transformation of context is at least as significant as that of the industrial revolution. This evidence establishes that the historical precedent could feasibly apply to the present circumstances.

The second factor is also concerned with the nature of the information revolution and, more specifically, with its relationship to the nature of war. Information is, of course, the pivotal factor in the information revolution, a revolution so named because the innovations it introduces in information technologies are transforming the role information plays in society - what information can do, how important it is, and even what part it plays in the composition of power. Likewise, as the previous sections have detailed, information is also a crucial element of warmaking. Recent innovations in information technology have further increased information's established importance in functions such as command and control, intelligence, and psychological operations.⁷⁸ The central role of information in both the current

⁷⁷ See the 'Man' and 'State' sections of chapter one.

⁷⁸ Cf. p.93

revolution and in warfare augurs that the latter will be highly sensitive to the influence of the former, since the information revolution introduces changes which affect not the periphery of conflict, but one of the keystones of warmaking. War's own reliance on information may thus cause it to be more receptive to the information revolution's forces of change. Ironically, although some sceptics refute claims that IAW is a new conflict paradigm on the grounds that information has always been a vital part of warfare, that very fact may render war more susceptible to the transforming forces of the information revolution.

Taken together, these contextual arguments illustrate better than any other available explanation that the information age holds the potential to produce a new paradigm of war. The historical example of the transition from agricultural to industrial age warfare ably demonstrates that context can serve as the definitive factor in the emergence of a new military paradigm. History, moreover, also details the character of the context and content shifts which herald a new conflict paradigm: from changes in the nature of power and the shape of the political system to alterations of the actors and their tools and goals for conflict, the transition to the industrial age sets many precedents for the dawning of the information age and its own war paradigm. Elements from the present also augment the evidence of the past, since both the nature of the information revolution and that of war itself indicate that the information revolution and information age warfare fulfil the prerequisites for introducing a paradigm shift to war. Whether or not this paradigm shift actually occurs depends now on the extent to which IAW fulfils its potential to transform the model by which the world understands war. Thus it is to the barometers of

paradigm shift, the how, what, why, and who of information age war, to which the investigation now turns.

Chapter 3

NEW MEANS to an END? How Information Age War is Waged

"The first, the supreme, the most far-reaching act of judgement that the statesman and commander have to make is to establish... the kind of war on which they are embarking, neither mistaking it for nor trying to turn it into, something that is alien to its nature. That is the first of all strategic questions and the most comprehensive."

- Carl von Clausewitz¹

Changes in how war is waged constitute the first and most obvious sign that a military paradigm shift may be occurring. Such changes take the form of shifts in the means soldiers use to prosecute war, a category which includes not only physical tools of war like weapons, transportation, and communications systems, but also more intangible tools like doctrine, command structure, tactical objectives, and training practices. Over the past decade or so, alterations in these aspects of war have become a marked component of military activity in many parts of the world. From the United States to China, the Soviet Union to Great Britain, the profusion of efforts to update military forces for the information age is a strong indication that the revolution in information technologies is indeed affecting the means of war. However, what that effect is, and how profound it is, remains a popular source of debate. This chapter will therefore begin the investigation into the potential information age military paradigm shift by examining these two issues, with the intent of establishing what IAW's changes in the means of war may mean for conflict in the information age. Specifically, the following pages will concentrate on one trend which has been conspicuous throughout the emerging changes in how war is

¹ Clausewitz, Carl von. On War. Michael Howard and Peter Paret, eds, trans. Princeton: Princeton University Press, 1976. p.596

waged - information age war's emphasis on the decisiveness of efficiency. The significance of this trend as a departure from traditional means of war will play the primary role in determining whether or not information age war fulfils the first criterion of an information age military paradigm shift.

The Changing Means of War as the First Criterion of Paradigm Shift

The investigation into the criteria for military paradigm shift begins here for several reasons. Firstly, changes in how information age war will be waged are the easiest and quickest changes to implement, and therefore are typically the first to appear. Shifts in the actors who will be able to engage in full-scale war or in their motives for doing so remain but distant forecasts, but changes designed to accommodate predicted shifts in the means of information age war have in fact already begun to occur. Evidence of this fact may be found most prominently in the profusion of efforts by the United States military to update the American war machine for the information age's potential challenges. The US military's use of technologies like stealth and precision guided weaponry, its establishment of information savvy organisations like the Defense Information Systems Agency (DISA), and the Air Force's 609th IW Squadron,² and its publication of doctrines - like Joint Vision 2010 and the Army's Force XXI - designed to accommodate information age military capabilities, are all among the first clear indications that the revolution in information technologies is indeed affecting war to a considerable extent.

Secondly, on a practical level, changes in how war is waged are also the easiest to recognise and to measure. Compared to the task of quantifying

² Scott, William B. "Information Warfare Policies Called Critical to National Security." Aviation Week and Space Technology. 28 Oct 96. p.62

changes in what war targets, why it is waged, or who wages it, measuring both the changes in means themselves and the effect these changes have on the waging of war is relatively straightforward. Of the actual changes in means, new practices - from the procurement of sophisticated sensors and the implementation of networked organisation to the deployment of stealth and precision guided munitions and even the prevalence of strategic decisions to blind an enemy's command and control systems - are all tangible changes which can even be physically counted. The effects such changes have are slightly more difficult to quantify but - from decreased casualties in battles against a blinded enemy and decreased collateral damage when using PGMs to improved battle reaction times and reduced materiel losses - many effects of the changing means of war are also visible and, to some extent, measurable for their contribution to warmaking.

In addition, the question of how information age war will be waged should be examined first because changes in other criteria of the paradigm shift might possibly result from a significant transformation of the means of war. For instance, a shift in the kind of systems which constitute a critical military vulnerability could influence a related change in what militaries will target in the information age. Likewise, a considerable change in the cost or accessibility of weapons for future wars might encourage new actors to consider employing war as a means to an end, thus affecting who will wage information age war. These possibilities will be considered in future chapters;³ the present chapter will confine itself to establishing that IAW is indeed changing how war is waged, and investigating the significance of those changes.

Before this inquiry can begin, however, it is necessary to remind the reader that there is a notable limitation to using changes in the means of war as a barometer of paradigm shift. That limitation arises from the fact that such changes have occurred hundreds of times without requiring a new model for understanding war. The majority of these changes, as the previous chapter details, have instead produced scores of military revolutions over the centuries. The fact that men have witnessed and studied hundreds of technological, organisational, and operational changes in war makes the well-known model of the military revolution a logical, but confusing starting point for studying the changing means of information age war. The example of military revolution is a logical frame of reference because the military revolution's changes - and their impact on the means of war - are relatively familiar. This viewpoint, however, is more likely to confuse one's understanding of IAW's means changes because the present investigation is examining these shifts not in the context of the familiar revolution in military affairs, but as potential components of a much wider phenomenon.

If information age war truly is a new paradigm of war, it will by definition require a new model for understanding warfare. Military revolutions, however, engender no such paradigm shift because they traditionally alter the calculation of military advantage within the bounds of time-honoured military principles, and therefore do not affect the nature of war itself. Because both IAW and military revolution have a very similar initial influence on how war is waged (in fact, chapter two established that IAW can be characterised as a military revolution at the least), many strategic thinkers have embraced the idea

³ Chapters four and six, respectively.

that the emergence of information age war represents a revolution in military affairs, without even entertaining the possibility that the current changes in warfare might signify an even more profound shift.⁴ Beginning the paradigm shift investigation with the changing means of war may therefore cause confusion by tempting the reader to just such an early conclusion.

There is evidence, however, that a profound shift may indeed be underway. If it is perhaps not yet obvious in warfare, this shift certainly is obvious in other aspects of social interaction. Chapter one's account of the information age's effect on the roles of man and the state in society is testimony to this fact. These contextual changes, chapter two demonstrates, provide preliminary justification for the assumption that the information age may introduce a new paradigm of warfare.

Endeavouring either to prove or disprove that assumption, this chapter will examine the current changes in how war is waged not for their independent significance, but for their significance as one of four barometers of military paradigm shift. For this reason the chapter aims not simply to illustrate the new capabilities that information age war may offer militaries, but rather to establish what the new means of IAW mean for conflict in the information age. With that intent in mind, the following pages will largely forego recounting the myriad developments in specific tools of war, as well as the numerous innovations in military practices. Others have done this in great detail elsewhere.⁵ Instead, the

⁴ Eg. Krepinevich, Andrew F. Jr. "The Coming Military Revolution." Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996. Fitzsimonds, James R. "The Coming Military Revolution." Parameters. Vol25, Summer 1995: 30-36.

⁵ E.g. United States. Department of the Army. US Army Field Manual 100-6: Information Operations. Washington, DC: ATSC-Army Web page, 27 August 1996. Krepinevich. "The Coming Military Revolution.", Everett, Charles D., Moss Dewindt, and Shane McDade.

chapter will focus on a larger trend in the changing means of information age war that, if it truly does represent a fundamental shift in the waging of war, would constitute the first indication of an information age military paradigm shift. That trend is defined by an ever-increasing emphasis upon the potentially decisive role of efficiency in future military operations.

EFFICIENCY over MASS

This emphasis on efficiency in the waging of information age war parallels a similar trend inherent in the rise of information power. The growing supremacy of information in the recipe for power is based primarily upon the ability of modern information technologies to create efficiency. Under this configuration of power, advantage is achieved depending on the speed and/or the accuracy with which an ever growing number of tasks can be completed. The acquiring and maintaining of almost every form of information age power should, as a result, come to depend less and less on the industrial age quotient of mass, relying instead on the capacity for efficiency now made available through sophisticated information management. From computer-integrated manufacturing to electronic inventory-tracking to guided missiles, the precision attainable through the use of modern information technologies promises to obviate a great deal of waste. This should reduce not only the need for physical

"The Silicon Spear: An Assessment of Information-based Warfare and US National Security." Washington, DC: National Defense University Press, 1997. National Defense University Web page. Martin Libicki has also contributed several useful sources on the more tactical side of IAW, including Libicki, Martin C. The Mesh and the Net: Speculations on Armed Conflict in a Time of Free Silicon. Washington, DC: Institute for Strategic Studies, National Defense University, McNair Paper 28, March 1994. Cooper, Jeffrey. "Dominant Battlespace Awareness and Future Warfare." in Johnson, Stuart, and Martin Libicki, eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University Web

resources, but also the dependence on them as quotients of power.⁶ As a result, the accurate and fast may increasingly be able to challenge the traditional advantage of the large and strong, dissolving the old correlation between power and size in favour of a new link between power and efficiency.

The waning military applicability of the old mass-power correlation is to date most obvious in the case of the 1991 Gulf War. During this conflict, the coalition forces drove the Iraqi army back to Baghdad with relative ease, despite the fact that the Iraqis at the time possessed the world's fourth largest army - an army which many predicted before the war would be no easy opponent.⁷ This conflict provided the first tangible evidence that militaries (like businesses and governments) must learn to compete according to the rules of the information age if they are to survive in the efficient contests of that age. Information age war, defined as a conflict in which victory falls to the force most effective at leveraging information, should ideally represent the epitome of such decisively efficient competition. In order to comprehend how IAW will be waged in the future, therefore, one must understand first and foremost the efficiency intrinsic to that new warform. However, since efficiency plays a pivotal role not only in information age military power but in all forms of information age power, it will be useful to establish an understanding of efficiency's contribution to power in

page, 1996. Chapter 6, and Libicki, Martin C. "What is Information Warfare?" Washington, DC: National Defense University, 1995.

⁶ See the introduction, 'Conceptions of War in the Information Age' and 'Understanding Paradigm Shift in Context.'

⁷ Biddle, Stephen. "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict." *International Security*. Vol21, n2. Autumn 1996: 139-79. p.142 Campen, Alan D., ed. *The First Information War: the Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War*. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1992. p.xx. Cf. also Cohen, Eliot. "A Revolution in Warfare." *Foreign Affairs*. Vol75, n2: 37-54. p.53

general, before moving to a more specialised investigation of its role in information age military power.

Efficiency's Rise to Power

The first step to understanding how efficiency may supersede mass as the decisive factor in power is establishing a grasp of the role which mass, until recently, has played in the power equation. Throughout the industrial age, the advantages of mass provided the key to success - for the military as for most of advanced society. Bigger was better, whether it meant more tanks, more guns, and more bombs for the security forces, or more cars, more factories, and more gadgets for the public. The primary war-winning strategy of the age reflected this emphasis: attrition targeted mass, aiming to conquer an enemy by destroying so many of his tools for war (and for war production) that he could not afford to fight back.⁸ Likewise, private business reflected this attitude, focusing marketing attempts on reaching as many people as possible, and satiating this mass market with quantity if not quality.⁹ This is not to say that the industrial age ignored the benefits to be had from efficiency - indeed, both the standardised assembly line and the machine gun were lauded for their capacity to increase efficiency.¹⁰ In the final assessment, however, the benefits of these and other innovations came to be felt most in the mass results they produced.

Nascent information age society, on the other hand, has already begun to show signs of moving away from the cult of 'bigger is better' toward the newly

⁸ Howard, Michael, ed. Restraints on War: Studies in the Limitation of Armed Conflict. Oxford: Oxford University Press, 1979. p.10

⁹ Toffler, Alvin. Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. New York: Bantam Books, 1990. p.25

¹⁰ Ellis, John. The Social History of the Machine Gun. London: Pimlico, 1976. pp.174, 126

decisive edge of efficiency.¹¹ Manufacturing increasingly aspires to produce not more, but more cost-effectively. Niche markets (such as, for example, the internet trade in gourmet food)¹² have sprung up, providing small, distinct sets of customers with tailored products and services.¹³ The booming service market is itself a reflection of this trend toward efficiency, dealing in specific expertise to help people maximise the resources they have. The success of small businesses within the market also provides testimony that size is no longer necessarily a positive correlation to success, as evidenced by the many thriving internet companies, like Amazon.com, which rely on comparatively¹⁴ small physical infrastructure to achieve a wide reach throughout the consumer market.

Nor has the military been left out. Innovations such as, most famously, the development of precision-guided munitions (PGMs) and computerised inventory-tracking enable soldiers to destroy their targets and supply the troops in the field more effectively with smaller losses of materiel. Likewise, the use of prototype simulations and computer-organised equipment production allows for greater stream-lining of military procurement by reducing both the waste generated in the production of an inappropriate system and in the manufacturing of needed systems. In the first instance, waste can be reduced by simulating the performance of a prototype. If that prototype does not meet the required

¹¹ Cf. Peter Drucker in Coates, Joseph F. and Jennifer Jarratt. What Futurists Believe. Mt Airy, MD: Lomond Publications, 1989. p.130

¹² See sites such as www.gourmetmarket.com, which offers everything from chocolate to cigars to wine; or www.freshcaviar.com, which sells not only caviar, but paté de foie gras and truffles, among other exotics; or www.unclfred.com, which specialises in spicy foods from Habanero pepper sauces to gourmet South Texas salsa.

¹³ The 21st Century Army: Roles, Missions, and Functions in an Age of Information and Uncertainty. Ann Arbor, MI: Vector Research, 1995. p.x

¹⁴ Small as compared to, say, IBM or Toyota, or even Barnes and Noble. While neither Barnes and Noble nor Amazon require the large factories or research and development centres of the other two companies, Amazon further benefits from the fact that, unlike Barnes and Noble, it does not have the overhead cost of maintaining stores.

standards, militaries can forego manufacturing it before incurring the cost of further production. In the second instance, techniques such as computer-integrated manufacturing can more precisely determine the amount of an input needed and track that input to increase efficient production. This practice should prevent waste both from purchasing excess inputs for the output required, or from failing to employ those inputs optimally.

These innovations have been made possible by the complex information technologies now available to facilitate the management - processing, sorting, analysis, and use - of information. Information management methods as basic as merchandise bar codes can track which products are selling and in what amounts, as well as gauge what is left in inventory and how much more must be ordered or produced. In addition, collating the data from bar codes with credit card accounts can give a merchant detailed information about who buys what kind of product and when.¹⁵ By using such information in the setting of production schedules, manufacturers can produce a precise accounting of demand and thus virtually eliminate the need to maintain large inventories of goods.¹⁶ It is precisely this kind of ability to create advantages through efficiency which should replace the industrial age dependence on mass.

These same methods should also help the information age military to function more efficiently. Logistics provides a parallel example, since information management may forestall the need for large back inventories of military supplies as well. For instance, computerised tagging and tracking of supplies sent to the front can insure that each unit gets exactly the amount of

¹⁵ Toffler. Powershift. p.10

food, ammunition, and fuel that it needs. There should then be no need to send extra supplies in case some get lost or mis-routed. Compare this scenario to the relatively unsophisticated logistics system still in use at the time of the Gulf War. Of the 40,000 supply crates shipped during the seven months of Desert Shield and Desert Storm, 22,000 had to be opened in order to find out what they held.¹⁷ In the future, nearly all the time and manpower required to reorganise those supplies for use in the theatre can be eliminated simply by better management of supply information.

Information management may, moreover, also be able to replace the cumbersome logistics infrastructure traditionally established in the theatre of conflict to manage supply distribution. If military suppliers can monitor distribution remotely via computer, satellite, and e-mail, the main supply base need not be located near the supplies. This so called “focused,” or “split-based logistics” should obviate the need to send entire corps of logistics managers to the theatre. Such a program could not only reduce the number of one’s soldiers that are placed at risk, but cut the risk to the soldiers actually in the theatre by rendering them much more mobile and flexible, and thus better able to avoid threats.¹⁸ This is just one of many examples in which efficiency - born of information management - could yield a more effective fighting force.

The capacity to create advantages such as these is gradually making efficiency the decisive edge in many forms of information age power. This

¹⁶ Molander, Roger C., Andrew S. Riddle, and Peter A. Wilson. “Strategic Information Warfare: a New Face of War.” Santa Monica, CA: RAND, 1996. p.17

¹⁷ Franks, Frederick M., Jr, Gen USArmy. “Winning the Information War.” Vital Speeches. 15 May 94, v60, n15: pp453-459. p.457

¹⁸ Shalikhavili, John, M. Chairman, Joint Chiefs of Staff. Joint Vision 2010. Washington, DC: United States Department of Defense, 1997. pp.24-5, 18. The 21st century Army. p.xi-

increasingly vital efficiency began as a novelty and a luxury, enabling the pioneers of modern information technology to operate a bit faster and a bit smarter. Once businesses learned to translate that extra time and productivity into a leverage over competitors, however, the power of information transcended luxury to become the “critical difference between success and failure.”¹⁹ This dependence on efficiency as the principal source of advantage is increasingly replacing the historical role of mass in the accrual of power. Already a competitor who possesses higher quality market research, more accurate product targeting, and an optimised production schedule can out-sell another company even if the latter possesses more factories and produces more goods.²⁰ Likewise the number of one’s tanks and guns should mean considerably less against an enemy whose information power tells him the exact moments and places where one is most vulnerable, and guides him to strike those targets with deadly precision. Thus the key to economic, social, political, and military survival is shifting from what resources one has, to how one uses them. This shift should ultimately spell a decoupling of the link between mass and power.

The information age’s potential decoupling of the mass-power link can be further illuminated by comparison with the last such shift in the composition of power, the industrial revolution. The shift from mass to efficiency reflects the industrial age shift from land to mass as the critical component of power. Though it is still uncertain whether the later of the two shifts will contribute to a

The US military has, in fact, already devoted considerable study toward the development of focused and split-based logistics.

¹⁹ *The 21st century Army*. p.xi

military paradigm shift, both of these power shifts clearly result from the fact that societal revolution introduced new tools which broke the monopoly of the privileged on the old sources of power. Just as the industrial revolution introduced machines which made agriculture exponentially more productive (and therefore cheaper per unit of production),²¹ the information tools introduced by the information revolution streamline industry, enabling it efficiently to produce more with less. And, as the industrialisation of agriculture rendered farming a relatively insignificant factor in the industrial age economy, so the informationalisation of manufacturing may dwarf the role of industry - and its emphasis on the power of mass - in the information age.

Efficiency in War

The dissolution of the link between mass and military power, in particular, is most evident in information age war's departure from the mass-centred means of industrial age wars. The strategy of attrition, "apotheosised" as it was by industrial age war, will likely be significantly challenged by the emergence of information age war.²² Attrition aimed to exhaust an enemy by striking at everything that contributed to the enemy's war effort,²³ or alternatively, by striking at anything a military force could hit and justify. The premise behind this strategy was that a military needed the force of mass to gain victory. In industrial age war, one prevailed in a conflict by destroying more of the opposition's essential military mass than he could feasibly replace. Because

²⁰ Amazon.com, for instance, boasts 4.5 million customers in 160 countries, even though it was only established in 1995, and does not operate one single store!

²¹ See 'Understanding Paradigm Shift in Context,' in the introductory chapter and 'The Information Revolution' in chapter one.

²² Arquilla, John. "The Strategic Implications of Information Dominance." Strategic Review. Vol22, n3. Summer 94: 24-30. p.26

firepower was usually more effective than the means to deliver it, militaries often accomplished this attritional exhaustion by destroying entire areas in which military targets were situated. They rationalised this practice with the argument that destruction of any enemy property furthered war aims.²⁴

Industrialised states built up larger and larger armouries (culminating in the “total war” of World Wars I and II)²⁵ in the belief that the more massive military force would be the more difficult to defeat, as it would require more time and effort to batter such a military below its critical mass.²⁶

Information age war’s emphasis on efficiency over mass, however, seems to herald a return to more decisive combat.²⁷ As the Gulf War (whether one views it as the first war of the information age or the last of the industrial age)²⁸ illustrated, information technologies can open a different path to victory. This path lies not through blanket destruction of the enemy, but through the selected elimination of the critical elements without which the enemy cannot fight effectively.²⁹ In Operation Desert Storm those elements proved to include, notably, radar and other components of air defence systems, as well as command and control nodes and the electricity grids that powered them.³⁰ The ability to strike such targets - in the Gulf War as in fully mature IAW - relies

²³ Howard. Restraints on War. p.10

²⁴ Ibid.

²⁵ Pearton, Maurice. The Knowledgeable State: Diplomacy, War, and Technology Since 1830. London: Burnett Books, 1982. p.160

²⁶ This was obviously not always the case, otherwise the victory of the larger force would have been a foregone conclusion, and many wars would not have occurred. However, the belief that the larger force should triumph has remained prevalent. Handel, Michael I., War, Strategy, and Intelligence. London: Frank Cass, 1989. p.399

²⁷ Cooper. “Dominant Battlespace Awareness and Future Warfare.” Chapter 6, p.6

²⁸ Howard. Restraints on War. p.1

²⁹ Or at least, not as effectively, or at the same pace, as an information dominant military force could. Cf. chapter five, ‘Tending to Extremes: How War Acts as Final Arbiter.’

³⁰ Parker, Geoffrey., ed. The Cambridge History of Warfare: the Triumph of the West. Cambridge: Cambridge University Press, 1995. p.363

heavily on information to inform military planners what and where these critical targets are,³¹ as well as to guide their strikes precisely to the point of greatest vulnerability. Information age militaries should be able to leverage such information to produce decisively efficient strikes that ideally expend energy only on those targets that directly contribute to the subduing of the enemy. By allowing soldiers to ignore objectives that are unlikely to impact the enemy's decision to continue the war, however, this information efficiency may not only push back the limits of military effectiveness, but could even supplant the industrial age need to sustain massed power in war. Military forces that can fulfil the same (or greater) objectives with less mass simply should not need as much mass to create credible information age military power. Thus the imperative for efficiency in IAW may alter the balance between mass and information in the foundations of military power.³²

Martin Libicki sums up the potential decisiveness of information efficiency in future war with the statement that, "the more we know about the other side, the more economical our strikes against it can be; if we can paralyse the head we need not take on the arms."³³ An expansion of this analogy provides a still clearer, if rather graphic, illumination of the point: in an ideal situation, IAW should be able to accomplish in one clean shot between the eyes what industrial age warfare could not complete without dozens of shots to the

³¹ In IAW, a military's most vulnerable targets are generally components of its Command and Control network, for reasons which will become clear in the following pages. One must recognise, however, that as IAW progresses, such points of critical vulnerability will increasingly be dispersed and more difficult to target.

³² Cf. The proposition that IAW is changing the equation of energy and information in military power in Singer, Abe, and Scott Rowell. Information Age War: An Old Operational Concept With New Implications. Washington, DC: National Defense University Web page, December 1996. p.2

limbs as well. IAW's advantage lies in the advanced information technology - from sensor networks to human spies linked by a global telephone network, from hackers to laser-targeted PGM's - that enables information age militaries first to identify the head as the vital target, then to recognise and track it, and finally to sight and deliver the shot straight to the brain. By contrast, attritional forces in the industrial age often did not have the capability even to find the head, let alone to deliver the critical shot. Hence the soldiers of that age made do by bombarding the entire body with bullets, aiming eventually either to hit some organ vital enough to elicit a concession of defeat or, barring such a shot, to cause so much blood loss as to render the enemy too weak to fight.

In considering the implications of this analogy, however, one must keep two caveats in mind. The first concerns the fact that pre-information age warfare never possessed a head that presented such a decisive and vulnerable target. Destroying the command and control system (the typical "head" in IAW) of Hitler's or Napoleon's or Caesar's armies would not have had nearly the fantastic effect it had on Saddam's army. The relative invulnerability of the former was, ironically, a product of their unsophisticated communications systems. Since these systems were not very good in the first place, the commanders of history did not rely as much on them. To be sure, attacks on command and control systems were not without their effect, as historical evidence attests,³⁴ but they did not alone inflict strategic defeat. The fact that such an attack may be so decisive in modern information age war is a reflection

³³ Libicki, Martin. "DBK and its Consequences." In Johnson and Libicki, eds. Dominant Battlespace Knowledge. Chapter 3, p.9

³⁴ See 'Historical Manifestations of Information Warfare' in chapter two.

of information age militaries' increased dependence on their sophisticated command and control systems, and of the vulnerability which results.³⁵

Secondly, one must remember that the ideal upon which this analogy is predicated rarely exists amidst the realities of war, even in the information age. For one matter, the Clausewitzian notion of the 'fog of war' will almost always interfere to a certain degree in the identification, targeting, and delivery of a perfect shot between the eyes. A more significant obstacle, though, arises from the likelihood that, as information age war matures, it will move further and further from fulfilling this ideal. A fully information-integrated military force should have little trouble with the precision necessary to deliver a shot between his opponent's eyes but, if that opponent is equally equipped to wage IAW, the 'head' of his military operations should become more and more difficult to find in the first place. As increasingly information-savvy militaries recognise the critical vulnerability of their information systems, they will, in all likelihood, respond by dispersing and hiding command and control systems as well as other tools critical to waging information age war. At this slightly more evolved stage of IAW, a shot between the eyes should again become impossible, because there will be no single pair of eyes, nor one brain directing the course of such a war.

³⁵ Molander, Riddle, and Wilson. "Strategic Information Warfare." p.17 It should be noted that less sophisticated militaries also confront this same vulnerability in IAW - both as a factor to guard against and to exploit. Consider the likelihood that silencing the internet propaganda of Subcommandante Marcos in the Zapatista conflict would have considerably reduced the international exposure - and the benefits the Zapatistas gained from this - of the conflict. Moreover, such less sophisticated militaries are unlikely to ignore their information age enemies' heightened vulnerability to decapitation. Though the former may not have the speed, accuracy, or technological sophistication for a finessed interdiction of command and control, judging by the fact that combatants like the Zapatistas and the Chechens have already shown an understanding of information age military principles, it seems likely that future asymmetrical IAW combatants will capitalise on the vulnerability of their opponents' heads, even if their own command systems have not yet reached a comparable level of sophistication and vulnerability. See chapter six, "The Widening Role of Lesser-state and

Instead, experienced information age military forces will likely have scattered the critical functions of the brain (and also reinforced them with redundant back-up systems) to establish a control system that resembles more the dispersed synapses of the spinal cord.

Yet while true information age militaries may have no one vulnerable "head," the analogy of the shot between the eyes should remain an apt description for mature IAW. Even fully developed, the war form should rely more on precision strikes at critical targets - the principle behind the analogy - than on massed offensives designed to bleed an opponent to death. For this reason, proponents of information age war predict that the decisive efficiency available through the various nodes of the IAW spinal cord could pave the way for knowledge and skill to replace brute force as the key ingredient in military power.³⁶ James Adams quotes one unnamed, but obviously enthusiastic Pentagon official as asserting that, "the age of mass meeting mass, which is how wars have been fought for centuries, is almost over. In the future, victory will go to the force which has harnessed the information revolution and mastered control of cyberspace."³⁷ That victory over mass could only become possible through the mastery of information and the tools of the information revolution which enable a military to wield force with unprecedented efficiency.

Speed & Accuracy

Efficiency's replacement of mass as the decisive element in information age power manifests itself in warfare primarily through IAW's imperative for

non-state actors: in Real Terms,' for further discussion of the Zapatistas' and Chechens' use of nascent information age military tactics.

³⁶ Cooper. "Dominant Battlespace Awareness and Future Warfare." p.6

³⁷ Adams, James. "Anoraks' Apocalypse." Sunday Times. 16 Mar 97: 5.9

speed and accuracy. In order to win wars by relying on efficient, rather than massed force, information age military forces must strike quickly and precisely at their opponent's critical vulnerabilities. This military imperative, like its counterpart in commercial business,³⁸ has its roots in the simple convenience of sophisticated information technology. As the example of the private sector illustrates, however, convenience breeds dependence, which creates vulnerability.³⁹ This cycle leaves the military facing a potentially significant disadvantage if it does not develop the speed and accuracy available through IAW. Such a disadvantage may arise because, as others develop information age military forces, viable military competition could increasingly close to all but those who can keep pace. Proponents of the paradigm shift explain this exclusivity of IAW with the argument that, while an IAW offence is very likely to succeed against an attritionist opponent, only an IAW defence can repel an IAW attack.⁴⁰ According to this view, no military force following an industrial age strategy of attrition can realistically hope to prevail against a true information age war fighting force. This claim is based on the assumption that information age militaries will have the capacity to defeat such an opponent so efficiently as to end a war long before that opponent could even begin to inflict the exhaustion of mass upon which attrition hinges.⁴¹

³⁸ See p.143

³⁹ Molander, Riddle, and Wilson. "Strategic Information Warfare." p.17

⁴⁰ Libicki. "DBK and its Consequences." p.3, Cohen, William S. "Remarks Prepared for the Defense University Joint Operations Symposium, QDR Conference." Fort McNair, Washington, DC: Defenselink Web page, 23 June 1997. p.3

⁴¹ This reading of IAW's exclusivity largely ignores the prospect that asymmetric strategies - like, most classically, guerrilla warfare - will likely pose as significant a challenge to militaries preparing to fight 'conventional' battles in the information age as they did in the industrial age. While the question of information age war's role in low-intensity and other asymmetric conflicts is a provocative one, it is an issue that remained largely unexplored in the open literature when this thesis was completed. Consequently, this study for the most part treats IAW's role against asymmetric opponents as a matter for future research.

Although this is a characteristically radical claim from the paradigm shift camp, examples from nascent information age wars do seem to support the assertion that the pace of IAW could allow information age aggressors to outrun any attempts by their opponents to defend themselves. Consider, again, the Gulf War, the conflict which to date provides the closest example of industrial age forces pitted against information age forces in full-scale battle. The lessons of this war, however, must be taken with a grain of salt for two reasons: firstly, the war was not a clear-cut competition between industrial and information age forces, as some future information age wars may be, owing largely to the early stages of information age military strategy, and the fact that the US military employed only certain information age tactics in combination with many older methods. Secondly, the Iraqi military was to some extent a 'perfect enemy'⁴² upon which to test these nascent information age tactics. Gulf War era Iraqi forces have been variously described as "militarily incompetent," "hopelessly outdated," "unmotivated," "dispirited," and lacking in morale.⁴³ These internal problems, many argue, were compounded by the fact that the desert terrain was ideally suited to a form of war heavily reliant on manoeuvre and on signalling.⁴⁴ Despite these caveats, however, the 1991 conflict with Iraq remains the most useful (indeed, the only full-scale) foreshadowing for the expected plight of an industrial age military facing an information age military.

Firstly, the industrial age military's lack of speed and mobility is likely to detract from its ability to attack an information age military force, or rebuff

⁴² Cf. Mueller, John. "The Perfect Enemy: Assessing the Gulf War." *Security Studies*. Vol5, n1. Autumn 1995: 77-117.

⁴³ Biddle, Stephen. "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict." *International Security*. Vol21, n2. Fall 1996: 139-179. p.148

an attack from said opponent. The Iraqis' inability to mobilise sufficient numbers of their air force in time to meet the coalition's first air strikes, for instance, handed the coalition almost uncontested air superiority over Kuwait and parts of Iraq.⁴⁵ That air superiority - maintained throughout the war - allowed the coalition easily to better even Iraq's best attempts at achieving speed with ground vehicles.

Secondly, the defenders' organisation will likely also add to their vulnerability to information age attack. Many of the Iraqi ground forces were organised to fight a very static war, dug in behind barriers to wait for the ground war to begin.⁴⁶ When the coalition proved able to break through these defences with relative ease, it exposed the Iraqi ground forces to some of the highly mobile manoeuvre tactics that are likely to be a keystone of IAW. While the vulnerability of a static force to such a manoeuvrable opponent is not unique to the information age,⁴⁷ this example does illustrate the advantage held by the mobile offensive, and offers a lesson which is increasingly important in information age war: that force without mobility is a sitting duck. Thirdly, the defenders will almost certainly suffer from a negligence in recognising the particular vulnerabilities and assets of information age war. For example, Iraq's failure to acknowledge the easy target presented by the Baghdad electricity grids that powered Iraq's command and control and air defence systems⁴⁸ contributed

⁴⁴ Johnson, Stuart, and Martin Libicki, eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University World Wide Web Page, 1996. Chapter three. p.5

⁴⁵ Mazarr, Michael J., Don M. Snider, and James A. Blackwell, Jr. Desert Storm: the Gulf War and What We Learned. Boulder: Westview Press, 1993. p.93-97

⁴⁶ Mazarr, Snider, and Blackwell. Desert Storm. p.130

⁴⁷ France's vulnerability after the breach of the Maginot Line is a classic example from the industrial age.

⁴⁸ Cf. Arquilla. "The Strategic Implications of Information Dominance." p.27, Mayfield, Terry. Senior Fellow, IDA. Interview with the author. 17 December 1996.

to the ease with which coalition forces disabled these systems in the very first minutes of the war. These strikes in turn gave the coalition a significant advantage in information supremacy against a nearly blinded opponent.

The asymmetry evidenced here between the strategies of attrition and IAW is a direct product of the information age war maxim that, "anything that can be seen can be hit."⁴⁹ Much of the West (among others) already possesses this capability in the form of Precision Guided Munitions (PGMs). Gulf War media coverage provided impressive testimony on the effectiveness of these weapons, filming laser-guided and satellite-tracked missiles which slipped into two metre chimney openings despite the fact that the coalition had launched them from hundreds of metres away.⁵⁰ When information age militaries combine this deadly precision with the looming capacity for one hundred percent visibility, Libicki posits that eventually an IAW force may be able to track and destroy enemy military platforms fast enough to wipe out a non-information age opponent's entire military before it can even mobilise.⁵¹

Against such impressive capabilities, the best hope for victory - or even successful defence - in a conventional conflict would be a response in kind, with

⁴⁹ Alford, Jonathan, ed. The Impact of New Military Technology. Hampshire: Gower Publishing Company, Ltd., 1981. p.81

⁵⁰ Cf. Hauss, Charles. Beyond Confrontation: Transforming the New World Order. Westport, CT: Praeger, 1996. p.28. Snow, Donald M. Uncivil Wars: International Security and the New Internal Conflicts. Boulder: Lynne Rienner Publishers, 1996. p.46. also Lambert, Andrew, Grp Capt, RAF. "The Psychological Impact of Airpower." University of St Andrews: Post-graduate seminar, 10 March 1997.

⁵¹ Libicki. "DBK and its Consequences." pp.11-34 In an information age twist on the classic principle of the preemptive strike, the speed and accuracy available to the information age force should theoretically allow it to destroy more of an enemy's war machine more accurately during the period of mobilisation. Failing a response in kind, such a strike could, in an extreme case, disable enough of an opponent's weapons platforms to prevent him from deploying them.

the same emphasis on speed and accuracy.⁵² While a slow, massive, and centralised attritional military is highly vulnerable to IAW attack, a force which defends itself also according to IAW principles should hold a much more credible potential to rebuff that attack. Such a defender must tailor its defence expressly to foil the speed and accuracy which attacking information age militaries will intend to leverage for victory. In this kind of defensive information age war, the “name of the game... is to avoid being seen.”⁵³ Since modern information technologies create the capability reliably to hit anything that can be seen, the best way to escape being hit is to escape being seen in the first place. In answer to this challenge, some strategists have advocated the waging of manoeuvre-intensive battle in small, molecular units. Units of this sort would be well-suited for avoiding detection because they can move swiftly and nimbly either to strike or to hide.⁵⁴ This kind of force structure should enjoy a higher potential for escaping detection while on the defensive, but should also be apt for an IAW offensive, since troops organised to optimise mobility and flexibility can seize opportunities of enemy vulnerability as they arise. Here too, speed and accuracy are imperative if troops are to stay a step ahead of their opponents.

The combined necessity of leveraging speed and accuracy while remaining unseen on IAW's increasingly transparent battlefield therefore

⁵² Alternatively, an asymmetrical response - from civilian-intensive attacks to guerrilla strike-and-hide manoeuvring in jungles or cities - would likely also be effective against IAW, in much the same way that Vietnamese guerrilla tactics proved effective against the US military's conventionally-focused war machine. In the interest of understanding IAW's status as the likely successor to conventional industrial age war, however, this discussion will focus primarily on the conventional full-scale battlefield, leaving discussions of the information age's influence on low-intensity conflict for future study.

⁵³ Ibid., p.6

⁵⁴ Alford. The Impact of New Military Technology. p.82

“places a premium on mobility, agility, flexibility, and rapid generation of combat power.”⁵⁵ Information age militaries must be capable of a high degree of mobility to enable them to move equally swiftly out of harm’s way or into striking position. They must develop agility and flexibility in order to exploit advantages as they emerge out of the ebb and flow which characterises the non-linear realm of information dominance.⁵⁶ Most importantly, information age soldiers’ quick access to precision force improves their potential to exploit each advantage over the enemy.

In addition to mobility, agility, and flexibility, the need for speed and precision on the battlefield will in turn likely place a premium on speedy and accurate intelligence. All the speed and accuracy of precision guided weapons and manoeuvrable troops can go to waste if commanders do not have access to exact information with which to guide strikes to the right time and place. Consequently, information age military commanders will likely have to rely more than ever before on the information they receive from intelligence - whether it takes the form of sensor readings, satellite mappings, or analyses of enemy morale and intentions - to tell them where and when the enemy is most vulnerable. Under the fast pace of IAW, victory is likely to belong most often to the force which is able to strike first at the precise points that can bring the enemy most swiftly to his knees.⁵⁷ Intelligence is the *sine qua non* that allows commanders to optimise this effort.⁵⁸

⁵⁵ Silvasy, Stephen, Jr., Maj. Gen., USArmy. “AirLand Battle Future: the Tactical Battlefield.” Military Review. Vol71, n2. Feb 91: 2-61. p.10 - in this respect, IAW shows itself to be a close descendant of AirLand Battle indeed.

⁵⁶ Brown, Michael, (Senior Fellow, SAIC). Interview with the author. 16 December 1996.

⁵⁷ Silvasy. “AirLand Battle Future: the Tactical Battlefield.” p.4

⁵⁸ Jones, R. V. Reflections on Intelligence. London: Heinemann, 1989. p.146

One should note, however, that the unique challenge of efficient intelligence in the information age is not, as in ages past, collection of data. Rather, the most difficult aspect of information age intelligence production is likely to be the task of sifting through an abundance of information from myriad sources, with enough speed and accuracy to match the high demands of information age battle.⁵⁹ With so much data available, the process of ascertaining which pieces are relevant and which are useless overtakes collection as the highest priority of the intelligence community.⁶⁰ The information revolution's explosion of sophisticated information technologies has greatly magnified the classic problem of separating the 'signals from the noise' in intelligence. This magnification of noise levels increases the difficulty of quickly processing intelligence at the very point when timely intelligence becomes more crucial than ever. For, "regardless of the amount of data collected, the targets identified or the accuracies achieved, information has no value unless the commanders and appropriate fire support elements receive it in time to react."⁶¹

Organisation to Maximise Efficiency

The combined need for flexibility and for access to information should influence not only the course of battle in information age war, but the configuration of the forces that enter into such a war as well. Military

⁵⁹ Not surprisingly, information age war's demands for intelligence, especially precision intelligence, are higher than any previous form of war's. The information age military's reliance on efficiency to create advantage leaves it open to considerable vulnerability when it is unable to create that efficiency - for instance, in a situation where no precision targeting information is available, all the speed and accuracy of an information age force's PGMs are wasted. Such a situation could leave that force with a tiny armoury (relative to historical industrial age standards) pitted against a mass of potential enemy targets, likely rendering it an open and highly vulnerable target.

⁶⁰ Jones, R. V. Reflections on Intelligence. London: Heinemann, 1989. p.146

organisation, like military doctrine, must shift if it is to accommodate the increasing complexity which IAW is predicted to introduce to warfare.⁶² This shift is likely to take two opposite forms - toward greater strategic centralisation, but also toward greater tactical decentralisation. Both types of organisation will be necessary in information age wars if, as expected, IAW battles are characterised by millions of independent elements trying to work together. On the offensive, this swarm character of the war machine may be necessary to exploit near total visibility for accuracy, or to capitalise on mobility and flexibility for speed.⁶³ Moreover, smaller, more mobile forces (including not only the soldiers themselves, but the tools they use, from sensors to transports to weapons) may be essential not only for capitalising offensively upon IAW's advantages, but also for escaping defensively from the enemy's own information age advantages. In particular, the capacity for almost one hundred percent visibility may virtually necessitate the use of smaller, agile forces suited to avoiding detection, as explained above.⁶⁴

On both the offensive and defensive, these smaller units would require a high level of co-ordination to insure that they all work toward the strategic objective of the force as a whole. Such co-ordination has been necessary since Napoleon first split his mass conscripted forces to converge upon an enemy from different directions, but the complexity of information age battle may add considerably to the challenge of this task. In the long range, the need to integrate the many elements of an information age military into a coherent effort

⁶¹ Campen. *The First Information War*. p.71

⁶² Van Creveld, Martin. *Command in War*. Cambridge: Harvard University Press, 1985. p.234

⁶³ Cf. Ronfeldt, David F. Senior researcher, RAND Corporation. Interview with the author. 24 June 1997.

introduces a heightened mandate for the centralisation of strategic command. Successful integration of the synergised information required by such information age military concepts as the 'system of systems'⁶⁵ will likely necessitate the direction of a leader who - through access to an overview of all these interwoven components - can form a focused understanding of the whole effort. A commander with a clear view of the bigger picture should be better equipped to lead his forces to victory through the complexities of information age war.

However, the same complexity that mandates more centralised strategic command may also necessitate the decentralisation of tactical command.⁶⁶ Military tactics have commonly been as centralised and hierarchical as military strategy.⁶⁷ This centralised system had its benefits in the days when battlefield communications were too slow to accommodate significant departures from operational orders. However, if troops are to exploit information age advantages of speed and accuracy, they should be allowed a degree of tactical initiative to act as soon as opportunities arise. Lower-level commanders on the ground ought to be able to act and react to a situation as it unfolds, without pausing for approval from central headquarters.⁶⁸ Such pauses might waste countless moments of enemy vulnerability while high-level commanders

⁶⁴ See p.154

⁶⁵ Owens, William A., Adm., USN. The Emerging U.S. System-of-Systems. Washington, DC: National Defense University Web page, February 1996.

⁶⁶ Cooper. "Dominant Battlespace Knowledge and Future Warfare." p.7

⁶⁷ Cf. Franks. "Winning the Information War." p.455, Van Creveld, Martin. The Transformation Of War. New York: Free Press, 1991. p.7, and Brodie, Bernard. Strategy in the Missile Age. Princeton, NJ: Princeton University Press, 1965. p.98 With some notable exceptions - including the Prussian army in the early 19th century and, notably, Napoleon's own forces from time to time. Van Creveld, Martin. Command in War. p.274 See also chapter two, 'Historical Manifestations of Information Warfare?'

⁶⁸ Cooper. "Dominant Battlespace Knowledge and Future Warfare." p.6

attempt to sift through the myriad messages from the battlefield. Under the decisive pace of information age war, militaries can afford less and less to waste such moments, a circumstance that erodes the usefulness of the historically hierarchical military command system. Consequently, as it enters the information age, the military, like the private sector, is discovering the benefits of networkisation.

On the tactical level, the network organisational form is as well suited to capitalise on the advantages of abundant information for the military as it is for business.⁶⁹ In a network, each cell has equal access to all available information,⁷⁰ and equal authority to act on that information according to its suitability for the task. By granting each component the responsibility to complete its own part of the mission, the networkisation of tactical command should largely obviate the need to await approval from a cumbersome central command structure for each separate action within an operation. Under this organisational form, information age soldiers should be able to pursue centrally engineered strategy within a framework of established doctrine, while relying on their own initiative and ingenuity during combat itself. Such tactical freedom should encourage soldiers to act swiftly and decisively in the battles of future information age wars.⁷¹

This interplay of decentralised tactics and centralised strategy, of networked battle formation and hierarchical theatre planning, should facilitate the speedy and precise application of force by creating a more coherent

⁶⁹ See the last pages of the 'Information Revolution' section in chapter one.

⁷⁰ Preferably according to a 'pull' system which would allow soldiers to request the information they need, rather than flooding them with all the information that the intelligence community deems relevant, as in the current 'push' system of intelligence dissemination.

awareness of war. Under such a system, the strategists who formulate a conflict's long-term aims should be relatively free to form a clearer picture of general themes, uncluttered by the detail of war's everyday workings. At the same time, the battle commanders who make the tactical decisions about the conduct of the battle should be better able to focus on situational awareness, since they would be left responsible for their own missions without the distraction of constantly updating headquarters. Thus equipped with the most relevant information, both strategists and tacticians should respectively be in the best possible positions to exploit the advantages of speed and accuracy in information age war.

This "perversely interlocking"⁷² mix of command styles emerges partially in response to the new kinds of intelligence which modern information technologies make available in IAW. Sensors and satellites largely replace the soldier as the primary line of sight on the information battlefield,⁷³ thus shifting intelligence collection from a bottom-up process to one that is more aptly top-down. The fact that high-investment assets like satellites function best under central administration means central command should typically be better able to monitor the progress of information age battle. Meanwhile, combat soldiers, freed from the need to apprise their superiors of every situation, should be better able to concentrate their information and their efforts on their own missions. In this way, information age intelligence capabilities encourage the establishment

⁷¹ Franks. "Winning the Information War." p.454

⁷² Van Creveld. Command in War. p.274

⁷³ This is not to discount the importance of the soldier as sensor, nor the importance of humint in general. Though these sources are invaluable in providing the nuances and details for situational awareness, the wider outline of the battle is provided more effectively by sensors and other centrally controlled technical intelligence sources. - Campen. The First Information War. p.53

of a combined system of centralisation and decentralisation which facilitates more comprehensive awareness for commanders in both hierarchies and networks, resulting in an increased capacity to act with speed and precision.

Furthermore, such complete awareness could enable commanders to operate more by intuition than they have done since command first retreated from the front line of battle. According to Army TRADOC's General Frederick M. Franks, the reintroduction of intuitive C2 could spark a shift from employing command as a science, to employing it as an art.⁷⁴ Industrial age commanders once employed rigid battle formations and calculated tactics according to enemy force structure in an attempt to impose scientific reason on war.⁷⁵ Equipped with the real-time intelligence of dominant battlespace knowledge (DBK), as well as the communications capacity to transmit orders instantly, information age commanders might be able to forego merely co-ordinating their troops for possible contingencies. They should instead be able to rely more on intuition and on reactions to immediate circumstances to *orchestrate* precision combat power at decisive points.⁷⁶ This too should augment a commander's ability to react with decisive speed and precision by fostering a higher quality of command in real time.

A Sign of Paradigm Shift?

Having established how the information age will affect the waging of war, the investigation can at last assess the significance of these changes and address the first question upon which IAW's status as a paradigm shift hinges:

⁷⁴ Franks. "Winning the Information War." p.457

⁷⁵ Van Creveld. Command in War. p.106

will the manner in which information age war is waged challenge the established principles of warfare, thereby requiring a new model for understanding war? The answer is simply, no. The nascent information age tactics of the Gulf War, the proliferation of information-intensive war games, and the introduction of new doctrines and organisations to meet the military challenges of the information age are all testimony that the information age is already introducing significant changes in how the world wages war. Those changes, however, affect the character of war, not its nature. That nature has remained unchanged since long before William Tecumseh Sherman pronounced that "war is cruelty, and you cannot refine it."⁷⁷ In the information age as for time immemorial, war will still be about compelling the enemy to do one's will, and doing so through force and bloodshed.

Despite predictions to the contrary both from members of the narrow school of information warfare⁷⁸ and from those dazzled by the surgical strike capacity of precision guided munitions, information age war can not depart from the bloody, forceful nature of war for two reasons.⁷⁹ First, war by definition entails the use of force. From the time of Sun Tzu to that of Clausewitz, Liddell Hart, and even the present day, strategists and soldiers have defined war as "an

⁷⁶ Cooper. "Dominant Battlespace Knowledge and Future Warfare." p.1

⁷⁷ Sherman in a letter to the people of Atlanta. Best, Geoffrey. Humanity In Warfare: The Modern History Of The International Law Of Armed Conflicts. London: Weidenfeld And Nicolson, 1980. p.209. For more recent remarks in a similar vein, cf. General Frederick M. Franks, the former head of the US Army's Training and Doctrine Command (TRADOC), who has remarked that war is "direct, it's sudden, and it's lethal," as well as being "tough, uncompromising, and sudden." Franks. "Winning the Information War." p.454

⁷⁸ See the introduction's 'Other Views in the Debate.'

⁷⁹ Lambert, Andrew, Cmdr, RAF. "The Psychological Impact of Airpower." Presentation to the Department of International Relations, University of St Andrews. 10 March 1997. Rogers, A.P.V. Law on the Battlefield. Manchester: Manchester University Press, 1996. p.65

act [or threat] of force to compel an enemy to do our will.”⁸⁰ War by any other name is simply not war, but rather a separate phenomenon. Proponents of the paradigm shift interpretation of IAW might argue that information age war requires a reassessment of this definition, but such an effort would be misguided. Even the efficiency of information age war requires some force of mass to be delivered against the target - albeit with the greatest possible speed and accuracy that the available information can convey - in order to be effective.

Second, war by definition involves force because only the extreme physical violence of military force is sufficiently indisputable⁸¹ to grant war its status as the final arbiter of intractable disputes. An expanded definition of war elucidates why this circumstance prevails: war is not merely the generic use or threat of force, but the use or threat of force in order to compel an enemy to act against his will in situations where there is no other recourse for compellance, no higher power than physical force to determine which contestant's will should prevail.⁸² This is most classically exhibited by the competition of sovereign state actors within the anarchical international system, though sub-state contests in situations where the authority of the sovereign has eroded - and thus, like the anarchical international system, provides no mutually recognised court of appeal - are hardly anomalies in the category of war.⁸³ Therefore, since war is by

⁸⁰ Clausewitz. *On War*. p.83. Although Clausewitz did not explicitly include the threat of force under the rubric of 'war,' this inclusion has become customary among modern scholars of war. Cf. Howard, Michael. *The Causes of Wars. & Other Essays*. Cambridge, MA: Harvard University Press, 1983. p.25

⁸¹ Though not utterly indisputable, as World War II's occurrence on the heels of the 1918 Versailles Treaty illustrates.

⁸² Lider, Julian. *Military Theory: Concept, Structure, Problems*. Aldershot, Hants: Gower Publishing Co. Ltd., 1983. p.70, Blainey, Geoffrey. *The Causes of War*. New York: Free Press, 1988. 3ed. p.120, Brown, Seyom. *The Causes and Prevention of War*. New York: St Martin's Press, 1994. p.66

⁸³ Please refer to chapter 5 "why" for further discussion of this subject.

definition the last resort for forcing an opponent against his will, the phenomenon must be at least potentially violent.⁸⁴ If information age war is to deserve its title, it must necessarily keep the nature of war intact at this most fundamental level.

Proponents of the paradigm shift view may be tempted to argue here that information age war's adherence to the nature of war at its most fundamental does not necessarily mean that the war form can not challenge the current military paradigm on some less basic level. This may be true, although IAW would have to transform more superficial aspects (such as the principles, rather than the nature) of war quite profoundly indeed to fulfil such an assertion. The point is moot, however, because information age war clearly does no such thing. In fact, far from defying the established principles of war, information age war comes closer than any previous form of war to attaining the ideal of several military principles. For instance, the very concept of efficiency which is so decisive in IAW epitomises the principle of maximising the injury one inflicts on the enemy while minimising the injury to oneself, a principle which has been emphasised by strategists from Sun Tzu to Clausewitz.⁸⁵ Several of Tzu's other famous precepts - including such legendary quotes as "Know the enemy, know yourself; your victory will never be endangered" and "All warfare is based on

⁸⁴ Conflicts without violence deserve the title of 'war' only if there exists a credible threat that violence would have been involved had the conflict continued. Along these lines, psychological operations, information infrastructure attacks, and other non-lethal elements associated with warfare should only be considered components of actual war in situations where violence or the credible threat of violence are involved. In all other situations they are simply (not particularly gentle) tools of suasion.

⁸⁵ Cf. especially Sun Tzu. *The Art of War*. Griffith, Samuel B., trans. London: Oxford University Press, 1963. p.77

deception” - are also clearly evident in the cardinal role which information and, especially, intelligence plays in the information age war form.⁸⁶

In addition, information age war's reliance on the advantages available from information rather than from mass echoes Frederick the Great's advice to his generals that, "In war the skin of a fox is at times as necessary as that of a lion, for cunning may succeed when force fails."⁸⁷ Basil Liddell Hart's enthusiasm for an indirect approach to war is also evident in IAW's use of cunning to strike the enemy at the right place and time. Similarly, some of Liddell Hart's advocacy of manoeuvre warfare is clearly heeded by information age war's emphasis on mobile combined strikes against the enemy's critical vulnerability.⁸⁸ Perhaps ironically, this mobility is more important in IAW for its capacity to manoeuvre away from the enemy's precision weapons and his "god's-eye view" of the battlefield,⁸⁹ than for its capacity to move friendly forces into better position for attack, as in more classical interpretations of manoeuvre.⁹⁰ This twist in the interpretation of the manoeuvre principle does not profoundly alter how the principle fits the established military paradigm, yet one might find it worthy of noting that the twist does foreshadow some of this dissertation's final conclusions about IAW's influence on the understanding of war. For the conclusion of the present chapter, however, suffice it to say that the continued application of these principles to information age war should

⁸⁶ Sun Tzu. The Art of War. p.106,84. Cf. also Asprey, Robert B. War in the Shadows: the Classic History of Guerilla Warfare from Ancient Persia to the Present. London: Little, Brown, and Company, 1994. p.23

⁸⁷ Asprey. War in the Shadows. p.50

⁸⁸ Cf. Strachan, Hew. European Armies and the Conduct of War. London: George Allen and Unwin, 1983. p.152

⁸⁹ Campen. The First Information War. p.58

⁹⁰ The latter function is, of course, not irrelevant, just relatively less important than the former.

banish any expectations that the information age's changes in how war is waged
fulfil the criteria for a paradigm shift of war.

Chapter 4

The CIVILIANISATION of WAR: At What Information Age War is Waged

If information age war is to represent a paradigm shift in war, the war form must also fulfil the second criterion for a new military paradigm. This criterion requires that IAW exhibit a profound shift in what warfare is waged at - that is, what warfare targets. Signs that information age war possesses the potential to produce such a shift are manifesting themselves in the 'civilianisation' of warfare, a phenomenon that increasingly blurs the distinction between the civilian and military realms. Civilianisation in information age war arises from the convergence of a historical trend challenging the delineation between combatant and non-combatant with uniquely information age trends that heighten the importance of civilian information and information technologies in war. IAW's civilianisation is both a continuation of the strategic targeting of civilians which was accepted at new levels under industrial warfare, and a product of a distinctly information age overlap of civil and military information and information technologies. This chapter will examine each of these developments in turn, with the aim of establishing the significance of their convergence and whether that convergence will produce a challenge to civilian war-time immunity which represents merely a dangerous extension of a historical pattern or a fundamental departure from established targeting practices. The answer to this question will determine whether the civilianisation of information age war necessitates a change in the way the world understands war and, therefore, whether or not the information age civilianisation of war fulfils the second criterion of paradigm shift.

In order to answer this question, however, one must also ask a second question. If one is to understand how what IAW targets differs from what other forms of war have targeted, one must not only find a solution to the query, 'at what is information age war waged?', but also for the query, 'at what was war waged before information age war emerged?' This second question must be addressed in concert with the first because it is impossible to understand IAW's changes to warfare without understanding the precursor of those changes. Moreover, to the extent that the civilianisation of information age war represents a continuation of a historical pattern, it is especially important to comprehend the development of the pattern itself in order to grasp what further changes IAW's civilianisation impends.

To that end, the following pages will provide a cursory glimpse into history's accounts of the long, troubled relationship between civilians and the military, a relationship that has by no means been static across the centuries. From the pre-industrial age, when civilians' role in war was predominantly auxiliary and the targeting of non-combatants played a largely peripheral role in strategy, to the onset of industrial age warfare, when the pivotal role of industry in sustaining total war produced a new incentive for the strategic targeting of civilians, the distinction between combatant and non-combatant - hardly ever sacred in practice - has been subjected to significant reinterpretations. With that background established, the chapter will then examine how specifically information age trends, particularly the increased prevalence of dual-use technologies, will contribute to the civilianisation process. Lastly, the final section will investigate how these two trends together will affect what warfare is waged at in the information age.

Following Historical Precedent

Civilians have always suffered the ravages of war, but the extent to which they suffer, and the extent to which militaries calculate their suffering will influence the outcome of war, has changed considerably over the centuries. These changes are, for the most part, directly related to shifts in the importance of non-combatants' contributions to the waging of war, and to the capacity of combatants to affect those contributions. Despite the long-cherished ideal that civilians should be immune from the effects of war,¹ the reality for centuries has been that civilians will suffer - and even become deliberate targets - in war to the extent that such practices are militarily expedient. In this, the civilianisation of information age war marks not a departure from the norm, but an extension of the trend.

That trend, however, does not represent a simple and inexorable geometric progression toward increased civilian targeting. In the modern era alone, in fact, the expediency of targeting non-combatants in war has been subject to multiple reinterpretations. If one considers the Middle Ages, for instance, the question of the proper standing of non-combatants in a conflict was largely subsumed by scholars' preoccupation with the status of the war itself as a just or unjust use of organised violence.² If a war was considered 'just,' then the means employed in waging it "derive[d] the complexion of their moral

¹ Green states that the law of civilian immunity is the oldest on the books. Green, L.C. The Contemporary Law of Armed Conflict. Manchester: Manchester University Press, 1993. p.18

² Bull, Hedley, Benedict Kingsbury, and Adam Roberts. Hugo Grotius and International Relations. Oxford: Clarendon Press, 1992. p.184

character from the nature of the end to which they lead.”³ Provided a war was fought for a noble and honourable purpose, even theory - which frequently idealises practice - allowed for considerable liberty of method in the prosecution of medieval wars.

Consequently, despite chivalric codes that dictated protection for the weak and innocent, and canon law that invoked immunity for those whose employment contributed to the public good,⁴ medieval military standards sanctioned attacks against civilians to a considerable extent. Such attacks manifested themselves primarily in the form of plundering and marauding throughout the countryside, practices which were considered necessary for feeding the army on campaign and adding incentive for the soldiers (especially, as chivalry collapsed, those not fighting primarily for the honour of battle). The fact that these practices also constituted an early form of economic warfare was, of course, also a beneficial contribution to medieval military campaigns.⁵ Civilians were also likely to suffer from other types of attacks levied against enemy supplies and, to a certain degree, popular morale. Many of these have become familiar in more formalised guises during more recent eras of warfare, including naval blockades and scorched earth campaigns.

Of the challenges to non-combatant immunity during the Middle Ages, economic warfare had perhaps the most pervasive effect on civilians, for the simple reason that wars were then comparatively well confined to the battlefield. The tools of war in that day had ranges measured in metres rather

³ Grotius, Hugo. The Rights of War and Peace (De Jure Belli ac Pacis). Campbell, A.C., trans. Washington: M. Walter Dunne, Publisher, 1901. p.290

⁴ This category included professionals as diverse as clerics, farmers, and artisans. Grotius (244) p.362

than miles, and were therefore likely to hit non-combatants only if they got in the way.⁶ Moreover, outside of basic living supplies and, to a lesser degree, morale, non-combatants made little contribution to the success of a military campaign, so the direct strategic returns of targeting them were relatively small. For this reason, medieval military forces had comparatively little incentive or justification to classify civilians as deliberate targets. Indeed, as late as the time of the Thirty Years War, Grotius held that the only legitimate purpose of targeting non-combatants was for retaliation or punishment of obstinate resistance.⁷ Illegitimate purposes did not extend far beyond the instilling of terror and the above-mentioned intent of inflicting economic damage.⁸

However, one can infer from the existence of statutes regulating the treatment of non-combatants that medieval civilians were in some jeopardy, despite the comparatively low expedience of targeting them. For example, chivalric standards called for a certain obeisance to the principle of “double effect,” a rule which resembles modern conventions on collateral damage in that it obliged soldiers not deliberately to target civilians, but acknowledged that incidental injury to non-combatants in the path of a military target may be unavoidable. The Church also attempted to mitigate the plight of non-combatants in medieval warfare by establishing the Peace of God during the 10th and 11th centuries. This movement encouraged the principle that “the

⁵ Best, Geoffrey. Humanity In Warfare: The Modern History Of The International Law Of Armed Conflicts. London: Weidenfeld And Nicolson, 1980. p.65.

⁶ The obvious exception here was sieges on cities.

⁷ Grotius. De Jure Belli ac Pacis. p.363

weak who could do no harm should not themselves be harmed.”⁹ Given the extent to which theory differed from practice, especially in the Middle Ages,¹⁰ these rules are interesting not as signs of any particular military temperance toward non-combatants, but as indications of the need for such regulations, necessitated only by a dearth of such temperance. Ironically, the very rules intended to protect non-combatant immunity illustrate that medieval civilians were indeed military targets.

With the close of the Thirty Years War and the advance of the modern state system in 1648, attitudes toward non-combatants shifted away from the standards of the Middle Ages. In the 17th and 18th centuries the principle of “limited war” replaced the medieval “just war” ideal. This age saw the institutionalisation of professional armies and a concurrent move to wage war only for strictly defined political objectives, thus limiting who and what would be involved in war.¹¹ Again, though, any salutary effect this policy had on civilians owed almost entirely to shifts in the expediency of targeting non-combatants, and was merely a fortunate by-product of necessity rather than ethics.

⁸ Grotius also noted that no such attack should occur for whatever cause unless it ultimately served a strategic purpose: “Though there may be circumstances in which absolute justice will not condemn the sacrifice of lives in war, yet humanity will require that the greatest precaution should be used against involving the innocent in danger, except in cases of extreme urgency and utility.” However, Grotius’ idea of proportionality was to remain an ideal of theory rather than practice for several centuries after his death. Grotius. De Jure Belli ac Pacis. p.361

⁹ Howard, Andreopoulos, and Shulman, eds. The Laws of War. p.41

¹⁰ Keen notes that England’s Henry V was a notable champion of non-combatant immunity, but concludes that he was an exception, not the norm, for “the observance of the rules was much more remarkable than their breach” in the chronicles of contemporary historians. Keen, M.H. The Laws of War. p.191.

¹¹ Typically only professional soldiers were permitted to wage such limited wars, and only for military targets. Asprey, Robert B. War in the Shadows: the Classic History of Guerrilla Warfare from Ancient Persia to the Present. London: Little, Brown, and Company, 1994. p.48

The ravages of the Thirty Years War, combined with the increasingly prohibitive expense of waging war, created an overriding incentive for the leaders of Europe voluntarily to limit the means and ends of war in the first years of the state system.¹² Indeed, the expense of warfighting left rulers little choice but to place limitations on war: military technology had developed far enough to require that armies build elaborate machines for war (such as muskets, cannons, and “artful fortifications” like the Italian traces designed to confound the use of gun powder by besiegers)¹³, but had not developed so far as to permit the cheap mass production of these machines. Consequently, armies remained small and professional because states could only afford experienced soldiers who knew how to accomplish military objectives effectively. In addition, local economies and the civilians who ran them were left largely unmolested because states needed their taxable profits to finance the limited wars.¹⁴ Non-combatants, therefore, developed a *de facto* immunity during this age of limited war, though their legal rights and immunities were not to be formalised until the 20th century.¹⁵

Ironically, the move to formalise civilian immunities corresponded with the reintroduction of vast threats to those immunities. At the same time conferences in Geneva and the Hague attempted to mitigate the horrors of war, the scope of violent conflict expanded far beyond the traditional front line,

¹² Weigley, Russell F. The Age of Battles: the Quest for Decisive Warfare from Breitenfeld to Waterloo. London: Pimlico, 1991 (1993). p.46

¹³ Parker, Geoffrey., ed. The Cambridge History of Warfare: the Triumph of the West. Cambridge: Cambridge University Press, 1995. p.168

¹⁴ Howard, Andreopoulos, and Shulman, eds. The Laws of War. p.3

extending both the territory and the people involved.¹⁶ This new challenge to the rights of non-combatants emerged as the industrial revolution's impact on war reached its peak, for it was the culmination of industrial warfare in the world wars of the twentieth century which raised the targeting of civilians and 'civilian objects' to a whole new level.

These industrial, 'total' wars challenged civilian immunity in two ways. First, the industrial revolution created the means for delivering destruction to civilians more completely and directly than ever before. Railroads, long-range artillery, and most especially, air power gave industrial age militaries the ability to deploy firepower farther and deeper into enemy territory. Mass production manufactured vast supplies of weapons with greater range and dependability, as well as long-range accuracy unknown to pre-industrial age soldiers.¹⁷ Armed with these weapons, and the new feasibility of air delivery, industrialised militaries gained the capability to strike targets far beyond the boundaries of the traditional battlefield and became able, for the first time, to threaten the *de facto* sanctuary which civilians had retained behind the front line for time immemorial.

While the new range of firepower alone was a great menace to non-combatant immunity, the combination of this threat with a second industrial age development held implications for the civil/military distinction which were dire indeed. Industrial warfare's second, and much greater, threat to civilian

¹⁵ It should be remembered that, although non-combatant immunity was not formalised until the international law conventions of the 19th and 20th centuries secured its international acknowledgement, the principle of non-combatant immunity had existed and been recognised for centuries, most notably by Gentili and by Grotius in the 16th century. Bull, Kingsbury, and Roberts. Hugo Grotius and International Relations. 1990. p174 also, Best. Humanity In Warfare. p.56

¹⁶ Howard. Restraints on War. p.10

¹⁷ Ellis. Social History of the Machine Gun. London: Pimlico, 1976. p.23

immunity derived not from the increased capability to strike civilians, but from a new incentive to target them. This incentive was rooted in the totality of the industrial age war effort, which in turn encouraged the totality of targeting made available by industrial technology. The industrial war form's profound dependence on the products of industry presented a highly exploitable vulnerability, leading military strategists to view the destruction, or at least disruption, of that industry as a significant influence on the outcome of a war. To that end the targeting of industry became a seminal point of industrial age military strategy. However, the factories which produced the tanks and jeeps, the bombs and machine guns - the very factories which had become prime targets of industrial age attrition - employed and relied on thousands of people who fit the traditional definitions of non-combatants.¹⁸ As a consequence, civilian activities acquired a new strategic importance in the war effort, a role which conferred on civilian targets a status of material significance unprecedented in previous ages of warfare.

This strategic significance implicitly controverted both the practical immunity of civilians established in the age of limited war and the legal immunity established in the Hague and Geneva conventions around the turn of the century. As justification for this violation, many decision makers adopted the position that, the "activities of civilians, in so far as they made possible the belligerent acts of governments, were a perfectly legitimate target for military activity."¹⁹ This policy, however, raised an even more intractable question: if a

¹⁸ Rogers, A.P.V. Law on the Battlefield. Manchester: Manchester University Press, 1996. p.11

¹⁹ Howard. Restraints on War. p.9

civilian in a bomb-making factory is legitimate collateral damage,²⁰ but he is not legitimately targetable on the streets of Dresden, at what point on his way from home to the factory does he become legitimately targetable?²¹ This question illustrates just how arbitrary the civil/military distinction became in industrial warfare.

Nowhere was this arbitrariness more apparent than in the practice of strategic bombardment. The philosophy behind this doctrine of air warfare apotheosises the industrial age's growing disregard for distinctions between military and civilian. According to the early American air power enthusiast Billy Mitchell, "[t]o gain a lasting victory in war, the hostile nation's power to make war must be destroyed - this means the factories, the means of communication, the food producers, even the farms, the fuel and oil supplies, and the places where people live and carry out their lives."²² Mitchell, Italy's Giulio Douhet, Britain's Sir Hugh Trenchard, and other proponents of aerial strategic bombardment, were among the first to raise the prospect of targeting civilians on such a scale. Moreover, their scale was remarkable not only for the degree of destruction it advocated inflicting on civilians, but for the extent to which such destruction was actually achievable, as well as for the level of influence such destruction was proposed to have on the final outcome of war.²³

²⁰ It must here be emphasised that under no circumstances do the laws of war justify the targeting of the civilian himself, they only allow the targeting of the factory which civilians may occupy.

²¹ Pearton. The Knowledgeable State. p.186

²² Warner, Edward. "Douhet, Mitchell, Seversky: Theories of Air Warfare." in Earle, Edward Meade, ed. Makers of Modern Strategy: Military Thought from Machiavelli to Hitler. First edition. Princeton: Princeton University Press, 1971. p.498

²³ The very name 'strategic' implies that air power used in this way would be sufficient to decide the outcome of an entire war, not merely a single tactical battle. Douhet himself championed the idea that air power would be both necessary *and* sufficient to win a war. Freedman, Lawrence. The Evolution of Nuclear Strategy. London: Macmillan, 1981. p.5-6

Interestingly, however, many of the early air power theorists placed increased emphasis on civilian targets more for the impact such strikes would have on civilian morale than for their effect on the industrial war machine.²⁴ Douhet, especially, believed aerial bombardment of urban centres could drive civilians to urge their governments to end a war. Yet the industrial-targeting emphasis of strategic bombardment has endured into modern air power theory, while the morale emphasis has been all but discounted²⁵ - not least due to the empirical evidence of World War II that Douhet significantly over-estimated the effect of aerial bombing on civilian morale.²⁶

Regardless of the early air power proponents' reasons for advocating strategic bombardment and its targeting of civilians, the strategy first came to be used in World War II primarily out of necessity. Britain, the most prominent of the strategic bombers, adopted a policy of strategic bombardment in 1942, arguing that aerial raids against urban centres were Britain's only recourse for inflicting pain on Germany and preventing her own loss of the war.²⁷ The Royal Air Force targeted cities because they simply did not have the technology to hit smaller targets with reliable accuracy, especially given the fact that "an understandable desire to avoid" the devastating losses of World War I led them to fly high and at night when risk to their own airmen was lower, as was target

²⁴ Brodie, Bernard. Strategy in the Missile Age. Princeton, NJ: Princeton University Press, 1965. p.92

²⁵ Warner, Edward. "Douhet, Mitchell, Seversky: Theories of Air Warfare." in Earle. Makers of Modern Strategy. p.490

²⁶ Freedman. The Evolution of Nuclear Strategy. p.11, Warner. "Douhet, Mitchell, Seversky." p.490. In fairness to Douhet however, David MacIsaac notes that Douhet posited his descriptions on the assumption that the next war would use not only conventional explosive bombs, but also incendiary and chemical gas bombs, a practice which would, in all likelihood, have had a much greater effect on civilian morale than conventional explosives alone. MacIsaac in Paret, Peter, ed. Makers of Modern Strategy: from Machiavelli to the Nuclear Age. Oxford: Oxford University Press, 1986. p.630

²⁷ Rogers. Law on the Battlefield. p.11 and Best. Humanity In Warfare. p.278

accuracy.²⁸ Britain attempted to make a virtue of this necessity, claiming that, even where inaccurate raids did not impede wartime industry, they would batter civilian morale and hasten the end of the war.²⁹ Civilian immunity was thus sacrificed in the name of winning a total war few had wanted to fight.

Conventional aerial bombing, however, was not the worst of World War II's challenges to the distinction between civilian and military. The worst emerged only at the end of the war, with the dropping of atomic bombs on Hiroshima and Nagasaki.³⁰ These bombings flattened two entire cities, bringing the horrors of war home with a terribleness hardly conceivable before 1945. Yet the true horror of this new step over the boundary between combatant and non-combatant became clear only after the war ended, as first the United States and then others began to develop strategies for the possible future use of these weapons.

Like conventional strategic bombing, these early nuclear strategies were constrained by technology. In the first years of the Cold War, nuclear weapons were too scarce and targeting was too inaccurate to risk dropping a nuclear warhead on anything but the concentrated mass of a city.³¹ Later, when it became possible to consider attacking enemy military installations, and especially enemy nuclear capabilities, the 'counterforce' strategy was deemed to carry too great a risk for encouraging a pre-emptive strike against the

²⁸ Brodie. *Strategy in the Missile Age*. p.120, and Howard, Andreopoulos, and Shulman, eds. *The Laws of War*. p.131

²⁹ Rowen, Henry S. "The Evolution of Strategic Nuclear Thought." in Martin, Laurence. *Strategic Thought in the Nuclear Age*. London: Heinemann, 1979. p.136

³⁰ This was initially seen as only an extension of earlier strategic bombing practices, "greatly compressed in time, magnified in effect, and reduced in cost." Rowen. "The Evolution of Strategic Nuclear Thought." p.137 Although initially the atomic bombings were no more deadly than the fire bombings in the European theatre, their reduction of time, cost, and effort for greater effect (psychologically, if not necessarily physically) added to the already considerable strain on the principle of civilian immunity.

aggressor's own cities. Consequently, the Eisenhower administration adopted the doctrine of Massive Retaliation, designed to serve as a deterrent by placing strategic emphasis primarily on holding a second strike, response-only capability. However, in order to instil confidence that this second strike capacity could not also be used to launch a first attack against enemy military installations, the weapons of Massive Retaliation were necessarily designed to suit not a precise 'counterforce,' but a more general 'countervalue' attack against civilian population centres.³² Nor did this trend improve with the passage of time or the development of new technology. From Massive Retaliation to Mutual Assured Destruction to Star Wars, strategies contemplating the use of nuclear weapons for whatever purpose have placed civilians, and indeed, mankind, in greater jeopardy from warfare than the world has ever known.

In response to this exponentially higher danger to non-combatant rights, international lawmakers came out in force after the end of World War II. The more pacific members of the international community were so horrified at the increased destructiveness of war that many even sanctioned attempts to outlaw war altogether. The post-World War II United Nations Charter placed this ultimatum in slightly less unequivocal terms than its inter-war predecessors in the Kellogg-Briand Pact and the League of Nations Charter, but the message was the same: the means of war in the industrial age had lost all proportion to its

³¹ Freedman, Lawrence. The Evolution of Nuclear Strategy. p.24

³² The primary difference lay in the degree of precision the weapons could sustain. Freedman, Lawrence. The Evolution of Nuclear Strategy. p.194

political ends, and as such had rendered total war all but unthinkable.³³ Indeed, the recent advent of nuclear weapons further underlined the urgency of the UN's message, as burgeoning nuclear strategy seemed to portend that any future war would hold consequences more dire than any yet known.

However, given the likelihood that members of the international community would not all universally abjure the use of their ultimate policy tool - even in the face of nuclear holocaust - the United Nations also passed resolutions to govern the treatment of non-combatants should war again erupt. Likewise, the general mood of the immediate post-war period spurred the convening of more laws-of-war conferences in Geneva. The participants at these conferences, like the delegates who drafted the UN Charter, could not escape the idealism that prevailed after the Allies' victory in World War II. As a result, the 1949 Geneva Convention on the "Protection of Civilian Persons in Time of War" went so far in safe-guarding civilian rights that many jurists believed the convention would instead jeopardise them further. According to one respected jurist, the convention's protection of civilian immunities went too far because no belligerent could realistically uphold it:³⁴ the "new rules will

³³ Reisman, W. Michael, and Chris T. Antoniou, eds. The Laws of War: A Comprehensive Collection of Primary Documents on International Laws Governing Armed Conflict. New York: Vintage Books, 1994. pp. 3-5. Also Howard. Restraints on War. p.10

³⁴ For instance, the 1949 convention mandated against the long-standing practice of taking hostages and prisoners of war, (Article 34) and prohibited its signatories from controlling protected persons with measures any more strict than "assigned residence and internment." (Article 41) In addition, Geneva IV required states to observe rights for internees which often the state's citizens did not themselves enjoy: Article 82 stipulated that families be housed together, and provided "with facilities for leading a proper family life;" while Article 93 provided for "complete latitude in the exercise of [internees'] religious duties." Furthermore, the convention required that states protect civilians during war to a degree that exceeded what many could provide even during peace: Article 24 charges signatories with providing for all orphans under age 15, and with insuring that "their maintenance, the exercise of their religion, and their education are facilitated in all circumstances. [Moreover,] their education shall, as far as possible, be entrusted to persons of a similar cultural tradition." Reisman and Antoniou. The Laws of War, Collected Primary Documents. pp. 239-60.

contribute to more anger, more accusation, more reprisal, more deviation from valid law.... it gives the misleading feeling of safety, although humanity was never more threatened.”³⁵

Largely to redress this dangerous idealism, both the United Nations and the International Committee of the Red Cross (ICRC)³⁶ reopened the question of non-combatants' wartime rights during the 1970s. In 1977 the international humanitarian laws of war were augmented by a further UN resolution, as well as by Geneva Protocols I and II, called Additional to the Geneva Conventions of 1949.³⁷ This time, Geneva produced a more realistic program to protect the rights of non-combatants, reforming many overly ambitious 1949 prohibitions,³⁸ and establishing a much more fair system of protection.

The 1977 Protocols - the current word on the international laws of war - define military objectives in unprecedented detail, differentiating them from civilians and 'civilian objects,' which are themselves never to be the explicit objects of attack. The Protocols also mandate that, in cases where civilian status is in doubt, military forces must assume the target to be civilian.³⁹ However, where military status is certain but civilians may be involved, the 1977 conventions do permit forces to strike, provided their objective is military and the damage to civilians is incidental. The Protocols deem that civilians necessarily share in the dangers of war, just as they share the benefits of victory;

³⁵ Best. Humanity In Warfare. p.296

³⁶ "Custodian" of the Humanitarian Law of Armed Conflicts, and the initiators of the previous Geneva convention series.

³⁷ Roberts, Adam, and Richard Guelff. Documents of the Laws of War. Oxford: Clarendon Press, 1982. p.387. also, Howard. Restraints on War. p.144

³⁸ e.g., the prohibition against the taking of hostages and prisoners of war.

³⁹ Article 48, and Article 50, et al. Reisman and Antoniou. The Laws of War, Collected Primary Documents. pp. 87-88.

⁴⁰ they are due all the protection which reasonably can be offered them, but it must be acknowledged that civilian immunity can never be absolutely delimited, for “the resort to war in the first place mark[s] an entry into a realm where limits [are] vague and wavering,... [a realm] which is of its very nature least illimitable.”⁴¹

According to Geoffrey Best, however, the protection of civilian rights established by the 1977 Geneva Protocols is perhaps the best available under the circumstances. In fact, Best writes, some (perhaps those leery of repeating the mistakes of 1949), believe the Protocols are even “too good to be true.” Best rebuts this belief, maintaining that, “Our surprise at [the 1977 convention for civilian rights in armed conflict] - if we are surprised - should be understood not as a comment on its military irrationalism, but as a measure of the extent to which we have become accustomed to excesses and horrors.”⁴²

This surprise, then, is the legacy of industrial warfare, a war form whose keystone strategy of attrition necessitated the targeting of industry’s contribution to the enemy war effort - regardless of non-combatant involvement - and whose tools made possible the pursuance of this strategy. By introducing, and institutionalising, the strategic targeting of civilians, industrial age warfare fostered a treacherous blurring of the distinction between civil and military which serves as a dangerous precedent for the civilianisation of conflict in information age war.

⁴⁰ Rogers. Law on the Battlefield. p.34

⁴¹ Best. Humanity In Warfare. p.63

⁴² Ibid., p.325

Strategic Civilian Tools in IAW

This industrial age precedent, however, is not the only factor behind the civilianisation of information age war. In fact, the civilianisation of IAW results as much from the information age's blurring of the distinction between military and non-military *technology* as it does from the industrial age's precedent for obscuring the distinction between military and non-military targets. By confusing the issue of what technologies and systems contribute to information age war efforts, the civilianisation of the tools of war may, in turn, encourage the same trend in targeting, magnifying the industrial war form's precedent. Together the two civilianisations forecast a level of military emphasis on the civilian realm unknown in any previous model of warfighting.

Interestingly, these changes in what warfare targets, unlike the changes in how warfare is waged, are not direct products of the shift to more information-intensive power. Rather, the trend toward the civilianisation of information age war is perhaps more aptly characterised as a by-product of that shift. Whereas the decisiveness of efficiency reflects *how* information age power is conveyed, the civilianisation of war reflects *what* conveys that power: the tools of information age influence, the information and information systems which are used by military and civilian alike.

These shared information technologies represent the information age's contribution to the class of dual-use technologies - a class whose extensive growth is the primary factor behind the blurring distinction between civil and military technology. Dual-use technologies are not necessarily information-based; they can be any technology which has applications to both military and non-military functions. Lasers, for example, are useful both for the precision

targeting of missiles and the precision placement of surgical cuts. Yet, while dual-use technologies are not unique to the information age - the aeroplane, the telephone, and the railroad have all been coveted by soldier and civilian alike - they have become exponentially more prevalent since the information revolution.⁴³

The military's shift from relying on technologies which produce greater masses of firepower to technologies that leverage information for greater efficiency⁴⁴ has put soldiers in the same market as civilians more than ever before. This overlap between military and non-military demand arises largely from the flexible nature of the information technologies upon which the military now increasingly depends. The flexibility of these technologies is, in turn, rooted in the non-linear character of information itself. Information is infinitely shareable: no matter where, when, how, by whom, or how many times a piece of information is used, it retains the same value.⁴⁵ In principle, therefore, anyone and everyone can use the same information, even if they have very different uses for it. Likewise, the technologies that allow the collection, manipulation, storage, and dissemination of that information have themselves acquired multiple uses. For example, the same operating system that the military uses on computers designed to facilitate navigation and group co-ordination in military

⁴³ Cf. Pearton. *The Knowledgeable State*. pp.246-7

⁴⁴ This shift, although presently driven largely by monetary considerations in most advanced militaries, will become a dependence if war shifts to pivot around the advantages of speed and efficiency, as forecasted in the previous section.

⁴⁵ Cf. Fast, William R. Lt. Col. "Knowledge Strategies: Balancing Ends, Ways, and Means in the Information Age." *Sun Tzu Art of War in Information Warfare Prize*. Washington, DC: National Defense University Press, 1997. p.7

operations, civilians use to run the computers on which they write essays.⁴⁶ Satellites that militaries use to gather strategic intelligence, civilian organisations employ in the global transmission of television signals. Moreover, civilians may employ the same database management tools for tracking consumer demand that the military apply to facilitating ordnance maintenance,⁴⁷ and the networked computing capabilities on which civilians rely for long distance business collaboration, the military employs for relaying medical information to units in the field.⁴⁸

The spread of dual-use information technologies is not, however, significant merely as a sign of the flexibility of modern ITs. Rather, the dual-use proliferation is material because it undermines the military's traditional monopoly on the tools and technologies for waging war. In so doing, the civilianisation of military tools further erodes the rationale for maintaining the distinction between civilian and military targets. The civilianisation which results from the information age growth of dual-use technologies manifests itself in two ways. First, many dual-use technologies and systems may be

⁴⁶ For instance, US Marine Corps helicopter pilots and special forces have been using a hand-held computer known as Pathfinder to facilitate navigation, message exchange, and location-finding. The second generation of this device, known as MicroPathfinder, "incorporates a mission planner in the form of a Microsoft Windows-based personal computer..." The US Army was also able to cut the time soldiers required to generate and submit reports by 99% by using a "commercially available personal digital assistant" as part of its 'Mini-Eyesafe Laser Infrared Observation Set' (MELIOS) designed for target location and reporting. Hewish, Mark. "Wearable Information Tailored to Battlefield." International Defense Review. Jane's Information Group, Ltd. Vol1, n11. 1 Nov 96: 1- 12. p.7, 4.

⁴⁷ The Israel Defense Force, US Air Force, and UK ministry of Defence have all employed an Israeli developed system called Techmate, which combines on-line documentation, fault-isolation systems, and other programs with database management tools. By facilitating the identification of problems, the tracking of inventory, and the sharing of lessons learned, this system helped military maintenance workers improve their performance level by 32.5% in field trials. *Ibid.*, p.3

targets because their status as purely civilian objects is difficult to verify - either because attackers are unable to discern whether such systems have a civilian or a military use, or because legitimately civilian operated systems also double for military ends. Secondly, the tendency to target dubiously civilian systems will likely be exacerbated by the fact that the infiltration of civilian technologies into the military encourages further reliance on civilian-developed versions of dual-use technologies. The more the military relies on non-military development and non-military systems, the easier it becomes to justify targeting these systems, and thus further weaken the civil/military distinction.⁴⁹

To expand on the first manifestation of the civilianisation from the proliferation of dual-use technologies, many civilian information systems may become targets on the grounds that they could possibly contribute to a war effort. This potentiality arises because one cannot judge the military or non-military nature of many modern information technologies and systems from their design, but only according to their use. Some primarily civilian systems do, in fact, also play pivotal roles in military operations,⁵⁰ and as such constitute legitimate targets under international law. This *de facto* extension of military targets further amplifies the justification for targeting non-combatants which

⁴⁸ For example, as part of a US army initiative, called Meditag, to improve medical care to remote unites, KPMG Peat Marwick and Apple Computers have developed "software that provides access to patients' medical records and laboratory results over wireless links via Apple Newton hand-held computers." Hewish, Mark. "Military Medicine Goes Digital." International Defense Review. Jane's Information Group, Ltd. Vol1, n5. 1 May 96: 1- 5. p.3

⁴⁹ Some may be tempted to argue that the problem is solved if one considers that once a system is appropriated by the military it is classified as military, and until that point it is non-military. However, such an argument would ignore the stated first impact of dual-use technology, which is that the distinction between military and civilian use of a system is increasingly difficult to verify in the information age.

was originally manufactured for the industrial war strategy of striking civilian-run factories. At that time, the classification of the enemy's war industry as a legitimately "military" target presented a controversial blow to civilian immunity - even when the factories in question manufactured such obviously military products as tanks and bullets.⁵¹ In future wars, the fact that many products of the information revolution can simultaneously support both military and civilian applications could serve only to increase confusion over the civil/military distinction and challenge the immunity of non-combatants to an even greater extent.

The second manifestation of the dual-use civilianisation trend derives from the fact that the military increasingly faces competition from private enterprises eager to develop systems that have civilian as well as military uses. In the future, the world's military forces may have a significant potential to choose between military- and civilian-developed versions of the same technologies. To the extent that military forces choose the non-military engineered option, they will encourage the tendency to target the civilians and civilian systems behind that option. Yet in the information age this choice will be highly tempting for a variety of reasons.

At its most elemental, this dual-use dilemma results from the fact that the non-military applications - and therefore marketability - of many IAW technologies have provided incentive for private companies to take over the

⁵⁰ For example, the Public Switched Network is a civilian operated system with primarily civilian functions, but since the US Department of Defense relies on this network for 95% of its non-classified telephone communications, disruption of this primarily civilian system would hinder military operations - a factor which is a key criterion in classifying targets as 'military,' even if the system itself technically is not military controlled. See also p.205

⁵¹ See also p. 175, Rogers. Law on the Battlefield. p.11

research and development of numerous military projects for their own ends.⁵²

The most famous evidence of this phenomenon is the backbone of the information revolution itself, the Internet, which began as the brain-child of the US' Defense Advanced Research Projects Agency,⁵³ and is now home to millions of commercial web pages and even advertisements. The Internet is only the most celebrated of many information technologies which were first developed under military auspices, but later turned over to private enterprise.⁵⁴

Although military imperatives 'jump started' much of the research and development which sparked the information revolution, that revolution now thrives because of its commercial possibilities.⁵⁵ "Military requirements no longer dictate the direction and speed of technology" since the world's militaries have begun abrogating their monopoly claim to such technologies as high-resolution satellites and electronic mail.⁵⁶ Instead, the private sector drives the state of the art and, not infrequently, surpasses the sophistication of the military's information technologies.⁵⁷ For instance, the first bomb damage assessment of Operation Desert Storm reached the Cable News Network's airwaves before it arrived on many generals' desks, largely because CNN's

⁵² To be distinguished from the numerous private companies contracted by the government to build systems specifically for the military.

⁵³ Molander, Roger C., Andrew S. Riddle, and Peter A. Wilson. "Strategic Information Warfare: a New Face of War." Santa Monica, CA: RAND, 1996. p.2

⁵⁴ Others include satellites, many computing peripherals like advanced LCD [liquid crystal display] screen technology, and, indeed, computing itself. Steven Aftergood surmises that much of the recent privatisation of military projects is the result of the Cold War's end, and the consequent slashing of defence budgets. After the Cold War, states generally retained their monopolies only for the most militarily sensitive of information technologies, such as stealth, leaving the rest to the open market. Aftergood, Steven. "Monitoring Emerging Military Technologies." Federation of American Scientists, Public Interest Report. vol48, n1; January/February 1995. p.1

⁵⁵ Freedman, Lawrence. Information Warfare: Will Battle Ever Be Joined?. London: International Center for Security Analysis, October 1996. p.9

⁵⁶ Scott, William B. "Information Warfare Policies Called Critical to National Security." Aviation Week and Space Technology. 28 Oct 96. p.60

reporters had portable direct broadcast satellite systems and flexible organisation, whereas the US military relied on over-tasked modems and a stove-piped intelligence system for information distribution.⁵⁸ The established ability of CNN to televise a story before it has entirely progressed through the military hierarchy highlights the fact that, in certain cases, the equipment (and the organisation) available in the private sector has a capacity for efficiency which significantly surpasses that of the military.

Moreover, the information capabilities of the private sector will continue to increase regardless of military progress in this area. Since the consumer market functions according to customer demand, it will persist in developing more and more sophisticated information systems as long as there are customers to buy them.⁵⁹ On the contrary, militaries, however much they might wish to govern their purchases according to demand, do not. Militaries remain subject to the availability of tax money,⁶⁰ and consequently cannot always afford either to build or to buy the state of the art - especially now that the Cold War's justification for defence spending has ended, and the state of the art is not publicly, but privately dictated.⁶¹ This situation may create intense pressures for military strategists in so far as it forces them to develop martial applications for technologies that emerge not from military planning, but from the whim of the open market. Indeed, these private technological innovations may not only be unexpected, but sometimes also unwanted. Militaries rarely welcome outside

⁵⁷ Kraus, George F., Comdr., USN (Ret); Senior Fellow, SAIC. Interview with the author. 16 December 1996.

⁵⁸ Campen, Alan D., ed. The First Information War: the Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1992. p.xvi.

⁵⁹ Freedman. Information Warfare: Will Battle Ever Be Joined? p.9

⁶⁰ That is, militaries rely on taxes if they are state run; otherwise their spending may depend, for example, on the lucrativeness of donations, or of drug sales.

innovation when, for instance, it nullifies years of accumulated wisdom on the use of now obsolescent technology, and when it compels strategists to devise a use for technologies they never wanted in the first place.⁶²

Even if militaries could both afford and anticipate all the private sector's new technologies, military technology would necessarily lag behind that available on the open market. Private computer companies can produce new models of software and hardware almost as quickly as the public is willing to buy them. The combination of soaring consumer demand and the lightening pace of micro-technology innovations means that a technology that is on the cutting edge one month may be all but irrelevant six months later. This state of the art is governed almost entirely by an innovation's impressiveness and its marketability. The general public is not concerned with more than a minimum of computer security and, since models become obsolete within just a few years, they are not greatly troubled over the "robustness" - the survivability - of their systems.⁶³

The military, however, cannot afford to sacrifice security and robustness for new gadgets, because it faces a much greater potential for disaster if its systems are compromised. In a military computer system, an error in a line of software code might accidentally launch a missile over a false alarm; a loophole in a password protection program could give a hacker access to vital military plans; a weak link in a network could mean the difference between a C2 system

⁶¹ Aftergood. "Monitoring Emerging Military Technologies." p.1

⁶² Buzan, Barry. An Introduction to Strategic Studies: Military Technology and International Relations. London: Macmillan Press, 1987. p.29 Such an invention was the development of steam power ships, which rendered useless the centuries of knowledge accrued on the use of sail-power.

⁶³ Munro, Neil. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." Washington Post. 16 Jul 95. p.3

which survives an electromagnetic pulse weapon and one that does not.⁶⁴ The process of eliminating all these flaws takes time however, time which the private sector spends not on making a prototype ready for the market, but on developing still more new technologies. Consequently, the information age military must make a difficult choice between buying the state of the art on the open market and using military-issue technologies which may lag years behind the cutting edge. If information age forces choose the former option, they risk relying on systems which simply may not withstand the rigours of war, which may hide accidental flaws causing them to fail unexpectedly, or which may even conceal viruses and "backdoors" planted by enemy spies.⁶⁵ However, if militaries choose the latter option - which will often mean older and slower technologies - they may fatally sacrifice too much of the efficiency vital to winning an information age war.

To a very great extent, therefore, civilians now command the development of the tools for information age war. Civilian innovations will guide - if not dictate - the directions, pace, and sometimes even the form which military developments take in the information age. In an age where a military force can feasibly buy the majority of its command and control system from the shelves of a commercial shopping mall, and civilians can hack into top secret military records with their home computers, the civil/military distinction may

⁶⁴ Din, Allan M. "Strategy, Security, And Advanced Computing." In Jacobsen, Carl G., Ed. The Uncertain Course: New Weapons, Strategies, And Mind-Sets. Oxford: Oxford University Press, 1987. pp.271-275 It was concerns such as these which the US public ignored in the late '80s scandals over the Pentagon's spending for coffee makers and toilet seats. Shocked public opinion utterly disregarded the fact that the \$500 or so which DOD spent on coffee makers went toward the research and development of coffee makers - and other technologies - which could survive a nuclear attack!

⁶⁵ These assertions may at first sound like the delusions of science fiction addicts; however, the CIA has already planted such devices in computers which Russia imports from America. Adams, James. "Anoraks' Apocalypse." p.5.9

become more a source of confusion than a guideline for humanitarian warfare. Consequently, the civilianisation of IAW's tools amplifies the difficulty of discerning not only between military and non-military tools, but also between military and non-military uses of those tools. This increasingly murky line between civilian and military may serve to extend the justification - already so drastically expanded during the industrial age's two world wars - for targeting marks that may not strictly fit traditional definitions of 'military objectives.' Thus, the civilianisation of the means of information age war could contribute to an erosion of the distinction between combatant and non-combatant even greater than that of the industrial age war form, for the more difficult it becomes to discern what constitutes a military tool, the easier it may be to justify attacks on objects which are not distinctly military.

Converging Trends: Civilians as Strategic Targets in IAW

Time's Douglas Waller neatly summarised the implications of IAW's civilianisation with the statement that "in some respects, information age war may only refine the way modern warfare has shifted toward civilian targets."⁶⁶ The convergence of the industrial age trend with the information revolution's civilianisation of the tools of war certainly advances the trend a few steps further, but whether or not it marks a fundamental departure from past targeting practices (a departure which would require a new paradigm for understanding war) depends on how the convergence manifests itself - as an incremental shift or as a qualitative transformation in what war is waged at. The early phases of

this manifestation should primarily take two forms: targeting of civilian information through psychological operations (psyops), and targeting of civilian information systems through electronic, conventional, and computer hacking tactics. The striking of similar civilian targets has been a military objective for centuries but, as the following pages argue, both civilian information and information systems are acquiring a more important role in information age war, a role which could also render them more important targets of war.

Group Captain Andrew Lambert of the Royal Air Force vigorously disputes this assertion. He argues that, on the contrary, IAW will facilitate *better* observance of non-combatant immunity. With precision weapons and detailed intelligence, information age military forces have a new capability to discern between military and non-military targets, and to strike, with surgical exactitude, only the military targets. As supporting evidence, Lambert cites coalition forces' "meticulous" efforts to spare civilians during the Gulf War.⁶⁷ Pilots had strict orders to attack only with positive identification of targets, and some military targets were not attacked at all because the coalition deemed the potential for collateral damage of non-combatants to be too high.⁶⁸ The coalition also went to great lengths to insure accuracy, using a majority of expensive PGMs when attacking populated areas and, significantly, suffering heavy losses in attacking low (which improves targeting at the price of increased vulnerability) over Iraqi airfields.⁶⁹ As a result of these practices, writes A.P.V. Rogers,

⁶⁶ Waller, Douglas. "Onward Cyber Soldiers." *Time*. Vol146, n8. 21 Aug 95. p.7

⁶⁷ Lambert. "The Psychological Impact of Airpower."

⁶⁸ Taylor, Philip M. *War and the Media: Propaganda and Persuasion in the Gulf War*. Manchester: Manchester University Press, 1992. p.213

⁶⁹ Rogers. *Law on the Battlefield*. p.63

“Even critics admit that ‘one claim has survived the tarnished aftermath of the Gulf War intact - namely, that the Coalition used modern military technology to comply with the fundamental legal requirement to distinguish between civilians and combatants more effectively than any belligerent in any past war.’”⁷⁰

Both Rogers and Lambert view this as a positive portent for wars to come.

Members of the Gulf War coalition - and perhaps a few dozen other advanced and primarily Western states - may, in truth, have every intention of fighting future wars with equal or better regard for civilian immunities.

However, the West will not always be able to fight its wars on its own terms.

Indeed, the most probable future threats are likely to be from non-western actors who view the prospect of shifting war to their own terms as their first objective, because this is an effective countermeasure to the West’s insurmountable conventional military advantage. These enemy terms entail a shift to a more labour-intensive kind of war, and one which is a more broadly social phenomenon than the West can accept.⁷¹ Such a war would rely on sheer manpower to strike not so much at an opponent’s military as at the very fabric of his society, targeting the civilian population and jeopardising not only their lives but their way of life as well. This is precisely the kind of war which dictators of poor, high population countries can best support, and democratic leaders of media-linked, public-opinion conscious Western countries can least afford.⁷² It is also precisely the kind of war to which IAW’s civilianised targeting could most obviously lend itself. The West must therefore understand

⁷⁰ Ibid., p.65

⁷¹ Freedman, Lawrence. Information Warfare: Will Battle Ever Be Joined?. p.7

⁷² Such tactics are not infallible, as evidenced by WWII civilians’ strengthened resistance in the face of strategic air attacks, yet they are least amenable to the Western way of war. Cf. Larson, Eric V. Casualties and Consensus: The Historical Role of Casualties in Domestic Support for U.S. Military Operations. Santa Monica, CA: Rand, 1996. p.xvi

and prepare to meet this strategy of information age war, regardless of whether it plans only to defend, or to retaliate in kind.⁷³

Targeting Civilian Information

The targeting of civilian information revolves largely around the use of perception management to influence popular opinion and the public will to continue a war. As chapter two notes, such psychological warfare is not a new tactic; however, early signs indicate that both the extent of psychological warfare's capabilities and of its effects may increase considerably as a result of information age technologies and influences.

Psychological operations have historically targeted both combatants and non-combatants, spotlighting the former in an attempt to erode the enemy's war machine by chipping away at his soldiers' morale and will to continue the war, and targeting the latter in an effort to defeat the willingness of the people to sustain the war or allow its continuation. In focusing psyops specifically against civilians rather than enemy troops or leaders, the "object of policy [becomes] no longer to convince ministers and officials that war [is] too hazardous in the given circumstances, but to induce populations in an 'enemy' state to demand peaceful solutions of their own governments."⁷⁴ This strategy may become even more desirable in the information age than it was in the past if public opinion fulfils its information age potential to play a larger and more influential role in

⁷³ In the face of this dangerous trend toward civilian-targeting, Western countries should especially be aware that good intentions can falter under the horrors of war. Though unfortunate, history proves that it does happen. In the Second World War, for instance, so strong was the desire to avoid the devastating stalemate of WWI, that commanders took actions to spare their troops whenever possible, even at the cost of enemy civilians' lives. One such step was Britain's practice of high flying carpet bombing, a tactic in which planes flew high enough to avoid enemy ground defences, but too high to target with any accuracy. Howard, Andreopoulos, and Shulman, eds. *The Laws of War*. p.131

⁷⁴ Pearton. *The Knowledgeable State*. p.202

government decision-making, and particularly in the making of those decisions involved in the beginning and conducting of war.

As discussed in chapter one,⁷⁵ the spread of information which accompanies the crumbling of hierarchies holds a capacity to grant individuals a greater voice in decision-making. The proliferation of information sources - ranging from traditional newspaper, television, and radio news reports to more innovational multi-media web sites, interactive news bulletin boards, and on-line "chat" rooms that permit the exchange of wide-ranging opinions across a broad base of the population - should encourage the development of more informed opinion on the part of the general electorate. Moreover, individuals in the information age, armed with a greater awareness of their government's actions, will also be better able to transmit their opinions about these actions to their representatives, and encourage more direct representation of the public's will.⁷⁶ In the United States, e-mails, faxes, web-polls, and even 1-800 freephone numbers have already begun to supplement the slower and more cumbersome means of paper mail and telephones through which constituents have been accustomed to contact their representatives. While in many cases governments will continue to implement some policies regardless of popular approval,⁷⁷ the increasingly abundant availability of informed public opinion in the information age should render the popular voice more and more difficult to ignore. Furthermore, the growing media interest in public opinion is a sign to

⁷⁵ See chapter one, 'Man.'

⁷⁶ Wriston. "Technology and Sovereignty." p.67

⁷⁷ Cf. the case of the Haiti intervention in 1994

politicians that popular approval is, in many cases, becoming an increasingly crucial component of political success.⁷⁸

Already the satellite transmission of the sight of one American soldier being dragged through the streets of Mogadishu has caused a public outcry sufficient to compel the American government to withdraw peacekeeping troops from Somalia.⁷⁹ This broadcast almost single-handedly 'upped the ante' of US involvement in Somalia, brutally shattering widely-held popular expectations that American troops were on a low-risk humanitarian mission to aid Somalis left starving by years of violent conflict. After months of growing disillusionment with a peace operation many had initially only supported on the condition it would be brief,⁸⁰ the graphic coverage of Somali crowds swarming around the American soldier's body galvanised popular opinion with all the immediacy of the sight itself. Overnight, public sentiments swung from resigned disapproval to vocal outrage. Fuelled by all of the emotion conveyed in that infamous broadcast, the horrified popular reaction swiftly persuaded the government that the cost of convincing the public to support the mission was higher than US interests in Somalia warranted, leaving the Clinton

⁷⁸ This is especially true in an era where constituents can easily access information monitoring whether representatives acted on the people's opinion or not, drawing a more explicit link between a politician's compliance with the public will and his or her potential for re-election.

⁷⁹ Adams, James. "The Role of the Media." Ethnic Conflict and Regional Instability. Pfaltzgraff, R.L. and R.H. Schultz, eds. p.164

⁸⁰ A USA Today/CNN poll in December 1992 showed that nearly three out of every four people polled supported the mission to Somalia, but 51% of them also believed the mission would be over one month later. A similar poll conducted on 5 October 1993, the day after the broadcast in question, showed that 52% of the 525 people polled believed it was a mistake to get involved in the mission in the first place, and 66% believed the mission had been unsuccessful. Furthermore, 43% wanted US troops to withdraw right away, and another 26% supported gradual withdrawal. "Somalia Rescue Begins; US Troops Pour Ashore." USA Today. 9 Dec 92. and "US: Return Our Men." USA Today. 6 Oct 93.

administration no option but to withdraw.⁸¹ This incident conspicuously illustrated the powerful links between new information technologies, public opinion, and decision making. In an age when television stations can rapidly shape opinions by broadcasting the progress of a battle in real-time, and constituents can reach government leaders moments later with their opinions via fax, internet, and e-mail, the swaying of public support holds a greater potential to influence governments' decisions about war than it ever has before.⁸²

The significance of public opinion's increasing role for the civilianisation of IAW lies in the fact that, if popular opinion does take on a more important role in decision-making, such a shift may also increase the expediency of targeting civilians with propaganda. Civilians may someday become targets for psychological warfare to the same extent that they hold power to persuade their government to stop fighting: in cases of extreme civilian influence over government decision-making, the swaying of popular opinion might even win a war - all unwittingly - for the other side. Ironically, the very leverage which information age civilians might enjoy over their own government's ability to wage war could render them unable to avoid involvement in information age wars.

⁸¹ Admittedly, the administration's seemingly obedient reaction to the outcry was heavily influenced by cost-benefit decisions to spend its political capital on something other than convincing popular opinion to support operations in Somalia, namely the passing of Clinton's coveted health care bill. Yet the importance of public as well as Congressional support for both these endeavours further highlights the growing importance of popular opinion in political decision-making. Feaver, Peter. "A New Theory of Civil/Military Relations." University of St Andrews Post-graduate Seminar, 14 Oct 97.

⁸² One must remember, however, that this impact of swaying popular opinion may only apply in certain kinds of military involvement. Eric Larson posits that popular support for military operations is a function of an implicit cost-benefits analysis. In situations where the public deems the stakes of military involvement to be high enough, Larson shows a trend of public opinion supporting bloodier measures than the government sanctions. Larson. Casualties and Consensus. p.199

The targeting of non-combatants with psychological warfare may also become a more tempting strategy with information age war not only because the returns from influencing civilians could be higher, but also because many technologies introduced by the information revolution make psyops both easier and more effective. This facilitation of psychological warfare manifests itself in two ways. First, the proliferation of information technology assists the spread of information and therefore, of propaganda, the central tool of psyops.⁸³ Access to low-cost, effective methods of distribution like direct broadcast satellite television and the internet has grown relatively easy and inexpensive to obtain, allowing even disadvantaged groups like Mexico's Zapatistas a ready medium for broadcasting information and propaganda with an unprecedented reach. In addition, growing databases of computerised information - listing details which range from one's medical, educational, and tax histories to the occupations one holds and the political beliefs to which one subscribes - also present new opportunities for targeting specific groups with tailored propaganda. Psychological operators might target regions around military bases with propaganda about the plight of their soldiers in battle, while regions heavily populated by immigrants with tenuous loyalty to the government might receive propaganda about the futility of that government's programs, and still other areas with a history of political liberalism could be bombarded by stories and images depicting the suffering of innocent enemy civilians. By utilising more precise, computer-managed information, perception managers in the information age should find it easier not only to disseminate their manipulated information, but to guide its distribution to the people it is likely to affect most.

⁸³ Molander, Riddle, and Wilson. "Strategic Information Warfare." p.23

Secondly, the sophistication of new information technologies permits a highly elaborate manipulation of information, and the creation of ever more persuasive propaganda. Techniques like video morphing - a visual blending technique which makes computer generated images indistinguishable from real life images on video - can project leaders onto the evening news, saying things they never said, in places they have never visited.⁸⁴ New technologies can also enable information age warfighters to spread disinformation through, among other methods, the interruption and overriding of satellite signals, the anonymous and untraceable falsification of orders, and transmission of footage documenting a humiliating - and fake - defeat in battle around the globe.⁸⁵

Although the effects of such techniques in war remain matters of speculation, by examining the effects of recent and comparatively primitive propaganda methods one can infer that the impact of the new psyops capabilities would be at least as significant if not more so. Coalition forces in the Gulf War applied one of the most simple propaganda forms - the leaflet - to induce thousands of Iraqi soldiers to desert their posts. Coalition planes dropped millions of these leaflets over Iraqi troops, usually broadcasting where and when an attack would occur, and offering the soldiers an opportunity to escape.⁸⁶ Post-war assessments indicated that 100-160,000 did. However, the propaganda was only effective because the coalition had the means to attack where and when it said it would, thus fulfilling the promise of the leaflets. By alternating leaflet drops with attacks with follow-up leaflet drops (the latter commonly read along the lines of 'We told you so,' emphasising that the attackers had fulfilled

⁸⁴ Schwartau, Winn. Information Warfare: Chaos on the Electronic Superhighway. Thunders Mouth Press, 1994. p.358

⁸⁵ Libicki. "What Is Information Warfare?" ch6, p.1

the promise of the previous leaflets and were now offering a second opportunity to flee before the attack was repeated)⁸⁷ battered away at the already tenuous morale of the Iraqi military forces.⁸⁸ If this simple propaganda, in combination with the decapitation of Iraq's command and control, could reduce much of Iraq's forces to chaotic anarchy, one can imagine that more sophisticated psyops techniques like morphing - which can create so many contradictory "facts" that it becomes impossible to discern the truth, let alone to act on it - could have an enormous impact on the conduct of information age wars.⁸⁹

Consider a situation in which television stations broadcast fabricated pictures of a hideous massacre brought on by the foolish policies of a government that has failed to fulfil its war aims and keep its promises; covert radio stations portray themselves as the voice of dissident groups within the state, offering an alternative to the current war-fraught leadership; hackers penetrate the computer systems of a trusted newspaper planting false stories detailing how the country's ruler is deliberately ignoring civilian suffering in prosecuting the war and is secretly in negotiations for a peace that will leave him wealthy and safe, but will betray the security and ideals of his nation. Such an onslaught of calumnious information could create a chaos of confusion that would add great weight to the voices of those opposing the war, as well as to those who oppose the government itself.

⁸⁶ Johnson and Libicki, eds. *Dominant Battlespace Knowledge*. Chapter 3, p.9

⁸⁷ Taylor lists the following as an example of the actual text of such messages: "Tomorrow if you don't surrender we're going to drop on you the largest conventional weapon in the world." After dropping a 15,000 lb. BLU-82 "Daisy Cutter" bomb that was the size of a Volkswagen bug and produced a blast resembling a nuclear bomb's mushroom cloud, coalition pilots would drop a second round of leaflets which read, "You've just been hit with the largest conventional bomb in the world. More on the way." Taylor. *War and the Media*. p.155.

⁸⁸ Lambert. "The Psychological Impact of Airpower."

⁸⁹ Molander, Riddle, and Wilson. "Strategic Information Warfare." p.23

Similar bombardments of disinformation (and censored truth) have, of course, been part of war throughout the ages, and have followed the same principle of galvanising doubts and dissension already present among the enemy's own citizens.⁹⁰ These rules for success continue to apply to information age psychological operations: to insure achievement of the objective, the doubts sowed through psychological warfare should find parallel sentiments upon which to capitalise in the target population, encouraging and validating opposition to the war, fuelling the cause of government dissenters, and in general undermining the war effort by striking at popular morale and the will of the people to sustain the war's costs.⁹¹ As in wars for time immemorial, these efforts will be more likely to succeed in cases where the ruling government is unpopular, its war aims are unclear, its progress with the war is difficult to measure, and the electorate does not consider vital interests to be at stake in the conflict.⁹² Advanced information age psyops could further improve the opportunities for influencing the enemy population - and thereby the length of the war - under these conditions as well as under circumstances less favourable to the success of propaganda. This improved capacity for influencing the target population results from psyops' information age ability to achieve an unprecedented level of pervasiveness and convincing "authenticity." Potentially ubiquitous and often indiscernible from legitimate information

⁹⁰ An established principle of psychological operations is the fact that propaganda that is most credible - or in other words, closest to the target population's conception of reality - has the highest chances of success. Rothgeb, John M., Jr. Defining Power: Influence & Force in the Contemporary International System. New York: St Martin's Press, 1993. p.119, also Taylor. War and the Media. pp.150-4. and Speier, Hans. "Ludendorff: The German Concept of Total War." in Earle. Makers of Modern Strategy. p.317

⁹¹ This tactic was used enthusiastically in World War II, as well as in the more recent 1991 Gulf War. Taylor. War and the Media. p.150

⁹² Mazarr, Michael J., Don M. Snider, and James A. Blackwell, Jr. Desert Storm: the Gulf War and What We Learned. Boulder: Westview Press, 1993. p.170

supplies, information age psychological operations may both reach a much greater number of people and sway a much greater number of people, thus amplifying the effectiveness of psychological warfare through the higher quantity and higher quality of psyops available with the tools of information age war.

Targeting Civilian Information Systems

In addition to psychological warfare's threat to civilian information, future information age wars may also pose a considerable threat to civilian information systems. Under the strategies of IAW, conventional military attacks, hacker attacks, electronic warfare, and economic information age war will likely all target non-military information systems as well as military. This targeting follows the same principle as did the World War air strikes against factories: destruction of an enemy's primary tools for waging war should eventually subvert his ability to resist. The prime targets, in an age where martial victory depends on the means of speed and accuracy, are the information systems which process the knowledge vital to such efficient battle. Due to the inherent non-linearity of information power, however, combatant and non-combatant often share information from the same system, as the following paragraphs illustrate. This sharing again blurs the distinction between civilian and military and, following the strategic precedents of industrial warfare, creates a tricky justification for the inclusion of civilian information systems as military targets.

The information age emphasis on targeting civilian information systems will likely be fourfold. Some of the impact on civilian information infrastructures will be incidental, simply because the civilian system got in the

way. For instance, an electromagnetic pulse will affect all electricity within a wide radius, blacking out homes and businesses, as well as disabling the electrical equipment upon which the military relies to strike back. Some cyber attacks on civilian systems could also be intentional: cutting off electricity in several major cities, interrupting long-distance phone service, causing currency exchange rates to plummet, and crashing planes by blocking air traffic control signals could cause enough chaos in a country to distract the military from its enemy at least until the forces can restore domestic order and internal security.⁹³

In addition, information age wars may also call for intentional attacks on non-military information systems because they are easier to strike than military systems are. A 1994 Pentagon report on the dangers of information age war concludes that:

An adversary determined to harm the United States through the use of information age war techniques may choose to completely ignore military systems because of the higher likelihood of success with civilian systems. Major dislocations in American society could be caused by targeting sensitive but unclassified data, such as power systems, electronic funds transfer systems, the PSN [Public Switched telephone Network] and the national airspace management system.⁹⁴

Since the West's probable future enemies are unlikely to be its equals militarily, they will be inclined to choose the battle which most evens their odds. At least until the private sector recognises the seriousness of IAW's threat and implements stronger security precautions (as Libicki-esque theorists predict they will),⁹⁵ non-military information systems could present much more tempting targets than military systems.⁹⁶

⁹³ "Cyber Wars." *Economist*, v3, 13 Jan 96: 89

⁹⁴ Munro. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." p.3

⁹⁵ For further elaboration of Libicki's viewpoint, see 'Other Views in the Debate' in the introduction.

⁹⁶ Freedman, Lawrence. *Information Warfare: Will Battle Ever Be Joined?*. p.8

Furthermore, the susceptibility of civilian information systems also leaves the military dangerously vulnerable. The fourth strategic reason information age military forces may target non-military systems is rooted in the fact that militaries rely on civilian systems almost as much as on their own systems in certain cases. In the United States, for example, 95% of the Pentagon's telephone communications run on the same lines civilian telephones use,⁹⁷ American military bases are powered from the same electricity sources which power civilian homes and towns; soldiers' pay is distributed through the same federal banking network where Mrs Smith and Mr Jones keep their savings.⁹⁸ This overlapping means not only that civilians are likely to be affected by information age war attacks aimed at the military, but that the military is vulnerable to the lack of security in civilian systems. Even the most sophisticated information age military cannot protect systems it does not control.

The universal vulnerability to information age war means that not only the military, but individuals, businesses, and private organisations must increase the security of their computer networks if a country is to have any true hope of safeguarding its citizens from information age war.⁹⁹ The military, however, is unique in its tendency to predict and prepare for threats in advance. Those outside the military are much less accustomed to pre-empting danger and securing against trouble that has not yet materialised. Ironically, the rise of

⁹⁷ Security Policy Board. "White Paper on Information Infrastructure Assurance." Federation of American Scientists, Project on Government Secrecy. Dec 95. p.2

⁹⁸ "Cyber Wars." p.89

⁹⁹ Szafranski. "A Theory of Information Warfare." p.1

computer crime may decrease vulnerability for that very reason.¹⁰⁰ Hacking into telephone computers for free long-distance calling, or tapping credit companies' databases to steal someone else's credit card number raises general awareness of the vulnerability of today's non-military computer networks. If individuals are driven to increase their information security practices in order to guard against computer crime, they will also help to secure the systems employed both privately and by the military against information age war.

Civilianisation's Implications for Paradigm Shift

In these ways historical precedent and information age trends converge to encourage the targeting of civilian information and information systems. This emphasis in information age war does, to a certain extent, represent a change in what it is that war is waged at. Civilian information systems, on the one hand, constitute a significantly new class of military target. Civilian information, on the other hand, is a familiar objective of military activity, but the degree to which the targeting of civilian information may be expedient in IAW is new to warfare. Far from constituting a fundamental departure from the established understanding of war, however, both of these shifts are in fact continuations of the time-honoured principles governing war.

In the case of civilian information systems, the shift in what war is waged at is a change in kind rather than in principle. From the Mongols to Britain's Bletchley Park codebreakers, military forces have targeted information systems throughout the history of war; the information age merely alters which

¹⁰⁰ Morton, Oliver. "The Information Advantage: Defence Technology Survey." *Economist*. v335, 10 Jun 95: 8-17. p.14

systems may influence the course of war. IAW's emphasis on civilian information systems in addition to military is an unfortunate increase in war's threat to the civilian realm, but what amounts to a change in ownership by no means represents a challenge to the principles of war.

In the case of civilian information, the shift in question is in the first place only a matter of degree. Military strategists have attempted to affect the outcome of war by influencing civilian opinions from the time of the Huns to the days of Radio Free Europe and beyond,¹⁰¹ employing the same principles - if not exactly the same tools - as those behind IAW's heightened emphasis on targeting civilian information.¹⁰² This change in degree alone does not itself necessarily preclude challenges to the current military paradigm, because a radical and, particularly, a very sudden leap in the importance of targeting civilian information could conceivably challenge the paradigm's ability to explain what war is waged at.

If, to take an extreme example, attacks on civilian information were to become the cornerstone of military operations, relegating attacks on political decision-making, military infrastructure, industrial productivity, and other traditional targets to mere supporting roles - perhaps in a situation where propaganda could be either so confusing or so persuasive as to sway mass opinion, and thereby government decisions, inexorably - then such a change in degree could fulfil a criterion for paradigm shift. This, however, is not the case with the role of civilian information in information age war, since attacks on civilian information remain one of many tactics employed in IAW. As the previous chapter illustrated, fast and accurate military strikes are also predicted

¹⁰¹ See chapter two, 'Historical Manifestations of Information Warfare.'

to play a cardinal role in future wars. While attacks on civilian information could certainly augment these actions,¹⁰³ they are unlikely to supplant such military attacks (prosecuted with information age efficiency or otherwise) for the simple reason that, where the stakes are sufficiently high, people will continue to fight - for their lives, for their beliefs, for their ways of life - regardless of all the chaos modern information technologies can generate.¹⁰⁴

Failing such extremes, IAW's emphasis on civilian information, far from challenging the principles of war, instead marks the continuation of a long pattern. Throughout history, military forces have generally targeted civilian perceptions in direct proportion to the expected ability of the popular voice to sway the course of the conflict. Any heightened emphasis on civilian information in IAW would therefore represent an adherence to established principle rather than a departure from it, since the principle in fact mandates that the military targeting of popular opinion ought to expand in response to such increases in the political influence of public opinion as those possible in the information age. The heightened expediency of attacking civilian information in information age war is therefore a dangerous, but incremental civilianisation of what war is waged at.

Furthermore, even the significance of this incremental change is in doubt, because the utility of swaying public opinion in warfare is itself uncertain. Since the early air power theorist Giulio Douhet famously presented his arguments that strategic aerial bombing would be most decisive by instilling

¹⁰² See the previous section, particularly p.202

¹⁰³ In proportion to the public's ability to sway government opinion and actions, as noted above.

fear in civilian populations, scholars and strategists have puzzled over the role of popular opinion in war and the susceptibility of that opinion to outside influence. Empirical evidence, most notably that of the extensive World War II Strategic Bombing Survey, has overwhelmingly indicated that public opinion does not respond to the stresses of war in the manner Douhet predicted. Significantly, several studies have shown that strategic bombing could have the opposite effect to that proposed, fostering greater resistance to enemy incursion rather than resistance to involvement in the war.¹⁰⁵ This seems to be particularly true in cases, such as that of the Londoners in the Battle of Britain, where the stakes are perceived to be high and failure in war means loss of one's freedom or way of life. Such evidence augurs that, even with information age increases in public opinion's role in government decision-making, attempts to influence the outcome of wars by swaying the public voice are as unlikely to achieve the strategic significance claimed by enthusiasts of non-violent 'cyber' wars as that claimed by Douhet. In the absence of such strategic significance, shifts in targeting civilian information will do little to challenge the present understanding of what war is waged at.

In the final analysis, the civilianisation of information age war falls short of fulfilling the second criterion of military paradigm shift. The heightened emphasis on targeting civilians in war does represent a noteworthy change in war, deserving of study in no small part because it signifies a dangerous extension of historical risks to non-combatants in war. That extension,

¹⁰⁴ This is not to say that wars can never be won on the basis of propaganda alone. However, if such a conflict is to be called a war, it must involve at least a credible threat that force will be used. In order for that threat to be credible forceful, if efficient, military tactics must still play a role in military capability.

however, remains within the bounds of the established models for understanding war and thus, despite the heightened challenge it poses to the civil/military distinction, information age war's civilianisation cannot be a paradigmatic change.

¹⁰⁵ Cf. Freedman. The Evolution of Nuclear Strategy. p.11, Warner. "Douhet, Mitchell, Seversky." p.490. See also p.177

WHY INFORMATION AGE WAR?

"The impact of the information revolution on the sources of conflict ... is both more and less obvious than its impact on purely military operations."

-Jeffrey Cooper¹

The analysis moves now to a more abstract aspect of warfare, one which, unlike the two previous criteria, has little to do with changes in technology. The third criterion of military paradigm shift deals instead with the question of why information age war will occur. This question poses a unique challenge for the paradigm shift analysis in that there are two very distinct ways to investigate the 'why' of information age war, two approaches so widely differing that they amount in practice to two separate questions. The first addresses why information age war, in particular, will be waged rather than other forms of war. This approach emphasises the unique content of information age war, and how that content may affect the reasons for resorting to war. The second approach addresses why war will be waged in the information age, examining how war's altered context - as well as its content - may affect the motivations and objectives for war. Together the two questions are intended to form a multi-dimensional picture of why this war form will be waged in this age, in order to establish more thoroughly if and how this picture differs from the current paradigm's projections. As in the previous two chapters, the extent of the difference will determine whether or not the information age changes in the 'why' of war fulfil the third criterion of military paradigm shift.

Following the pattern of the preceding chapter, this third appraisal of the paradigm shift will begin the investigation into why information age war will be

¹ Cooper, Jeffrey. 'Dominant Battlespace Awareness and Future Warfare.' in Johnson, Stuart, and Martin Libicki, eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University World Wide Web page, 1996. Chapter 6, p.6

waged by examining historical answers to that question. History provides a necessary background for understanding IAW's effect on the reasons for waging war, because it is impossible to determine the import of information age war's changes without a clear conception of why other forms of war have been waged in the past. Here one must begin at the most basic level with an understanding of why any war is ever waged. This subject has, of course, been treated at great length by others who have held it as their primary focus. Geoffrey Blainey, Seyom Brown, Anatol Rapoport, Quincy Wright, and Julian Lider are among those who have addressed the question of why war is waged in far more detail than could be attempted here within the context of examining the information age's potential for military paradigm shift.² Hence the discussion that follows will aim only to present an overview of the canon's answers to why war is waged in order to lay a foundation for understanding the whys of information age war.

Why Wage War?

"... for better or worse, the great issues regarding how men ought to live have been settled by war..."

- Paul Seabury and Angelo Codevilla³

War, understood most basically as organised violence in pursuit of some political objective, has been used as a means to some end since before the

² Cf. Blainey, Geoffrey. *The Causes of War*. New York: Free Press, 1988. 3ed. Brown, Seyom. *The Causes and Prevention of War*. New York: St Martin's Press, 1994. Rapoport, Anatol. *The Origins of Violence: Approaches to the Study of Conflict*. New York: Paragon House, 1989. Lider, Julian. *On the Nature of War*. Farnborough, Hants: Saxon House, 1979. as well as Brodie, Bernard. *War and Politics*. New York: Macmillan Publishing Co., Inc., 1973. Waltz, Kenneth N. *Man, the State, and War: A Theoretical Analysis*. New York: Columbia University Press, 1954.

record of history began. Given its often horrifying costs in human life and treasure, the popularity and the lasting nature of this phenomenon may seem counterintuitive - until, that is, one factors in the consideration that war has long served as the final arbiter of conflict.⁴ No other form of persuasion or coercion can put an end to disagreement as convincingly as the violence and physical force inherent in war. War has endured, despite all attempts to invalidate it, because time and again the force brought to bear through warfare has proved the best way to compel another actor to comport with one's own wishes, regardless of the other's preferences. War succeeds where other methods fail because, in destroying opponents' will and ability to resist, it proves concretely and beyond doubt that the loser has no choice but to abide by the decisions of the victor.⁵ Such a result can only be contested by a return to war. War is waged, therefore, most fundamentally because it acts as the *ultima ratio*,⁶ the final judge of who is right, who is most powerful, whose will should predominate.

This forceful final court of appeal⁷ has enjoyed particular demand on the level of the international system. That collection of interactions between states and other actors has been dubbed an 'anarchical system' by realists⁸ since it possesses no overarching authority with a mandate to rule over the interactions between its various actors. Anarchy prevails because the main actors here have

³ Seabury, Paul, and Angelo Codevilla. War: Ends and Means. New York: Basic Books, Inc., 1989. p.8

⁴ Luder. On the Nature of War. p.64

⁵ Geoffrey Blainey argues that "a decisive victory tends to promote a more enduring peace." The more decisively a victor defeats his opponents, the more obvious is the power differential between them. As the following pages illustrate, when the distribution of power is clear, conflict tends not to occur, since it is obvious without the contest which actor holds the capacity to impose his will. Blainey. The Causes of War. p.17

⁶ Brown. The Causes and Prevention of War. p.66, also G.F. Hudson. The Hard and Bitter Peace: World Politics Since 1945. New York: Praeger Publishers, 1976. p.9

⁷ Cf. Blainey. The Causes of War. p. 10

⁸ Cf. Bull, Hedley. The Anarchical Society. London: Macmillan, 1995.

historically been sovereign states who hold recognised authority to regulate everything that occurs within their own territory. However, since states, regardless of size, wealth, or military might, are all equally sovereign, none has the jurisdiction to regulate the actions of another. The precepts controlling the workings of the international system have therefore come to consist only of those which the states have imposed upon themselves and each other. Owing to the anarchical nature of the system, the methods for establishing such rules necessarily involve either persuasion (for example, economic incentives or diplomatic measures aimed at consensus building) or coercion (for example, trade sanctions or the use of military force). In the 350 plus years since the inception of the states system, the sovereign states have employed persuasion and non-violent coercion to accumulate an impressive number of treaties, conventions, and supranational charters which they have agreed to observe as guidelines for the orderly running of international affairs. War, however, has superseded almost all of them.⁹ Nowhere is it more obvious than within the anarchical context of the international system that regulations only stand so long as either the relevant actors agree to abide by them, or they can be enforced; thereafter war is the more truly decisive judge of appropriate behaviour, for only military force can eliminate avenues of resistance to deliver a verdict that dissenters cannot immediately contest.¹⁰

⁹ Clausewitz, Carl von. On War. Michael Howard and Peter Paret, eds., trans. Princeton: Princeton University Press, 1976. p.83

¹⁰ Of course, the defeated may, and not infrequently do, contest defeat once they have recovered, as World War II's occurrence on the heels of Versailles illustrates. However, the fact remains that Germany was incapable of contesting the Versailles Treaty at the time, precisely because it was decisively defeated in war. Blainey. The Causes of War. pp. 118-119

At the most basic level of understanding, therefore, the answer to the question 'why is war waged?' is rooted in the fact that war acts as the final arbiter of intractable disagreements. The decision to wage war does not, however, rest solely on the prognosis that a matter of dispute cannot otherwise be resolved. Several other calculations regarding the wisdom of going to war come into play for both the aggressor and defender. First, the decision to impose one's will through military force rests on the prediction that one's effort will succeed, and succeed easily. Nations who have provoked war have historically set out buoyed by immense optimism for their ability not only to accomplish their objective, but to do so with alacrity.¹¹ However, martial action would not be necessary at all were it not for the fact that other actors are rarely as convinced in the ability of one actor to assert itself over the others. Geoffrey Blainey posits that wars usually begin because the participants cannot agree on who is stronger, and end only when war impels them to reach an agreement.¹² At the outset each believes there is at least a possibility that he may be able to force his opponent to abide by his decisions, hence he chooses to fight for that potential outcome; he ceases to fight once he recognises unavoidably that such a potential no longer exists.

In understanding why war is waged, one must also remember that implicit in such predictions of success is the belief not only that one will win, but that one will win at an acceptable cost for the objective. According to Basil Liddell Hart, "[n]o acquisitive state is likely to embark on war unless it has

¹¹Blainey. The Causes of War. p. 35, 41, 47; Sociologist Ralph K. White lists among 6 preconditions for a state's choice of war the characteristic of "military overconfidence." in Brodie. War and Politics. p.305

reason to believe that it will gain an adequate result for its efforts.”¹³ Judging what constitutes an ‘adequate result’ is, however, particularly difficult, due to the fact that the efforts in question invariably necessitate the sacrifice of human life, in addition to vast destruction of property and wealth. Moreover, history testifies that achieving military victory does not necessarily translate into fulfilling one’s objective,¹⁴ as has been the case in Pyrrhic victories like the Tet Offensive in Vietnam or the British, French, and Israeli collusion to seize Egypt’s Suez Canal. In such cases, tactical success failed to yield the achievement of war aims, and in these particular instances, actually brought political failure. The disparity between military means and ends that prevails under such circumstances renders the calculation of success still more problematic. In answer to this conundrum, writers on the subject have almost universally arrived at the conclusion that the prospect for success in war is most perfectly measured by the determination that an actor “can achieve more by going to war than by remaining at peace.”¹⁵ This measurement of success, however, must be tempered by one additional consideration: that is, “that the ends for which we fight are reasonably to be sought through the kind of war that it is reasonable to fight.”¹⁶ The measure of success hinges not only objectively on the calculation that a goal is worth its cost, but also subjectively on the

¹² Blainey. The Causes of War. p. 122, Cf. also Brown. The Causes and Prevention of War. p.70 - who holds that decisions to wage war depend on perceptions of one’s own and one’s enemy’s power

¹³ Liddell Hart, Basil. Thoughts On War. London: Faber and Faber, Ltd., 1944. p.14

¹⁴ Liddell Hart. Thoughts On War. p.42

¹⁵ Howard, Michael. The Causes of Wars, and Other Essays. Cambridge, MA: Harvard University Press, 1983. p.22, Cf. also Blainey. The Causes of War. p. 119, Liddell Hart. Thoughts On War. p.43, and Brodie. War and Politics. p.3 - all of which state such concordant sentiments as to sound like they are merely paraphrasing each other (of course, some of them are).

¹⁶ Brodie. War and Politics. p.6

determination that an actor is willing to pay that cost to achieve that particular goal.

Each of these factors plays a role in an aggressor's decision to start a war, yet that decision alone is not enough to cause war to erupt. The resolution to wage war is ultimately a two-way decision which depends as much on the choice to defend as on the choice to attack.¹⁷ Just as more than one participant is required for a tango, so war requires (at least) two actors, because military action would be pointless unless one participant chooses to resist the aggression of another. In making the decision to resist, defenders perform many of the same calculations their attackers do when determining their own prospects for success. Here the equation is perhaps more suitably stated in the negative: an actor will choose to defend itself through force if it determines that "more evil... will ultimately result from not going to war than from doing so."¹⁸ As Thucydides noted almost 2400 years ago, this determination is most often driven by fear, particularly by the fear that allowing an enemy to impose his will may create an intolerable sort of peace.¹⁹

These same calculations are also sometimes made below the anarchical level of the international system, in arenas where there are conceivably alternative forms of regulation and arbitration. Here the determination to wage war also involves the conclusion that the available non-violent forms of achieving justice are unacceptable. Especially in the case of conflicts internal to states, such a decision represents, on the part of the challenger, a crisis of faith in the legitimacy of the ruling government and its right to impose its will, and

¹⁷ Seabury and Codevilla. War: Ends and Means. p.46

¹⁸ Brodie. War and Politics. p.3

¹⁹ Seabury and Codevilla. War: Ends and Means. p.49, 7

its version of justice, on the people. In such instances, war, within states just as among states, serves as a final court of appeal providing for the settlement of differences when all other means prove incapable of reaching a verdict to which both sides will adhere.²⁰

Tending to Extremes: How War Acts as Final Arbiter

The relative finality of the verdict imposed by war lies in the Clausewitzian dictum that war tends to the extremes of violence.²¹ Violence itself represents the most absolute form of coercion, and war theoretically takes that coercion to its limits by employing the height of violence available in each era. Functioning as it does at the pinnacle of violent coercion, war nullifies opponents' ability to gainsay the arbitration it imposes by leaving dissenters no higher resort for immediate appeal. Of course, no matter how total the effort or the destruction, this final arbitration has never yet given rise to permanent peace. As the history of the two World Wars illustrates, even the most decisive wars rarely establish peace for more than a generation; in that span of time the cost of past wars generally fades from memory, as does the acceptance and understanding of the power balance that resulted from those wars.²² Yet despite the relatively ephemeral nature of its arbitration, war is still used as a means to an end for the simple reason that, when actors sign a peace treaty at the conclusion of hostilities, they can be fairly well assured that none of the

²⁰ Cf. Hauss, Charles. Beyond Confrontation: Transforming the New World Order. Westport, CT: Praeger, 1996. also Bell, David V.J. "Global Communications, Culture, & Values: Implications for Global Security." pp. 159 - 184. In Dewitt, David, David Haglund, & John Kirton, eds. Building a New Global Order: Emerging Trends in International Security. Toronto: Oxford University Press, 1993. p.193, and Brown. The Causes and Prevention of War. p.79

²¹ Clausewitz. On War. p.85, also 289.11, Liddell Hart. Thoughts On War. p.43

²² Blainey. The Causes of War. p. 118

vanquished parties will be capable of challenging that peace for some time. The more total the destruction, the more concrete has been this assurance.

Perhaps driven by the aim of cementing that assurance, war's tendency toward the extremes of violence has been especially marked during the reign of industrial age war. Over the course of that era, states mobilised higher and higher percentages of their populations and their resources, and armed them with increasingly deadly tools of war which allowed them to field ever greater levels of destructive power. That capacity for destruction ultimately culminated, of course, in the late industrial age's unused stockpiles of nuclear missiles which carry the potential of blowing up the whole world several times over. This mad drive to achieve more and more total destruction springs from the status of war as the *ultima ratio* of the international system and from the manner in which this last court of appeal has reached its decisions during the industrial age. In that era, the primary factor determining the victors in war and, therefore, the actors whose will should prevail in the international system, was a competitor's ability to bring mass to bear in order to destroy the mass of his enemy's forces and thus not only his will, but his capacity to resist. Consequently, during the industrial age the principal extreme to which war tended was that of mass destruction.

The primacy of destruction in industrial age war supplanted the pre-industrial age approach to war which, from trial by combat among selected medieval knights to limited warfare between early 18th century professional armies, could often accept as final a verdict delivered by something less than the utmost of available force. The decisiveness of such limited conflict rapidly came to an end once states began to mobilise every resource they could in the

hopes of tilting the scales of war in their favour. Beginning with Napoleon's *levée en masse*, even before the industrial age had fully permeated warfare, clashes involving anything other than full military capacity came to be seen as little more than "incidental reverses" by states which grew increasingly adept at drawing on more and more of their national resources to redress damage done. Consequently, "against a fully mobilised and determined adversary, nothing short of the erosion of his entire physical and moral resources to a point of virtual impotence could be effective in reducing him to a condition in which he could be truly 'coerced.'"²³ By the time of the world wars at the height of industrial age warfare, the verdict of war could only achieve a degree of permanence if every conceivable resource was sacrificed to it; anything short of total effort and total destruction would always leave room for more fighting to change the decisions reached.

The persistent desire to inflict total destruction was perhaps the ultimate motive behind the creation of nuclear weapons at the pinnacle of destructive power. Ironically, however, the nuclear threat nearly ended the importance of destruction as the deciding factor in war, because it created a destructive force that was rationally unusable. The devastating power of nuclear weapons brought Clausewitz' extremes of war closer to reality than he could have ever imagined, and transformed full-scale military force from being the only lasting arbiter of international affairs into a barbarous possibility to be vigorously avoided. By thus severing the link between the extremes of violence and war's utility as the height of coercion, the dawning of the nuclear age seemed almost to bring war full circle back to the more limited manner of final arbitration

²³ Howard. The Causes of Wars. p.87

characteristic of the pre-industrial era. In the shadow of this terrifying destructive power, limited warfare returned to the battlefield.

The re-emergence of limited warfare, however, had little to do with a renewed acceptance of limited measures as decisive, and everything to do with the paradoxical desire to pursue the Cold War conflict forcefully, but cautiously. The modern 'limited warfare' doctrine answered this dual need to stave off the advances of Cold War opponents while avoiding nuclear war. By limiting the objective, means, geographical scope, and/or the targets of war, limited warfare doctrine offered a useable alternative to total war and its concomitant danger of Armageddon.²⁴ Industrial age conventional limited warfare was, however, still a tool for deciding the outcome of conflicts based on destruction. The only difference was that, in the limited wars of the bi-polar contest, the combatants endeavoured not to destroy their opponents' whole capability to resist, but rather to destroy enough of his resources to raise the cost of continuing the conflict beyond what the enemy was willing to pay. In this, participants in limited warfare were aided by the fact that the objective was, by definition, a limited one.²⁵

The ethos of destruction, then, has not significantly changed during the whole reign of the industrial age military paradigm. Throughout this era, the answer to 'why wage war?' has been grounded in the fact that war is the final arbiter of disputes between the sovereign actors of the anarchical international

²⁴ Baylis, John, Ken Booth, John Garnett, and Phil Williams. Contemporary Strategy: Theories and Concepts. New York: Holmes and Meier, 1987. p.191

²⁵ It should be noted that the small state and non-state actors facing the constrained great nuclear powers in these conflicts often held distinctly non-limited objectives, like their survival as free agents. In these cases the former continued to levy the extremes of military power available to them (none of them had independent nuclear capability at the time of their involvement in limited warfare), though not the extremes of power available in general.

system, and the answer to 'why wage industrial age war?' has lain in the stipulation that this final arbitration could only be delivered through that war form's extremes of destructive force. Significantly, information age war will not fundamentally change those answers. War will remain the *ultima ratio* of world affairs, no matter what kind of tools are used to fight it or what kind of actors dominate the international system. Moreover, contrary to the claims of some information warfare enthusiasts,²⁶ war will continue to be a lethal activity that delivers its final arbitration by destroying the enemy's will and physical capacity to resist.²⁷

The one notable difference in the information age answer to 'why wage war?' lies instead in *how* war wreaks the destruction with which it imposes its most final of decisions. While information age war will not alter the reasons why man wages war in general, its changes in the means of war point to a shift in the reasons why combatants would choose a particular form of war over another. Not surprisingly, the significance of this shift lies predominantly in the reasons why military forces might choose to wage information age warfare rather than other forms of war. Principal among these reasons is the fact that IAW, when employed leveraging fully synergised information, may introduce a new interpretation of the decisive extreme of force, one centred not around *mass* destruction, but around precise, *selective* destruction. War will continue to be waged for the purpose of incapacitating the enemy, but instead of aiming to obliterate as much of the enemy war machine as possible - as was the practice in

²⁶Cf. Magsig, Daniel E. 'Information Warfare In the Information Age.' p.1, and Waller, Douglas. 'Onward Cyber Soldiers.' *Time*. Vol146, n8. 21 Aug 95, p.1

the industrial age - information age militaries should ideally go to war in order to effect selective and highly disruptive paralysis of those critical elements without which the enemy cannot fight.

The targeting of nodes critical to the functioning of military operations has, of course, long been a central tenet of war. This information age emphasis on selective destruction therefore does not, at first glance, seem a noteworthy change in why war is waged. Whether capturing military leaders and strategically important strongholds in the agricultural age, or destroying railroads, bridges, command centres, and munitions factories in the industrial age, the principles of war have always dictated that soldiers should apply force at the most decisive points.²⁸ The idea of inflicting maximum damage to the enemy at minimum cost to oneself is, in fact, the central premise behind the strategy of manoeuvre. Conventional manoeuvre warfare, however, has never been able to fulfil this axiom to its ideal, lacking as it has the precision requisite dependably to locate the enemy's centre of gravity, and/or to assure hitting it when the opportunity arises. By contrast, the capacity for efficient action available through IAW's synergistic leveraging of information should bring the ideal closer to fulfilment than it has previously come.²⁹ One might, as a consequence, be tempted to attribute the reasons for waging IAW solely to the fact that information age technologies are expected to confer a new ability to strike accurately (and more dependably) where and when an attack will do most

²⁷ In the information age, as in the industrial age, war might feasibly be decided in some cases by non-lethal forms of suasion, like propaganda and other psychological operations. However, as stated above, in order to be classified as 'war,' this suasion must be accompanied by at least a credible threat to use military force.

²⁸Cf. Sun Tzu. The Art of War. pp.79, 111

damage. However, while this ability should certainly be a cardinal feature of information age war, no mere change in the feasibility of a time-honoured principle warrants the claims that information age war will radically alter the world's understanding of why war is waged and, in so doing, of war itself.

Instead, the potential significance of any shifts in why war is waged is rooted in the changes which have already begun to occur on the level of how war is waged. Efficiency's replacement of mass as the decisive factor on the tactical level not only foreshadows the introduction of new strategic-level reasons for waging information age war, but also necessitates it. As discussed in chapter three,³⁰ the precision and speed born of leveraging information eclipses the decisiveness of mass by allowing warfare to do more with less. In the information age, one remote-launched, precision-guided ballistic missile can destroy an enemy military installation more effectively (and certainly more quickly) than several hundred World War II-era bombs boasting target accuracies not within five miles.³¹ Advances in firepower do play a role in this heightened effectiveness, but the information which delivers the missile to its target is vastly more crucial to the success of the strike than is the sheer mass of the missile. While a certain minimum essential mass will, of course, always be necessary in order to deliver destructive force to a target, information age military forces, leveraging sophisticated information and information technologies in synergy, should increasingly be able to achieve victory through

²⁹ Information age war will, of course, never completely fulfil the ideal of efficiency in war, since it, like all other forms of war, will still be impeded by the Clausewitzian friction in war. Cf. Clausewitz. *On War*. p. 138

³⁰ See chapter three's 'Efficiency Over Mass' section.

smaller quantities of higher quality. This distinctly information age capacity could largely free advanced militaries from reliance on the vast numbers of men, machines, and munitions requisite to bomb the enemy into oblivion during the reign of industrial age war.

Significantly, with the end of reliance comes the end of vulnerability. If an information age actor does not rely so much on mass to win a war, losing mass should not have the crippling effect it once did. This equation is the keystone for understanding how information age war may reinterpret the extremes of military force, and thus the operational reasons for why this war form is waged. Selective destruction should replace the destruction of mass as the deciding factor in information age war not simply because modern militaries have found a favourable alternative, but because the obliteration of mass alone is becoming an impracticable tool for forcing the submission of an information age adversary.

The utility of destroying mass as the principal vehicle toward defeating an enemy is likely to be void in information age war for two reasons. First and most fundamentally, given mass but no capacity for leveraging information to use that mass quickly and accurately, a military force must rely on what seems - by comparison to the information age force's near transparent view of the battle - remarkably like blind luck to destroy the enemy's centre of gravity. Employing the accuracy and speed of information in place of mass and patience, an information age opponent equipped to avoid the wasted effort of attrition could almost certainly defeat such an information-blind force long before the

³¹ Rowen, Henry S. 'The Evolution of Strategic Nuclear Thought.' in Martin, Laurence. Strategic Thought in the Nuclear Age. London: Heinemann, 1979. p.136. Only 1/5th of the

latter could do any real damage. Second, the inutility of mass should be even more obvious in conflicts between equally equipped information age military peers, because “mass,” per se, should become extremely difficult to target in such two-sided information age wars. In an age where seeing is killing on the IAW battlefield, military commanders will be less likely to mass their forces for pitched battle in the first place. With mass dispersed, the cost of attacking it vastly outweighs the utility of actually destroying it, since each fire launched will destroy less and less of the objective as the target becomes more dispersed. Together, these factors may render mass an undesirable information age target indeed.

Efficiency could thus replace mass not only as the primary tool of information age war, but also as that war form’s most decisive target. Since combatants can no longer dependably prevail against information age adversaries through the destruction of mass, they must instead disable their opponents’ capacity for efficiency - that is, the information, information systems, infrastructure, and even decision-makers that enable a military force to act with the speed and precision requisite for competing in information age war. IAW’s reinterpretation of war’s extremes according to the rigours of efficiency could potentially manifest itself in two ways: first, the decisiveness of efficiency should necessitate a pace of war which capitalises on the extremes of speed and accuracy. As chapter two established, this shift would alter the scale and tempo of war at its extremes.³² Second, information age war introduces the theoretical

bombs dropped at the beginning of World War II fell within five miles of their intended targets.

³² See chapter three, ‘Speed and Accuracy.’

possibility of redefining the extreme efforts of war not according to the capacity for destruction, but according to the capacity for disruption.

If fulfilled, this second reinterpretation of war's extremes would be revolutionary, because it could entail incapacitating the enemy's war machine not by destroying it, but simply by disabling it. This reinterpretation is predicated upon the assumption that an attacker may be able to decapitate an adversary simply by demonstrating mastery and control of the information advantage. In theory, victory could precede destruction because an information age military force with blatant 'information superiority'³³ could 'force' capitulation by vividly displaying his capability of annihilating an enemy who, once blinded, would be all but helpless to resist.³⁴ Because mass without efficiency should have little influence in IAW, the victor would not necessarily need to press his advantage in order to vanquish the paralysed military.

This second reinterpretation of war's extremes is, however, unlikely to be fulfilled on a practical level. Violence and destruction are embedded in the very nature of warfare, and will remain intrinsic to information age war for the simple reason that no mere threat of annihilation will ever win a war unless a military force has the capacity - and the will - to carry that threat out.

Disruption and paralysis may substitute for destruction in certain cases, particularly in those involving blatantly unequal matches of military power.³⁵

³³ A concept analogous to air superiority, in which one force has obvious control over the realm in question. Cf. Campen, Alan D., ed. The First Information War: the Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1992. p.xi, Libicki, Martin C. The Mesh and the Net: Speculations on Armed Conflict in a Time of Free Silicon. Washington, DC: Institute for Strategic Studies, National Defense University, McNair Paper 28, March 1994. Ch2 p.6

³⁴ See chapter three, particularly the section 'Speed and Accuracy.'

³⁵ Cf., for example, the success of the coalition's propaganda leaflet campaign in the Gulf War. See also chapter four, 'Targeting Civilian Information.'

But disruption will never supersede destruction (whether mass or selective) as the vehicle to military victory because no amount of speed and precision will ever decide a war unless a military force also possesses the capability to employ that efficiency toward destroying the enemy's ability to resist.

The answer, then, to why information age war in particular will be waged is likely to be simply that the war form's efficiency offers a pace of war which should be decisive in most, if not all, instances of full-scale, pitched-battle warfare. Given the description of how IAW will likely be waged, this answer marks neither an unexpected development in the whys of war nor a fundamentally different development. While waging a form of war for the express reason that information technologies lend it a decisively fast and accurate pace represents a certain departure from past reasons for employing a particular war form, the decision to exploit a new decisiveness, or for that matter, to exploit new vehicles of speed and accuracy, are as old as the first military revolution. On a small, tactical scale, the adoption of the stirrup - which facilitated speed and mobility in battle - was one such decision, as was that of the long bow, which lended long-range accuracy significantly greater than that of the crossbow. On a wider, strategic scale, the move toward mass conscription and the more intensive industrial war form was likewise dictated by its decisiveness - first in Napoleon's hands, and later in those of his opponents. This being the case, the first of information age war's changes in why war will be waged - that is, the introduction of reasons for waging the information age warform rather than other incarnations of warfare - are worthy of note, but by no means worthy of being called signs of paradigm shift.

First Order Reasons for Waging IAW

As information age war matures and the information age progressively becomes entrenched throughout more of the world, military strategists will likely choose to wage IAW because the war form offers evident advantages in the pace and efficiency of military action. The recognition of information age war's utility in many military arenas, however, is likely to be gradual, halting, and uneven, like the transition into the information age itself. To date, although many actors have begun studying the potentials of IAW,³⁶ only a handful have progressed far enough along the path of information age development to be able to implement anything resembling true information age war. In the near future therefore, only an advanced few may have the capacity adequately to pursue information age war's efficient extremes of force, and thus also the ability to demonstrate the advantages of leveraging accuracy and speed in waging, and winning, war. The preceding pages establish that IAW is eventually likely to be waged for the simple reason that its information-efficient selective destruction could conspicuously provide the most decisive path to military victory in many situations. In these initial days of the emerging information age, however, one cannot assume that the question 'why wage information age war?' can be answered in the same way now, when the decisiveness of information age war has not yet become obvious.

If, in these early stages of IAW's emergence, actors will not wage information age war simply because it has proved itself a highly effective (and, in certain cases, perhaps even superior) way to defeat an armed enemy, then one must ask why anyone would wage IAW in the absence of such evidence.

Several reasons prove compelling. First and most obvious is the fact that, especially in comparison to conventional industrial age war, information age war is a relatively cheap and easy-access form of warfare. IAW's decreased reliance on mass, for instance, renders the war form less costly almost by definition. Before the middle of the 21st century, information age militaries, with fewer troops and less machinery, should be spending millions less than their industrial age counterparts did on maintenance alone - from feeding and housing soldiers, to building, repairing, and safeguarding equipment, even to the infrastructure required to sustain all of this. In addition to these savings, many of the tools that will be critical for the more stream-lined forces can be obtained much more cheaply than the key tools of the previous military paradigm. Information systems, the very basis of IAW's decisiveness, are in particular relatively inexpensive, in no small part because many of them are developed commercially, with costs driven by the market incentive for profit, as chapter four explains.³⁷ Certainly in some instances - the millions spent on the B-2 stealth bomber being a prominent example - the higher quality which IAW demands of its smaller quantity tools will equal, if not surpass, the massive military investments of the past. In the aggregate, however, information age militaries, like IAW strategy, should yield more for less.

The cheap, easy-access nature of information age war is likely to influence why actors wage this war form in three principal ways. First, this factor may permit the great military powers to maintain their military forces near their accustomed level of capability, despite the necessity of downsizing

³⁶ Security Policy Board. 'White Paper on Information Infrastructure Assurance.' Federation of American Scientists, Project on Government Secrecy. December 1995. p.1

³⁷ See chapter four's 'Strategic Civilian Tools in IAW' section.

after the disappearance of the Cold War's justifying threat.³⁸ Since the decisiveness in information age war lies not in how much one has, but in how one uses it, smaller force sizes and procurement budgets should prove comparatively small impediments to projecting information age military power. In the case of force sizes, smaller - though more elite and highly trained - forces should, in fact, be not a burden but a requisite for successful information age militaries. In the case of procurement budgets, even significantly reduced defence budgets should be able to accommodate the comparatively small investments in the information systems which form the keystone of IAW's potential. The decisiveness of these and other low-cost components of information age military power should allow the great powers to maintain high levels of military sophistication even as they introduce requisite reductions in their post-Cold War defence budgets.

Secondly, as the following chapter will explore in greater detail,³⁹ the relative inexpense of waging IAW may permit many smaller actors to pose a credible international challenge, even many of those who could never before afford to compete at full-scale war. Since these actors might otherwise only have recourse to smaller-scale forms of violent coercion like terrorism and guerrilla warfare, information age war may be the obvious, and indeed the only viable choice in the event that these smaller actors choose to challenge the

³⁸ Johnson, Stuart, E. "DBK: Opportunities and Challenges." in Johnson, Stuart, and Martin Libicki, eds. *Dominant Battlespace Knowledge*. Washington, DC: National Defense University World Wide Web Page, 1996. Ch.2, p.1

³⁹ See chapter five's section on 'Widening' under the heading 'Small State and Non-State Actors.'

larger powers on an open battleground.⁴⁰ Lastly, the comparatively low cost of information age war may make it an attractive choice for its appeal to popular opinion. If, with fewer forces, less materiel, and smaller infrastructure, information age war requires fewer taxes and fewer lives spent in winning a conflict, IAW should not only be a rational choice for any military, but a politically expedient one as well.

The second reason that may motivate the waging of IAW in the near future arises from the fact that many of the emerging changes in war, like numerous past military innovations, should serve as a force multiplier - particularly in situations where only one of the combatants takes information age methods into consideration.⁴¹ As several conflicts waged over the past decade have shown, even primitive and ad hoc efforts at leveraging information can act as force multipliers which improve a military force's effectiveness. Neither the 1991 Gulf War, nor the Chechen or Zapatista insurrections⁴² represented fully mature information age wars integrating information in the holistic, decisive manner defined here as the hallmark of true IAW, yet in each of these conflicts the side which most thoroughly incorporated information into its operations gained important advantages. In the Gulf War, the US-led coalition was able to drive Iraq out of Kuwait with the expense of considerably less time and bloodshed than industrial age calculations might have predicted.⁴³

⁴⁰ This is by no means to suggest that guerrilla warfare and other tactics of low intensity conflict are likely to become irrelevant in the information age. On the contrary, such tactics seem to be gaining increasing currency in the world's various conflicts. However, if smaller actors wish to engage in the pitched battles of high intensity conflicts with large military powers, their best opportunity to meet these larger opponents as peers may be to wage information age war.

⁴¹ See chapter two, 'The MTR as Force Multiplier.'

⁴² See chapter six, 'The Widening Role of Lesser- and Non-State Actors: In Real Terms'

⁴³ Libicki. The Mesh and the Net. ch.2 p.2

In Chechnya and Chiapas, the information-savvy insurgents drew international attention and sympathy, requiring their opponents to expend much more effort in defeating the rebels than they might otherwise have done. The success of information tactics in these three cases, despite the widely differing character of each conflict, seems to imply, moreover, that information age military methods - employed in the true, integrated spirit of IAW - may increase not only an advanced military force's chances of success, but those of less sophisticated militaries as well. Information age war's status as a general force multiplier may thus provide an incentive for military forces from a wide spectrum of military capacity to adopt IAW's practices, even if some can initially only do so piecemeal.

To What End War?

Thus far, this chapter's investigation has addressed the 'why' of information age war solely with respect to the purposes the war form is likely to serve. The answer, at its most fundamental level, has emerged to be fairly straightforward: information age war will be waged in cases where it is the most effective available tool for achieving final arbitration on matters of contention in the anarchical international system.⁴⁴ In order truly to fully grasp why information age war will be waged, however, it is necessary also to understand what subjects of dispute may warrant such a final, dire court of appeal in the information age. This section therefore looks beyond the purposes and justifications for war to the objectives and motivations which drive political actors to seek war's ultimate judgement.

As this investigation has emphasised over and over, to comprehend the future one must look to the past. The inquiry therefore turns again to history to cement this third piece of the puzzle that is the question of information age paradigm shift. Chroniclers have recorded numerous and varied motivations and objectives for war over the ages,⁴⁵ many of which are hardly less relevant today than they were during the agricultural age. Many others, however, have shifted as the passing years altered political orientations, legal conventions, and power calculations. Significantly, these shifts have, often coincided with the widespread societal changes that have divided the modern age into two, now three, distinct eras: the agricultural, industrial, and information ages. As the Tofflers and others have illustrated,⁴⁶ the coinciding of these societal revolutions with past changes in the whys of war provides the basis for paradigm shift enthusiasts' expectations that the information age will produce a repetition of such far-reaching and fundamental changes in warfare. The survey of historical objectives and motivations for war will therefore follow the same three-part pattern.

Since history does not record the details of wars before the agricultural age, the investigation must necessarily begin after the first societal revolution. Through the development of agriculture, this 'agricultural revolution' granted nomad hunters and gatherers a static, dependable means of subsistence and

⁴⁴ On the state level as well as on the supra- and sub-state levels.

⁴⁵ Cf. Luard, Evan. *War in International Society: a Study in International Sociology*. London: I.B. Tauris and Co., Ltd., 1986. Levi, Werner. *The Coming End of War*. Beverly Hills, CA: Sage Publications, 1981. Holsti, K.J. *International Politics: A Framework for Analysis*. Englewood Cliffs, NJ: Prentice Hall, 1983. (esp. pp.400-403)

allowed them to sustain stable civilisation and political organisation for the first time.⁴⁷ According to Seyom Brown, the ability to provide for oneself through stable cultivation of the land fostered, indeed necessitated, the rise of social and political group identity: the stationary agricultural system required common language for communication among neighbours, shared norms for trading, mutual understanding of work/reward ratios, and general acceptance of organisation; in other words, a commonality of values and a sense of community. Thus emerged a way of life which people felt a need and desire to defend,⁴⁸ a development which had a significant impact on the reasons people waged war in the agricultural age. Before this occurrence one can assume that conflicts over the means of subsistence - the rights to roam lands where hunting was most productive and gathering most plentiful - dominated wars of the pre-agricultural age. From the agricultural revolution onwards, however, two distinct categories of motivations for war can be identified: political motivations related to the prosperity and security of a polity - be it republic, empire, city-state, or monarchy - and abstract motivations related to the furthering of ideals cherished by members of the polity or, more specifically, the elite that governed it.⁴⁹

The more concrete, political motivations for war are more familiar in any era. In the agricultural age these included, in particular, the quest for land,

⁴⁶ Toffler, Alvin, and Heidi Toffler. War and Anti-War: Making Sense of Today's Global Chaos. Boston: Little Brown, 1993. pp.22-23, 27. Jensen, Owen. "Information warfare: Principles of third-wave war." Airpower Journal. Vol8. 1 Jan 94: 35-44. pp.35-6. Cf. also Luard. War in International Society. p.133, Biddle, Stephen. "The RMA and the Evidence." Institute for Defense Analyses. Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996. p.5.

⁴⁷ Brown. The Causes and Prevention of War. p.34

⁴⁸ Ibid.

⁴⁹ Van Creveld, Martin. The Transformation Of War. New York: Free Press, 1991. p.142

for dynastic succession, and for survival as an independent political entity. The conquest of land, always significant in war,⁵⁰ was especially important during this age since land was the primary coin of both political and economic power. Territory carried with it not only prestige and security, but also expanses of fields for the production of tradable agricultural goods and, especially during the feudal age, the men tied to the land as serfs or as vassals owing fealty and military service to the liege.⁵¹ The matter of dynastic succession, of continuity in leadership, also held special importance in the agricultural age. Organised political entities being in the first place a product of this era, the matter of who should rule them became the subject of war early on. Moreover, in the centuries before the birth of nation-states, much of the political identity of these entities was invested in the person of the dynastic leader,⁵² as was the control over the decision to wage war. As evident in 15th century England's Wars of the Roses between the Houses of York and Lancaster, and in Charles the Bold's campaigns against France to re-establish an autonomous Burgundy,⁵³ the reasons for war were often closely tied in with the individual desires of "monarchs and dynasts" to achieve personal prestige and wealth, or to reap honour for their own dynastic house,⁵⁴ as well as with their more broadly political aims of establishing their 'rights' to rule over particular kingdoms.⁵⁵ Since these hereditary autocrats usually held sole jurisdiction over the decision

⁵⁰ Levi. The Coming End of War. p.179, Brown. The Causes and Prevention of War. p.50

⁵¹ Lynn, John A., ed. Tools of War: Instruments, Ideas, and Institutions of Warfare, 1445-1871. Chicago: University of Illinois Press, 1990. p.238 also Hollister, C. Warren. Medieval Europe: A Short History. New York: McGraw-Hill, Inc., 1994. p.102, 120-21, 164.

⁵² Democratic Greece and Republican Rome being probable exceptions:

⁵³ between 1455-1485, and 1465-1477, respectively

⁵⁴ Cf. Seabury and Codevilla. War: Ends and Means. p.41, Luard. War in International Society. p.135, also Blainey. The Causes of War. p.68

⁵⁵ Luard. War in International Society. p.138

to go to war, their motivations for making such a choice often paid little regard to that end's appeal for the masses who actually went to battle to achieve it.⁵⁶

This principle of dynasty was, however, closely related to the motivation for self-preservation which spurred both individuals and entire polities to wage war. Although newly conceived as the source of group identity and shared loyalty, and often so amorphous as to be defined only by allegiance to a particular leader, agricultural age polities early on learned to support their leaders' self interests, especially where they matched the interests of the group. In such cases the community itself often chose to fight for the continuity of leadership and with it the preservation of their way of life, as occurred in the Anglo-Saxons' failed attempts to fend off the Norman invasion in the 11th century, and in the Scots' more successful efforts at rallying behind William Wallace and then Robert the Bruce to end English overlordship two and a half centuries later. As these examples illustrate, preservation of the security and integrity of even an amorphous political entity was an important objective of war at the onset of political organisation just as it is today.

The abstract reasons for war in the agricultural age are perhaps less obvious, though hardly less prevalent. They encompass ideals like religious beliefs, justice, honour, and prestige. Religion, of course, stands out as a divisive issue across the ages. The agricultural age was well acquainted with wars to this end, being the scene of the original Islamic '*jihad*' which united all of North Africa and Asia Minor under Muslim rule, encroaching ominously on

⁵⁶ Ibid., p.133

Europe.⁵⁷ Between the 11th and 14th centuries the West, under the universal Roman Catholic Church, responded with an intermittent series of Crusades against the 'infidel' in the Holy Land with the intent of establishing the primacy of Christianity as well as Christian suzerainty over the lands of pilgrimage.⁵⁸ Later, as the agricultural age waned and the Church split, the Reformation sparked a series of 'wars of religion' during the 16th and early 17th centuries, pitting Christians against fellow Christians in the name of defending the faith against heresy from within and, not infrequently, in the name also of political interest.⁵⁹

Wars of justice were similarly fought over the conviction that others should universally share one's own beliefs, here in the case not of mysticism and divine rule, but of the worldly rule of law, morality, and justice. In the Middle Ages especially, war was viewed as a continuation of justice, fought ideally for noble purposes like punishing another's misdeed, avenging an injury,

⁵⁷ The word *ġihad*, if it must be remembered, should more properly be translated as either the struggle against evil or temptation, or as the defence of Islam. As used here, however, *ġihad* conveys the more conventional understanding of *ġholy war*, specifically that spate of war through which believers in Islam attempted to propagate the message of the Prophet Mohammed. The Muslim holy war began in the 6th century at the behest of the Prophet Mohammed, and ended only when the Ottoman armies were driven back from the gates of Vienna in the late 17th century. Bowker, John, ed. The Oxford Dictionary of World Religions. Oxford: Oxford University Press, 1997.

⁵⁸ Pope Urban II called the First Crusade in 1095, and the age of crusade is most logically dated as ending with the fall of Acre - the last Christian city in the Latin Kingdom of Jerusalem - in 1291. A Western Christian presence continued in the East, however, throughout the 14th century, as did the popes' calls for a new crusade. Nicholas, David. The Evolution of the Medieval World: Society, Government, and Thought in Europe, 312-1500. London: Longman, 1992. p.263, 273

⁵⁹ Luard. War in International Society. p.141, also note that wars fought ostensibly over abstracts often also had political motives - for example, Catholic France fought on the side of the Protestants during the 30 Years War, for the simple reason that it was politically expedient.

or defending oneself.⁶⁰ This view of why war should be waged was likely a heritage from Roman times, when much of war was justified because it upheld Roman law. Those who considered this to be the principal end of war believed that the victor not only won the privilege of asserting his will over the conquered, but also proved his cause to be right and just.⁶¹

Lastly, honour and prestige lay behind many wars of the agricultural age, motivations befitting an era in which society placed great emphasis on the character of its men and, above all, its warriors. In the West, the centrality of the chivalric code reached its peak during the years of feudal rule, but honour was an important theme through much of the agricultural age, as evidenced early on by Biblical stories of wars fought to avenge the compromised honour of women. More famously, accounts of the Trojan wars cite the beautiful Helen as a key prize because winning her would not only preserve her own honour, but would also redeem that of the victor.⁶² With this preservation also came prestige, for the ability to prove one's honour in battle was a matter of considerable respect in an era when honour served as the chief barometer of great men and great leaders. The lure of honour and prestige as motivations for waging war was, moreover, intensified by the fact that political group identities in the agricultural age were very narrowly entwined with the individual personalities of their leaders,⁶³ thus the prestige and honour which those rulers

⁶⁰ Grotius lists these as 'Defence, indemnity, and punishment.' Grotius, Hugo. The Rights of War and Peace (De Jure Belli ac Pacis). Campbell, A.C., trans. Washington: M. Walter Dunne, Publisher, 1901. p.75 see also Bull, Hedley, Benedict Kingsbury, and Adam Roberts. Hugo Grotius and International Relations. Oxford: Clarendon Press, 1992. p.184.

⁶¹ Grotius. De Jure Belli ac Pacis. p.73, Van Creveld. The Transformation Of War. p.153, 131

⁶² Van Creveld. The Transformation Of War. p.151

⁶³ Cf. Sorensen, Georg. "An Analysis of Contemporary Statehood: Consequences for Conflict and Cooperation." Review of International Studies. Vol23, n3, July 1997: 253-270. p.260

won both singularly on the battlefield and at the head of an army engaged in an honourable war, reflected on the international prestige of the entire polity, as well as on the ruler's standing and the legitimacy of his rule among his own subjects.

The coming of the industrial age introduced many changes in these motivations and objectives for warmaking; some of them were radical, but none were sudden and certain from the outset. For, the transformation from the agricultural age to the industrial age, like that of the present reconfiguring for the information age, was a long, gradual, and often all but imperceptible process. The transition, in fact, spanned centuries, from the first crumbling of feudalism to the appearance of the mass-production factories usually viewed as the hallmarks of industrialisation, and even beyond, to the machinations of the Cold War and the first signs of the next transition to a new age. The new whys of waging industrial age war, likewise, evolved throughout this entire period.

Some agricultural age motivations, of course, persist as ends of war to the present day. Most prominently, religion remains a highly incendiary factor in conflict, as evidenced by the religious issues accompanying the deep nationalist sentiments that divided the former Yugoslavia, and by the religion-tainted politics that continue to trouble the floundering Arab-Israeli reconciliation process. Prestige, credibility, and the desire for self-preservation also continued to be pivotal, if in slightly different guises as nuclear weapons stockpiles and industrial infrastructure replaced the honour of knights and rulers' personal military prowess as gauges of prestige and power in military affairs. Other motivations continued to play an important role in war causation during the burgeoning of the industrial age, but found their role shifted slightly

as that age progressed. In the case of land, for instance, the industrial age gradually transformed both the degree and the reasons for its importance over the passing years, as the following paragraphs will detail.

The first watershed marking a discernible change in the motivations and objectives for war appeared, aptly, at the Peace of Westphalia which laid the groundwork for the states system that has ordered international affairs throughout the industrial age. This treaty was the first concluded in the modern age without mentioning God, a fact both ironic and eminently fitting since it put an end to thirty years of bitter fighting over religious differences.⁶⁴ The Peace of Westphalia proved, in fact, to be the first of many treaties ending war without reference to religion. Despite the persistence of religious wars even to this day, high politics and the motivations for war among the great powers have moved decisively toward secular issues since the birth of the westphalian system.⁶⁵ Among these were political considerations like the balance of power between the various states in the newly secular international system. The waning power of the universal church and the secularisation of international affairs deprived the westphalian international system of authoritative papal oversight, leaving it to rely increasingly on the principle of power balancing to order the anarchy of international affairs.⁶⁶ States felt their security reasonably assured when the balance of power was stable or, preferably, when it weighed in their favour. As the previous section details, however, in a system with no overarching regulator, states can only maintain such a balance through war. Thus the thoroughly

⁶⁴ Van Creveld. *The Transformation Of War*. p.139

⁶⁵ Luard. *War in International Society*. p.159

⁶⁶ Der Derian, James. *On Diplomacy: a Genealogy of Western Estrangement*. Oxford: Basil Blackwell, 1987. p.106

political and secular concern of balancing state power distribution became a primary motivation for industrial age war.⁶⁷

Moreover, once instituted, the preservation of the state itself became a powerful secular incentive for war. Ironically, however, Westphalia's establishment of states was itself largely a product of the growing complexity of mechanised warfare. As the industrialising war machine became more complex it required greatly increased efforts of organisation and bureaucracy to sustain it; the first institutions of modern statehood were therefore a response to the needs of industrialising war, though war itself rapidly became a tool to maintain the security of the state.⁶⁸ Just as agricultural age polities had been moved to defend their way of life, so the citizens of industrial age states mobilised to protect the security of their nation-states. In the industrial age, however, the objectives of defence were much more concrete, for states had developed institutionalised governments, definitive territory, and in most cases, unifying language and culture, all attributes which people have fought heatedly to preserve from the Napoleonic wars to World War II. Thus the wholly political and secular ideal of state security - defined in various forms from the "preservation of territorial and political integrity,"⁶⁹ to the ability to protect a state's own land, people, and possessions,⁷⁰ to the maintenance of the "capacity

⁶⁷ Blainey. The Causes of War. p. 109, Brown. The Causes and Prevention of War. p.69; See also Levy, Jack S. The Causes of War: A Review of Theories and Evidence. In Tetlock, Philip E., Jo L. Husbands, Robert Jervis, Paul C. Stern, and Charles Tilly, eds. Behavior, Society, and Nuclear War. New York: Oxford University Press, 1989. for a survey of the wealth of literature dealing with the balance of power and its role in causing war.

⁶⁸ Sorensen, Georg. An Analysis of Contemporary Statehood: Consequences for Conflict and Cooperation. Review of International Studies. Vol23, no3, July 1997: 253-270. p.258

⁶⁹ Reynolds, Charles. The Politics of War: A Study of the Rationality of Violence in Inter-State Relations. New York: St Martin's Press, 1989. p.156

⁷⁰ Hauss. Beyond Confrontation. p.31

to function as independent actors in the international system"⁷¹ - has gained a significance among the motivations for war that is proportionate to the state's own importance as a unit of political organisation.

Interestingly, many of these newly prevalent secular interests also reflected a shift in war's primary objectives away from the concerns of individual leaders to the interests of groups, typically those in the form of nation-states.⁷² This motivational shift was also a product of statehood, since that institution in turn fostered the emergence of national identities built less upon the personality of the leader than upon common cultural and linguistic bonds among people living within recognised (if not entirely static) borders. As a result, the communal interests of these newly grounded collective identities came to dominate the objectives for industrial age war, replacing the highly personal motivations which had often characterised the causes of agricultural age wars. This group interest is openly evident in each of the main secular motivations for industrial age war cited above, as both the position of the state within the international power balance and the security of the state as a stable, independent entity came increasingly to be valued because they served the collective good of the state and its people.

Later, as the industrial age progressed and connective technologies from telegraphs to railroads to mass-distributed newspapers further cemented the bond of national identity,⁷³ that group identity itself became a value worth fighting for, and nationalism grew to become an incendiary motivation for war.

⁷¹ Howard. The Causes of Wars. p.13

⁷² Luard. War in International Society. p.135, Van Creveld. The Transformation Of War. p.216

Especially during the years between the French and the Russian Revolutions,⁷⁴ peoples increasingly viewed war as a mechanism for promoting the interests not merely of the state, with its political institutions and legal borders, but of the 'nation,' the human collective of shared history, culture, and language.⁷⁵

Bernard Brodie describes this motivation as a fact of human nature, a simple manifestation of "[t]he common desire of peoples everywhere to be ruled by persons who, whatever their shortcomings, are at least not felt to be foreigners."⁷⁶ And indeed, this nationalist sentiment still sparks wars, as the 1990's terrible spate of conflicts in the ethnically divided Balkans attests.

The advancing of the industrial age introduced further changes in the more concrete political motivations for war as well. Of these, one of the most significant was the shifting importance of land as an aim of warfare. Since industry increasingly replaced agriculture as the chief means of wealth production, land gradually came to be valued less for its own sake than for the resources it held.⁷⁷ This transformation, like many of the changes predicted for the information age, resulted from a re-balancing of the critical components of power. As chapter one details,⁷⁸ resources superseded land as decisive factors in power because the industrial machines built from those resources could

⁷³ Benedict Anderson in Shapiro, Michael J. and Hayward R. Alker, eds. Challenging Boundaries: Global Flows, Territorial Identities. Minneapolis: University of Minnesota Press, 1996. p.348

⁷⁴ 1789-1917

⁷⁵ Luard. War in International Society. p.161

⁷⁶ Brodie. War and Politics. p.3

⁷⁷ Rothgeb, John M., Jr. Defining Power: Influence and Force in the Contemporary International System. New York: St Martin's Press, 1993. p. 153. Bell. "Global Communications, Culture, and Values." p. 209. Also Klare, Michael T., ed. Peace and World Security Studies. Boulder, CO: Lynne Rienner, Publishers, 1994. p.101, and Toffler, Alvin. Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. New York: Bantam Books, 1990. p.331.

⁷⁸ See especially the 'Information Revolution' section of chapter one; also the 'Understanding Paradigm Shift in Context' section of the introduction.

negate the wealth and power available from land alone. The machines of the industrial revolution made farming faster, cheaper, and easier, allowing farmers to produce more for every square foot of land. With this advantage, industrialised agriculture soon eclipsed the competition from manual agricultural ventures which, no matter how much land they possessed, were unable to rival the quantity and speed of production possible with the aid of industrial tools. As a consequence, resource-dependent industry replaced agriculture as the chief means of achieving prosperity and a higher standard of living, shifting power from those who had land to those who possessed the modes of production. Given this industrial age composition of power, the importance of land as an objective for warfare became increasingly coloured by its capacity to provide needed resources for industrial production.⁷⁹

The role of resources as an industrial age motivation for war is closely related to another martial objective which took on new prominence in the industrial age, that of economic gain. While wealth and profit have almost always been an aim of war, from Napoleon's mercantilist blockades to the colonial wars that extended into the early twentieth century, economic motivations seemed to play a more central role in industrial age war than they ever did during the agricultural age.⁸⁰ Many have refuted the claim that the struggle for colonies was driven by expanding industrial capitalism's desire for new markets, offering as supporting evidence the fact that many colonial

⁷⁹ Cf. Rothgeb. Defining Power. p. 153. Also Brown. The Causes and Prevention of War. p.31, and Holsti. International Politics. p.401

⁸⁰ Van Creveld. Technology and War: From 2000 BC to the Present. New York: Free Press, 1991. p.138. Cf. Also Hynes, William G. The Economics of Empire: Britain, Africa, and the New Imperialism, 1870-1895. London: Longman Group, Ltd., 1979. p.1

possessions actually proved to be a drain on capital.⁸¹ Yet despite such lessons from hindsight, imperialism remains linked to economic motivations for conflict because, at the time, many of the imperialists fighting for imperial expansion did so convinced that new colonies promised economic gain as well as prestige for the home country controlling the empire.⁸² After the end of imperialism, wars clearly motivated by economic gain certainly waned, though some maintain that a conflict as recent (and as near the information age) as the 1991 Gulf War was driven by the economic consideration that Kuwait's oil in Iraq's hands would benefit no one but Saddam Hussein.⁸³

Although a certain dubiousness taints the assertions that direct economic gain from warfare can be a motivation for waging industrial age war,⁸⁴ there is a large body of literature which claims that indirect economic improvement is very much a central aim of war even in the present day. Dependencia theorists like Organski and Kugler, Johan Galtung, and George Modelski have argued that the unevenness of industrial development has created a volatile spark for conflict. They maintain that states, especially former colonial possessions of the developed world who have been unable to attain the latter's standard of living,

⁸¹ Hobson, J.A. Imperialism: A Study. London: George Allen and Unwin, Ltd., 1902. pp.46,48. Morgenthau, Hans. Politics Among Nations: the Struggle for Power and Peace. Thompson, Kenneth W., revised. New York: McGraw-Hill, 1985. pp.63-4.

⁸² Hynes. The Economics of Empire. p.7 also Langer. Diplomacy of Imperialism. p.76.

⁸³ Spero, Joan E. and Jeffrey A. Hart. The Politics of International Economic Relations. New York: St Martin's Press, 1997. While oil was of course an important factor in that conflict, one cannot ignore the fact that, unchecked, Saddam's invasion of Kuwait posed a serious threat to the balance of power in the already volatile Middle East. It is this threat which provides a more plausible explanation for the motivation behind Operation Desert Storm.

⁸⁴ Hans Morgenthau, for instance, maintained that, during the late industrial era, only the Boer War was motivated primarily by economics. Morgenthau does acknowledge, however, that economics did play at least a small role in many late 19th - early 20th century conflicts. Morgenthau. Politics Among Nations. p.63

will turn to war to redress that inequality.⁸⁵ Others, like Walt Rostow and Ted Robert Gurr, posit that the true threat lies not in the unequal distribution of wealth, but in the *recognition* of that inequality, and the realisation that it need not continue. According to this theory, the danger of economically motivated conflict arises not from utterly backward states largely unaware of development potentials, but from half-developed nations who have progressed far enough to be aware that a better standard of living exists, but not yet so far that they have achieved such a level of industrialised prosperity for themselves.⁸⁶ Both theories support the assertion that uneven industrial development may spark conflicts over economic objectives, wars which aim not for direct profit from the fighting, but for evening the global distribution of wealth.

The last of the industrial age's changes in why war is waged emerged during the Cold War period which capped the final phase of that age's evolution. At the opening of the Cold War, industrial age development and technology had progressed to the point of producing nuclear weapons. So unfathomable was the destructive potential of these weapons that their existence essentially froze the great powers in the status quo established at the end of

⁸⁵ Levy, "The Causes of War: A Review of Theories and Evidence." pp.251-2 Renner, Michael. Fighting for Survival: Environmental Decline, Social Conflict, and the New Age of Insecurity. Worldwatch Environmental Alert Series. New York: W.W. Norton and Company, 1996. p.77, See also Organski, A.F.K. World Politics. New York: Knopf, 1968. And Organski, A.F.K. and J. Kugler. The War Ledger. Chicago: University of Chicago Press, 1980. Modelski, George. Long Cycles in World Politics. Seattle: University of Washington Press, 1987. Galtung, Johan. A Structural Theory of Revolutions. Rotterdam, 1974. Galtung, Johan. Essays in Peace Research. Copenhagen: Eljers, 1975.

⁸⁶ Snow, Donald M. Uncivil Wars: International Security and the New Internal Conflicts. Boulder: Lynne Rienner Publishers, 1996. p.52 Gurr, Ted Robert. Why Men Rebel. Princeton: Princeton University Press, 1973. Rostow, Walt W. The United States in the World Arena. New York: Harper and Row, 1960.

World War II.⁸⁷ This circumstance, in combination with the global 'shrinking' fostered by connective industrial age technologies like air travel and automobiles, and by nascent information age technologies like long-distance telephony and satellite television,⁸⁸ encouraged a new interest in external affairs, and in security on a global scale. This shift of interest in turn affected both abstract and political motivations for late industrial age war.

On the abstract level, the ideologies of communism and capitalism largely replaced the old ideals of justice and honour - and even, to some extent, religion - as primary motivators for war.⁸⁹ Typical of the industrial age, both ideologies represented very secular ideals of life. Furthermore, communism and capitalism are themselves products of the industrial age to the extent that they focus on making sense of the monetary culture which was born of the industrial age's extensive capacity for surplus production and trade.⁹⁰ Karl Deutsch ably illustrates the power of these two doctrines as motivation for war by explaining that communism and capitalism, like any ideologies, provide their subscribers with an image of the world that is clear and understandable, as well as consonant with their own preconceptions. Communism and capitalism became the subject of heated wars over the past half century simply because, "in

⁸⁷ Cf. Dellums, Ronald V., Rep., US Congress. "Toward the Post-Transition World: New Strategies for a New Century." *SAIS Review*. Winter-Spring 1995: 93-108, Van Creveld. *The Transformation Of War*. p.10

⁸⁸ Bankes, Steve, and Carl Builder. "Seizing the Moment: Harnessing the Information Technologies." *The Information Society*. Vol8, 1992: 1-59. p.4 Cf. also Handel, Michael I., *War, Strategy, and Intelligence*. London: Frank Cass, 1989. p.192.

⁸⁹ Brown. *The Causes and Prevention of War*. p.54

⁹⁰ Cf. Rapoport. *The Origins of Violence*. p.98

politics, national and international, many people have preferred losing power, wealth, or life to losing their illusions.”⁹¹

None of the Great Powers, however, were threatened with such a fate, yet nearly all were involved in one or more of the many small wars which punctuated the Cold War period. This involvement was a product of the Cold War’s redefinition of national security to include external political interests. In the burgeoning global village of the late industrial age, security of one’s own territory and way of life satisfied few of the major military powers. Given both the nuclear stalemate and the tension between Communism and Capitalism, most of the industrialised states worried less about invasion than about the encroachment of the enemy’s ideology from abroad and the threat it posed to their ways of life.⁹² As a result many of the industrialised players in the bi-polar contest redefined their political interests in the security and integrity of their own states in terms of the stability of the world order, and the distribution of belief in one ideology or another. Ideology thus motivated war during the late industrial age not only as an abstract, but also as a concrete political threat to security.

Why Wage War in the Information Age?

To understand how these historical objectives will change in the information age one must first recognise one simple commonality: each of the objectives listed above is inexorably connected to the desire for power. This connection is most obvious in the political motivations for war like the quest for land or resources, since each of these has constituted the primary currency of

⁹¹ Deutsch, Karl W. The Analysis of International Relations. 3rd edition. Englewood Cliffs, NJ: Prentice Hall, 1988. p.55

power in its age. The relationship between power and abstract motivations for war is slightly more difficult to discern, but no less important. While most of the abstract ideals which have motivated war throughout history have not, like land, resources, or even prestige, directly contributed to the power of those fighting for them, power is requisite both to achieve these goals and to sustain them.⁹³ Implicit in the characterisation of ideals as motivations for war is the understanding that these goals - whether the spreading of a religious faith or the imposition of a just punishment, the unification of national peoples or the containment of an inimical ideology - can only prevail over the resistance of others, because otherwise there would be no need for the war. In order to defeat such resistance, one must by definition have access to some form of power, because power, in its simplest form, is understood as the ability to influence others to do that which they would not otherwise do.⁹⁴ Hence, power, as a means rather than an end, is just as critical to the achievement of abstract martial objectives as it is to that of more obviously political aims.

To the extent that war in the information age will continue to be waged with the aim of fulfilling objectives which cannot otherwise be attained, information age war will follow precedents set by previous eras of warmaking. War, the final arbiter, will remain the ultimate manifestation of power, employed because only its forceful judgement can compel an actor to concede

⁹² Luard. War in International Society. p.172, Cf. also Aron. The Great Debate. p.53

⁹³ Cf. Levy. The Causes of War: A Review of Theories and Evidence. p.224

⁹⁴ Robert Dahl in Nye, Joseph S. Bound to Lead: the Changing Nature of American Power. New York: Basic Books, 1991. p.26, Cf. Hans Morgenthau distinguishes power from influence by the fact that the former implies only the capacity to persuade, while the latter implies the ability to compel another by means of promised benefits or threatened disadvantages. Morgenthau. Politics Among Nations. p. 34 also Rothgeb. Defining Power. p.19, Knorr, Klaus. Military Power and Potential. Lexington, MA: DC Heath and Co., 1970. p.3

that which it does not wish to concede. Power is thus, in the information age as for time immemorial, the foundation and the most elemental aim of war.⁹⁵

What the information age changes, of course, is the nature of that power. This is the key to the shifts both in why information age war may be waged, and in why war may be waged in the information age.

As chapter one details,⁹⁶ the current changes in the recipe for power are products of the information revolution and its incorporation into information age society. While many of the ingredients of power will remain the same in the coming age, the ratio of their importance is likely to shift considerably⁹⁷ as information becomes the pre-eminent component in the power equation. Though rare, this dramatic shift is not without precedent. In fact, information will likely supersede the importance of industrial resources just as the latter replaced the primacy of land in the last great societal revolution at the dawn of the industrial age. Michael Howard traces this earlier shift, noting that, “[f]rom the time of Thucydides until that of Louis XIV there was basically only one source of political and military power - control of territory, with all the resources in wealth and manpower that this provided.” The advent of the industrial age, however, began a transformation in the land-based resources society deemed important: with the rise of manufacturing, extractable minerals, metals, and fossil fuel sources replaced agricultural wealth and manpower as land’s most critical assets. This, Howard notes, reflected a more general shift in the character of power from an agricultural, land-based construct to one more reliant on industry and natural resources. The extent of territory in one’s

⁹⁵ Blainey. *The Causes of War*. p. 109, 196.16

⁹⁶ See the ‘Information Revolution’ section of chapter one in particular.

⁹⁷ Levi. *The Coming End of War*. p.90

possession did remain important, though because industrial age tools conferred a far greater capacity of production per unit of land, power calculations became increasingly concerned not with acreage, but with “the effectiveness with which the resources of that territory could be exploited.”⁹⁸ As industry came to match and exceed the advantages possible from agriculture alone, it increasingly replaced the latter as the critical source of influence in the power equation.

Information has begun to eclipse the advantages of industrial resources in much the same way, enabling a level of efficiency which, like the industrial tools before it, will allow enterprises to improve the quantity and quality of output possible per each unit of input. Land and resources, though proportionately less important, will remain part of the power equation, but their roles will likely be tempered by a decreased emphasis on size resulting from information power’s hallmark capacity to ‘do more with less.’⁹⁹ This capability arises from the fact that leveraged information can *create* efficiency: from the employment of simulators to reduce the trial and error of prototype development to the use of computer networks to track inventories and eliminate the need for surplus stockpiles, to the application of computer databases to chart consumer preferences and target market strategies, information efficiency prevents the waste of resources, time, and effort, thus maximising the utility of all the other components of power.

Since war in any age revolves around power as both a means to an end and, to a certain extent, an end in itself, the information age’s changes in the composition of power will presumably affect both why certain types of war are

⁹⁸ Howard. The Causes of Wars. p.16

⁹⁹ See p.225

waged, and what their aims are. The previous section has already illustrated that information age changes in the military content of power may alter how influence is wielded in war, affecting the tactical, operational, and strategic objectives of warfighting. This section will complete the puzzle by examining how information age changes, by changing power in general, may affect the purposes for which influence is wielded, the political and abstract motivations for war.

Information Age Motivations for War

The effect of these power shifts on the motivations for war should be most readily apparent in the concrete political objectives for information age war, those that are most directly connected to the quest for power. This should come as no surprise, as land and resources, the central political motivations for war in the agricultural and industrial ages, were both closely linked to the composition of power in each age. One might, therefore, logically predict that information (as the principal component of information age power) should become not only a crucial tool of IAW, but also a vital aim of war in the information age. A war fought purely over information, of course, has yet to occur - and such a contest will be difficult to imagine or comprehend until it does actually occur - but the historical precedent of the agricultural and industrial ages seems to indicate that such a war should be expected, at least after the passage of several decades has allowed the information age to mature more fully.

Interestingly, even though the eventuality of waging war over information remains difficult to envision, signs have already begun to emerge that territory, whether in its guise as a source of agricultural wealth or as a

source of industrial resources, may be slowly losing its significance as a goal for war. Since the great reordering of territory at the end of the two World Wars, borders have become increasingly sacrosanct,¹⁰⁰ and territorial conquest has often been feasible only by those who could claim some previous right to the land.¹⁰¹ Furthermore, throughout the Cold War neither bloc claimed land or resources as their primary aim in the bipolar competition;¹⁰² instead the declared goal in the most significant conflict of the past half century was to convert the world to the abstract ideology espoused by one side or the other.¹⁰³ These are telling signs that, as the industrial age has waned, so also has the motivation to wage war over that age's most fundamental vehicle of power.

With the declining importance of land as a motivation for war, there may emerge a gap in the political objectives for war in the information age. Information, succeeding as it does the role of land and resources in the composition of power, seems at first tailored to fill their role as the predominant political objective in war as well. The very nature of information, however, exhorts caution in assigning such a status to the primary component of information age power. While information will certainly be the key to information age influence, unlike its land-based predecessors information is an intangible commodity. It cannot, therefore, be meaningfully 'won.' Moreover,

¹⁰⁰ Van Creveld. The Transformation Of War. p.154 Even where, as in Africa, borders were highly arbitrary at the outset.

¹⁰¹ Cf. The historic arguments over the establishment of a Palestinian state. Other new borders that have recently appeared in the former Soviet Union and the Balkans, for instance, have similarly been justified through historical, national, or ethnic claims to legitimacy.

¹⁰² This is not to say that neither land nor resources were at stake in the skirmishes of the Cold War, but rather that they were rarely articulated as the principal end of a conflict. Indeed, in many cases (Vietnam, for example), the conquest of territory was seen to be a victory for ideology, rather than a source of power or wealth.

¹⁰³ Aron. The Great Debate. p.53

as illustrated in chapter four,¹⁰⁴ information is also non-linear, and as such is infinitely shareable. The same piece of information can be leveraged multiple times, for a multitude of purposes, by many different users, without depleting its value. Though military force can deprive an opponent of access to certain information (such as satellite imagery, or networked financial data), nothing can erase his past knowledge of that contested information. Furthermore, even if an attacking force wins access to information for itself, in many cases (for instance the theft of information or information systems used to streamline industrial production, or the destruction of military training and planning simulators) the defeated enemy will retain the knowledge to rebuild or otherwise restore their own access.¹⁰⁵ How, and more importantly, why one would go to war to fight for such a commodity is therefore very difficult to fathom. The challenge of conceiving how wars can usefully be fought over information logically raises doubts over whether information will, in fact, replace territory's role as an objective for war, despite the fact that information has already replaced it among the leading components of power.

If the most important component of information age power cannot be won in battle, one might consider the happy possibility that the information age could see a radical decrease in the incidence of war. And indeed, rational choice calculations based on the amorphous nature of information power point to the conclusion that the coming era might witness far fewer wars fought with the intent of augmenting the victor's concrete supply of power. Before one even

¹⁰⁴ See chapter four, note 46, in 'Strategic Civilian Tools in IAW.' Cf. also chapter six's section on the widening of small and non-state actors.

¹⁰⁵ This argument refers, of course, to the strategic, not the tactical level of war. In the case of the latter, gaining information superiority and depriving the enemy of information access at critical moments - such as during a troop advance or air strike - certainly may prove decisive.

begins to dream of world peace, however, it must be remembered that the aims of war do not encompass only the direct aggrandisement of one's power. While politically motivated wars fought explicitly to win power seem - due to the nature of information age power - likely to become more difficult to fight and more rarely fought, wars waged to achieve more abstract objectives are unlikely to become any less prevalent and, indeed, may become more so in the information age.

Two separate sets of factors could contribute to a higher incidence of war over abstract ends (as opposed to concrete political goals) in the coming era. These factors, like the changes in information age power, stem less from the information age's influence on war, than from its influence on the context of war. The information age's changes in the abstract motivations for war should result primarily from the kind of actors - and the number of actors - empowered to wage war in the information age, and from the highly connected nature of the information age international system. Interestingly, neither results from a direct change in war's abstract aims themselves. Many of the abstract motivations behind why war will be waged in the information age should, in fact, remain essentially unchanged. The maturation of the information age should have little effect on the lure of such time-honoured ideals as religion, nationalism, prestige, liberty, or self-preservation as goals for war. Nor will the emergence of IAW greatly influence new abstracts, like the quests to preserve the global environment or to enforce universal human rights, which some scholars posit may become motivations for future wars.¹⁰⁶ Other ideals will lose their status as

¹⁰⁶ Klare. *Peace and World Security Studies*. p.100; also Dewitt, David, David Haglund, and John Kirton, eds. *Building a New Global Order: Emerging Trends in International Security*. Toronto: Oxford University Press, 1993. p.192

ends of war due to changes unrelated to the information age. The fierce motivation of ideological struggle, for instance, has paled drastically since the end of the Cold War contest between the champions of Capitalism and Communism.¹⁰⁷ The information age, then, will not change why war is waged by directly introducing new ends for war.

Changes in why war will be waged in the information age may, however, result from information age shifts in the kinds of actors motivated to wage war for the relevant objectives, and from IAW's affect on whether or not they are empowered to do so. In this, information age war's changes in the abstract motivations for war are closely connected to the fourth criterion of the paradigm shift, the information age war form's changes in who will wage war. If, as the next chapter argues, new actors become more viable participants on the stage of full-scale war, they will add an element of uncertainty to warfare in the information age. While small states and non-state actors seem unlikely to introduce wholly new aims for war, they will quite probably use new calculations for determining the expediency of waging war. For instance, recently empowered information age military actors may have unaccustomed triggers for starting war: with less to lose, small actors, especially dispersed non-states, may be harder to deter and perhaps more apt to resort to high-risk wars with odds of success lower than those that have usually tempted traditional state actors to launch campaigns of organised violence.¹⁰⁸ This introduction of a

¹⁰⁷ Brown. The Causes and Prevention of War. p.55 Cf. also Snow. Uncivil Wars. p.55. In place of this ideological objective, a newly predominant emphasis on the spread of world democracy and freedom has emerged. US Congress, Office of Technology Assessment. American Military Power: Future Needs, Future Choices - Background Paper. OTA-BP-ISC-80. Washington, DC: US Government Printing Office, October 1991. p.3

¹⁰⁸ Morton, Oliver. 'The Information Advantage: Defence Technology Survey.' Economist. v335, 10 Jun 95: 8-17. p.18

new calculation for the cost-benefit returns of warfare may render objectives like universal human rights or mandatory environmental protection (which heretofore have been considered largely hypothetical goals for war because their costs are too high for slim chances of success¹⁰⁹) reasonable war-aims in the view of the new actors. Likewise, these actors may have different pain-thresholds for ending war, and may be willing to pay a much greater cost to achieve their objectives than previous combatants have deemed rational. This is especially probable in the case of groups fighting to preserve their existence (or assert their right to exist) either as states or as legitimate sub-state collectives.¹¹⁰ Such a pursuit could potentially become more common in pace with IAW's predicted empowerment of traditionally marginalised actors.

The information age expansion of viable military actors may also affect the incidence of war because of the particular aims which motivate the new actors. Just as small and non-state actors are the most probable source of threat in the information age,¹¹¹ the sorts of goals that these actors fight over are liable to be the most prevalent sparks for future wars. Scholars have identified certain pressures likely to have a growing share in the motivation of war.¹¹² Among these are included: the globalisation of the market economy, with all of its implications for the uneven spread of development and the widening of the gap between the world's rich and poor; the intensification of religious and ethnic

¹⁰⁹ Particularly acute in the case of human rights since the aggressor would normally be fighting for benefits which would not directly accrue to him.

¹¹⁰ Van Creveld. The Transformation Of War. p.148

¹¹¹ Kraus, George F., Comdr., USN (Ret); Senior Fellow, SAIC. Interview with the author. 16 December 1996., See chapter six, 'On Balance, Who Can Wage IAW?'

¹¹² Builder, Carl. 'Toward a Theory of Aerospace Power for a More Disorderly World.' Rand, Project Air Force Briefing, 5 February 1997. p.10, Klare. Peace and World Security Studies. p.100-101, Lider. On the Nature of War. p.69, Binnendijk, Hans, ed. Strategic Assessment 1995. Washington, DC: National Defense University World Wide Web page, 1995. ch.14, p.1

tensions, often coincident with demands for national self-determination; and the looming environmental and population crises, with all the potential for conflict inherent in insupportable population growth, resource scarcity, and mass refugee migrations.¹¹³ All of these pressures are more likely adversely to affect marginalised small state and non-state actors who do not possess the monetary or organisational resources to deflect or manage the impact of such pressures in the same way that more advanced states can.¹¹⁴ Although predicting how these actors will react to such pressures is beyond the scope of this study, given their predicted empowerment, one can reasonably argue that the stresses particularly affecting small states and non-states deserve heightened attention as potential motivators of war in the information age.

Additionally, in considering what may motivate empowered small actors to wage IAW, one must also recognise the possibility that these actors will simply seek further aggrandisement of newly acquired power. While the previous pages have already dismissed as unfeasible the potential for war over the conquest of information, this may not be the only source of power actors will seek through information age war. The spread of the information age society, as previously noted,¹¹⁵ will proceed gradually and unevenly. As a consequence, actors who have adopted enough of information age technologies and methodologies plausibly to wage IAW may still have not advanced far enough along the path to information age society to have abandoned industrial age conceptions of grandeur through territorial conquest. As a result, territory

¹¹³ Klare. *Peace and World Security Studies*. p.100-101

¹¹⁴ Renner. *Fighting for Survival*. p.55

¹¹⁵ See 'The Information Revolution,' chapter one.

and resources may still be objectives for information age war, though not actually information age objectives for war.

Lastly, in examining the impact of new actors on the whys of information age war, one should consider the popular apprehension that the information age's numerical increase in martial actors may itself be a cause of war. Following the proverbial adage 'too many cooks spoil the soup,' many expect that more actors capable of waging full-scale war could lead to more instability.¹¹⁶ Theorists raised this concern early in the nuclear age when, at the height of war's irrationality, many worried that the risk of an actor making an irrational decision or even starting an accidental war was multiplied by the number of actors in possession of nuclear weapons.¹¹⁷ In the information age, as the preceding paragraphs have demonstrated, the influx of unaccustomed new actors should, according to some theories,¹¹⁸ lead to still more complexity and uncertainty in the international system, and a larger set of stresses liable to spark war. This uncertainty (and the consequent raised probability of war) may, however, be mitigated by the interdependence of the complex information age international system. Several scholars have proposed that an expanded number of actors in the system might actually lead to greater stability, and a decline in the use of force to settle disputes.¹¹⁹ In fact, Quincy Wright has maintained that the probability of war may actually decrease in inverse proportion to the number of independent political organisations in the international system, due to the fact that the system's increased number of interactions allows more opportunity for

¹¹⁶ Levy. *The Causes of War: A Review of Theories and Evidence.* p.214, 234.

¹¹⁷ Aron. *The Great Debate.* p.63

¹¹⁸ Levy. *The Causes of War: A Review of Theories and Evidence.* p. 234.

¹¹⁹ Levi. *The Coming End of War.* p.71,

tensions to be expressed peacefully.¹²⁰ Like many of the future effects of information age war, then, the ultimate impact of IAW's multiplication of the viable military actors in the international system is impossible to predict with any real certainty until it can actually be observed. A second set of factors may also influence why war will be waged in the information age; these are related not to the number of actors in the information age international system, but rather to the highly connected nature of that system. Through its facilitation of information dissemination, the information age may add two further changes to the whys of information age war. Firstly, the wide reach of information in the information age could potentially encourage actors' to wage war by encouraging their hopes for success in war. Nationalists, religious fundamentalists, non-state actors with global agendas like protecting the environment, and others whose organisations have been augmented and expanded by the internet and other communications technologies will not only be empowered on the military level to wage war for their ideals, but might be spurred on to wage that war by a conviction, born of information age connectivity, that they are justified in that pursuit. Small, and often dispersed, actors from the Zapatista rebels and left-wing environmentalists, to right-wing white supremacists and religious terrorists have garnered international attention, support, and in some cases, membership through their increasingly prominent presence on the internet.¹²¹ This growing support and participation may in the future sponsor the belief that a disaffected actor is almost democratically entitled to its goals by the sheer

¹²⁰ Wright, Quincy. A Study of War. Vol2. Chicago: University of Chicago Press, 1942. p.1275 Blainey. The Causes of War. p. 110

¹²¹ See chapter 4, 'Targeting Civilian Information' and chapter one, 'Man.'

force of numbers in its favour. Such an optimism could prove to be a heady impetus for embarking on an information age war.

Secondly, the connectivity of the information age international system may significantly facilitate the recognition of relative deprivation, a phenomenon which has already been identified as a potential motivation for war.¹²² The dispersion of information via modern ITs may foster resentment among the disadvantaged to the extent that they are increasingly confronted with what they lack. The technologies which allow disadvantaged actors to observe and recognise what they lack will not, however, present any significant prospect of improving their development in the short run. This would leave these actors with the awareness of their disadvantage, but without any ready capacity to address their situation peacefully. The sense of helplessness and resentment this situation may foster is, moreover, likely to be further intensified by the fact that many of the world's poorer nations will skip entire phases of industrial development in their race to catch up to the 'first world,'¹²³ a jump which will leave many particularly ill-equipped to deal with the information age. Together, these phenomena can only exacerbate the economic motivation identified for industrial age war, wherein the real danger of violence lies in actors' recognition of relative deprivation, rather than in deprivation itself.¹²⁴ Information age connectivity may bring that recognition faster, closer to home, and more vividly, further fanning the flames of resentment that already characterise the gap between the world's rich and poor.

¹²² See above, p.247

¹²³ Cf. Snow. *Uncivil Wars*. p.57, Parts of Indonesia, for example, went from having no phone service to regular use of cellular phones, completely skipping the phase of land-line telephony.

¹²⁴ Rothgeb. *Defining Power*. p.52

Conclusion

Having established how information age war is likely to change the 'why' of warfare - both on the level of why information age war will be waged, and why war will be waged in the information age - it is now possible to assess the significance of those changes, and their contribution to the argument for paradigm shift. In the final analysis, the information age's shifts both in the reasons people choose war as a means to an end and in the motivations for which people go to war do not challenge the established understanding of warfare. As with its changes in the how and what of war, information age war's changes to the why of war still fall well within the explanatory power of the current military paradigm.

The information age's changes in why people wage war do not fulfil the third criterion of paradigm shift primarily because they do not introduce fundamental alterations to the principles of warfare. In the case of why information age war will be waged, the preceding pages have illustrated that the reasons people will choose to wage war as a solution to their disputes are, on the most basic level, no different from the reasons given for war throughout history. The information age war form, like all past forms of war, will continue to be waged because its extremes of force constitute the final arbiter of dispute and conflict; this fact is a strong signal that IAW will in essence conform to the established models for explaining war.

The chapter has shown that the war form is, however, more likely to introduce noteworthy changes with respect to more superficial aspects of the why of war, namely, the reasons why people may choose to wage this information age form of war in particular. IAW's introduction of a new efficient dimension to the extremes of warfare - a product of the war form's

reliance on the speedy, accurate pace made possible through the concerted leveraging of information - may indeed add new answers to the question 'why wage war?' by rendering information age war, rather than other forms of war, the best available path to military victory in some cases. However, although these shifts in the reasons for waging war are noteworthy for their influence on the choice to wage IAW, they do not require new models for explaining war because they alter only the reasons why a specific form of war is waged, not, more fundamentally, the reasons why war itself is waged.

In the case of why war - in any form - will be waged in the information age, the motivations behind why people will wage war in the information age are also likely to remain largely unchanged in principle. The greatest potential for change in this aspect of the 'why' of war, according to the pattern of past paradigm shifts, lies in the likelihood that shifts in the composition of power will introduce parallel shifts in the main aim of war.¹²⁵ Yet the information age renders information, an intangible, non-linear, infinitely exchangeable commodity, the primary component of the information age power equation. Since this commodity cannot be meaningfully won in battle, it very obviously cannot become the primary aim of the new war form. Thus, despite widespread societal changes in the role and influence of information, information age war will introduce no profoundly new political objective for the violent conflicts of the future.

Other likely aims of information age war, moreover, also show little sign of significant change as a result of information age influences. Neither the influence of information age war nor the information age itself seem likely to

resolve, nullify, or otherwise alter any of the more abstract issues over which people wage war. Consequently, wars in the near future will undoubtedly continue to be motivated by religion, by nationalism, by the quests for influence and wealth, and by the ubiquitous desire for freedom and autonomy, among other time-honoured war aims. However, while these motivations are themselves unlikely to change (at least, as a direct result of information age influences), their role in sparking wars may shift indirectly as a result of information age changes in who can wage war. The next chapter will argue that information age war is likely to alter the balance of relative military power between large state actors and small- and non-state actors. If this prediction is fulfilled, such a shift may affect the 'why' of war to the extent that different actors choose to wage war for different reasons, and may have different calculations of the costs and benefits of warfare. New actors on the stage of full-scale war may therefore have different triggers for beginning and ending a war, if not necessarily different aims for the war itself. This shift may be both significant and dangerous to the extent that it could alter the incidence of war, but because it does not affect the basic motivations for waging war, information age changes on the level of why war will be waged in the information age, like those on the level of why information age war in particular will be waged, should not require a new paradigm for explaining warfare.

¹²⁵ The waning importance of land as a goal for war after the agricultural age is a primary example of this phenomenon.

DRAMATIS PERSONAE: Who Can Wage Information Age War?

The fourth, and final, criterion of paradigm shift deals with the question of who can wage information age war. This last barometer of the information age's effect on war is the one criterion which exhibits some genuine potential for introducing profound changes in the conventional understanding of war. Those changes, however, are unlikely to involve any surprisingly new answers to the question 'who can wage war?.' Rather, IAW's influence on the cast of actors capable of waging full-scale war will more likely manifest itself in the form of shifts that affect the various actors' capability for war in the information age. The actors in question fall primarily into two general categories: state actors, and lesser- and non-state actors.¹ Perhaps not surprisingly, the projected shifts in the military standing of these two sets of actors seem to follow the same pattern as that identified in chapter one to describe the information age's influence on man and the state: both state and lesser- and non-state actors are likely to face a paradoxical widening and weakening of their roles in waging war. The net effect of these contradictory influences should alter state and lesser- and non-state actors' capacity to wage war both relative to their own

¹ The former should be understood here mainly as traditional 'great power' states. Lesser state actors should be understood to be states that boast less than peer capability to compete militarily with the great powers. Typically less developed and comparatively recently invested with statehood, these states are not necessarily small in terms of territory, population, or resource base. They are, however, small in terms of 'power' (usually measured militarily, but lesser states often have small economic power as well). Primarily for this reason, the current chapter examines lesser-state actors and non-state actors concurrently, as one set of actors, since both occupy a disadvantaged position vis à vis great power states and traditional measurements of power. While these two actors' differing sovereign status does pose a challenge for this concurrent approach, the overlapping effects of IAW on both lesser- and non-state actors seems to outweigh the disadvantages of examining the two together. In recognition of these disadvantages, however, IAW's differing implications for non-sovereign actors in particular will be examined later in the chapter.

previous capacity for war, and relative to each other's capacity. The resulting balance will define who can wage information age war, as well as indicate the actors' positions of relative advantage in the waging of that contest.

This chapter will examine the widening and weakening influences of IAW on both state and lesser- and non-state actors as a step towards calculating the balance of military advantage between these two sets of actors, and thus toward establishing how the information age may influence their absolute and relative capacities for waging war. This calculation should determine the extent and significance of information age war's changes in who can wage war, and indicate whether these changes challenge the current understanding of war sufficiently to fulfil the fourth and final criterion of military paradigm shift.

The State

The investigation into who will wage information age war begins with state actors, because scholars of warfare have also traditionally chosen states as their point of focus. In fact, throughout the three and a half centuries of the Westphalian state system's existence, war and the state have been inextricably intertwined in western scholarly literature. Writers on the subject of warfare have viewed the relationship between the two to be so close that they have more often than not defined one in terms of the other. For instance, war is most typically described as "an act of force taking place between sovereign states."² The phenomenon has even been more narrowly characterised as a violent

² Van Creveld, Martin. Technology and War: From 2000 BC to the Present. New York: Free Press, 1991. p.285

contest designed to win “control of a state’s powers, its actions, or its assets.”³ Similarly, a state, according to Max Weber, is “a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory.”⁴ From the origins of the modern state system to the present day, most scholars of war have deemed states to be the only kind of actor under whose aegis humanity could and should wage war.⁵

This is not to say, of course, that no actors besides states have waged war throughout the reign of the modern state system. On the contrary, insurgents, guerrillas, revolutionaries, and other ‘non-state actors’ have been waging war longer than the state system has existed, and they certainly did not stop with the inception of the state and its declared monopoly over the legitimate making of war. Over the past 350 years, however, formal attempts to answer the question ‘who will wage war’ have overwhelmingly focused on state actors, to the exclusion of all others.⁶ This bias has led to the accumulation of a

³ Libicki, Martin C. “What is Information Age War?” Washington, DC: National Defense University Press, 1995. p.1

⁴ Brown, Seyom. The Causes and Prevention of War. New York: St Martin’s Press, 1994. p.40 - from Weber 1946.

⁵ Van Creveld. Technology and War. p.285

⁶ This is particularly true of Western writers before World War II, but the trend has extended throughout the Cold War. However, the rash of insurgencies and other non-state military conflicts which dotted the Cold War years have, in recent decades, sparked considerable interest in the field of low-intensity conflict, a war form most typically involving non-state actors. Apt examples of this interest include Van Creveld. The Transformation of War. Coll, Albert R., James S. Ord, and Stephen A. Rose, eds. Legal and Moral Constraints on Low-Intensity Conflict. Newport, RI: Naval War College, 1995. Hoffman, Bruce and Jennifer Taw. Defense Policy and Low-Intensity Conflict: the Development of Britain’s “Small Wars” Doctrine During the 1950’s. Santa Monica, CA: RAND, 1991. Snow, Donald M. Uncivil Wars: International Security and the New Internal Conflicts. Boulder: Lynne Rienner Publishers, 1996. For examples of the more state-centric view of war, cf. the literature on the causes of war, which until recently has overwhelmingly emphasised the character of states and their regimes, as well states’ access to resources as primary causes of war. This literature includes such recent publications as: Seabury, Paul, and Angelo Codevilla. War: Ends and Means. New York: Basic Books, Inc., 1989. p.41, also Brown. The Causes and Prevention of War. Blainey, Geoffrey. The Causes of War. New York:

profuse quantity of information regarding the state's role in waging war, a foundation that makes state actors not only a logical starting point for the investigation into who will wage information age war, but also an easier one.

Widening

Information age war's potential to widen the state's position in warfare derives primarily from the centuries of experience that state actors have accumulated in waging war, and from the well-established infrastructures and institutions that states have tailored over years of seeking the best possible fit for efficient military operation. As the following section argues, this body of tradition might perhaps impede the innovation integral to the development of an information age military force.⁷ The present section will attempt to demonstrate, however, that the potential negative aspects of experience may in many cases be outweighed by the benefits derived from constructively employing that commodity towards the making of reasoned choices for progress. If states can leverage their experience to make informed decisions about change, rather than allowing tradition to stand in the way of progress, that experience could serve to widen state actors' role in war by facilitating their efforts to insure the optimal functioning of military activity.

Moreover, the particular changes information age war is predicted to introduce in the content of war might actually increase the value of experience, because constructively employed experience could actively foster the efficiency believed to be decisive to the information age war form. Consider the fact that

Free Press, 1988. 3ed. and Howard, Michael. The Causes of Wars, and Other Essays. Cambridge, MA: Harvard University Press, 1983.

⁷ See 'Weakening' under the State heading, beginning p.282

states have honed their practices of strategic planning, of intelligence production, and of tactical training, preparation, and implementation through countless trial-and-error lessons conducted over decades of involvement in warfighting. With this background, soldiers in established state forces should be better able to assess situations and make decisions quickly, and will be more likely to have the tools they need to act on these decisions where and when they need them.⁸ For example, a matter as simple as an established doctrinal protocol, which can guide conduct in a situation such as an unexpected contact with the enemy, might sufficiently reduce uncertainty to give experienced soldiers an edge in reaction time and thus, perhaps, an advantage in such a confrontation. This is one of several ways in which experience may enable military forces to take greater advantage of the efficiency that integrated information makes available to them. While this capacity for quick, informed action has always been important, it has heightened significance in the information age, where the quality of action is crucial to a war form that relies on fast, precise strikes to overcome an enemy.

States' long experience with war should aid their capacity for efficient military action most noticeably by providing them with a substantial foundation upon which to expand. Established military powers in particular should be able

⁸ This, of course, is not *always* true. Russian state military troops, for example, were often not even equipped with enough batteries to power their radios during Russia's conflict with the Chechens. Herrera, Geoffrey L. "New Information Technologies and the Future of State Security." Monterey, CA: Proceedings of the Security Studies Conference on Revolutions in Military Affairs, Naval Post-graduate School, August 1996. However, experience does prove advantageous often enough that Dunnigan and Bay include experience, along with military tradition and efficiency, among the intangible factors which contribute to an actor's military power. Dunnigan, James F. and Austin Bay. A Quick and Dirty Guide to War: Briefings on Present and Potential Wars. New York: William Morrow and Co., Inc., 1985. p.379

to build many information age military capabilities upon institutions and infrastructures that are already in place.⁹ Physical infrastructures like secure power grids, intangible infrastructures like schemes and preparations for mobilisation, official institutions like organisations that co-ordinate combined military operations or regulate internal military order, and unofficial institutions like bodies of military tradition and databases of trial-and-error lessons all provide a groundwork which should allow established military forces to concentrate more on the business of providing security than on developing the accoutrements of this business. In addition, although the increasing unwieldiness of attritional warfare may greatly reduce the importance of weapons and platforms stockpiles held by states, stockpiles of established systems designed for the organised dissemination of information - from training facilities and received doctrine¹⁰ to command and control apparatus and secure telephone networks - could put states a step ahead on the path to leveraging information for military advantage. Systems, institutions, and assumptions such as these, which have already been tested and adjusted in war (regardless of which war form), should provide an edge simply because they are more likely to function with the speed and accuracy necessary for the efficient pace of information age war.

The efficiency that such experience encourages is most obvious in the realm of intelligence, one of the potentially most pivotal components of IAW.

⁹ As the following section details, this foundation can also be a distinctly negative influence in cases where it deters complacent actors from adopting needed changes. See p.282ff

¹⁰ Even states that have not begun to consider IAW doctrine will benefit from the fact that they have a familiar doctrine system, and that their soldiers are accustomed to learning and following doctrine to integrate roles within or among military forces.

In intelligence the state will perhaps accrue its greatest advantages from embedded institutions, practices, and experience, since success in information age war (even more obviously than in past forms of war, because of IAW's emphasis on precision) hinges not simply on intelligence, but on *good* intelligence. As one US military intelligence officer avers, "precision weapons need precision intelligence."¹¹ If a military force is to depend on its ability to strike quickly and accurately as its primary means of defeating an enemy, then its intelligence must transcend 'adequate' to be thorough, detailed, and complex, as well as fast.¹² States have heretofore composed by far the majority of actors with access to the resources (both capital and labour) necessary for building an intelligence community which is capable of such a product.¹³ Hence the actors with experience in producing this high level of intelligence will predominantly be state actors.¹⁴

The benefits states may accrue from their experience in intelligence production are evident in each of the three steps in the intelligence process, from acquisition to analysis to dissemination and application.¹⁵ In the acquisition, or collection, phase, priority is increasingly being placed on imint (imagery

¹¹ Campen. The First Information War. p.53

¹² Mayfield, Terry; Senior Fellow, IDA. Interview with the author. 17 December 1996.

¹³ Toffler, Alvin. Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. New York: Bantam Books, 1990. p.312

¹⁴ This is not to say that states are the only actors with experience in intelligence, nor that they necessarily have the best intelligence. Indeed, many covert organisations like terrorist groups and international organised crime gangs depend for their existence on the quality of their intelligence. As the following pages will argue, however, state actors stand to gain greater benefits from their experience in intelligence (though not necessarily from intelligence per se!) simply because states' experience is longer.

¹⁵ Handel. War, Strategy, and Intelligence. p.208

intelligence) and humint (human intelligence).¹⁶ Imint, which relies on satellites, surveillance aircraft, and other forms of sophisticated aerospace reconnaissance, carries obvious advantages for state actors with large budgets, established research communities, and stable organisational infrastructure.¹⁷ Imint systems are expensive to build and expensive to deploy, especially in the instances where they must first be launched into space.¹⁸ They require long-term investments in research and development, as well as in converting prototype to production. As chapter four noted, the information revolution's explosion of information technologies may deflate some of the state's advantage in procurement and in research and development by rendering many traditionally military technologies - like surveillance equipment - publicly available at an unprecedented level of sophistication and affordability.¹⁹ Such devices, however, are unlikely soon to compete as technological peers with military-developed systems like JSTARS (the Joint Surveillance and Target Attack Radar System). The crown jewel of US military imint, JSTARS can

¹⁶ Bondanella, J., E.M. Cesar, Jr., P.D. Allen, et al. Estimating The Army's Intelligence Requirements and Capabilities for 1997-2001. Santa Monica, CA: RAND, 1993. p.49 This should not be taken to imply that other forms of intelligence - signals, electronic, or even open source intelligence - will be less important in the information age than they have been in the past. Rather, that high level imint and humint are taking on an extra role as differentiating factors in states' collection of intelligence. Sigint, elint, and especially osint collection have become increasingly available to lesser- and non-state actors. This, combined with the fact that imint is typically the source of the most detailed intelligence available on competitor activities, and the fact that humint remains the best source for intelligence on enemy intentions - one of the most scarce and valuable forms of intelligence, particularly amidst the information age explosion of information - makes imint and humint collection particularly valuable to the state actors who enjoy access to them in the information age.

¹⁷ Such advantages will obviously be more prevalent among the 'great power' states and other developmentally advanced state actors. In some cases, small, young states barely hold an advantage over non-state actors in these aspects.

¹⁸ The United States' National Aeronautics and Space Administration (NASA) currently estimates space delivery payload costs at roughly \$10,000 per pound. NASA World Wide web page. November 1998.

reportedly track a bicycle on the streets of Cambridge from the skies over Calais on a clear day.²⁰ Systems like this, which require substantial investments of time, planning, and money - assets that states typically have far more abundantly than non-state actors - could give state actors a significant edge over non-state actors in information age war.

Like imint, human intelligence collection is another projected source of advantage for the state. Despite the amazing capabilities of modern technological intelligence collection, humint is becoming more, not less, important to information age intelligence.²¹ In this era of abundant information, it is not enough to see numbers of tanks, shape of terrain, or even preparations for mobilisation; information age militaries must also have access to information about their enemy's intentions, and about his intelligence. While the need to understand intentions is not unique to the information age - Sun Tzu recognised its importance almost two and a half millennia ago²² - the deception and surprise that are so important in IAW battle manoeuvre particularly depend upon the capability to know what the enemy knows about one's own forces. Moreover, in order to undermine an opponent through his dependence on information, soldiers will need to understand not only what information that opponent has, but how he uses information, and where he is most vulnerable to its lack.²³ No sensor could acquire this kind of intelligence, only a human agent

¹⁹ Libicki, Martin C. "What is Information Age War?" Washington, DC: National Defense College, 1995. Chapter 6, p.2

²⁰ Lambert. "The Psychological Impact of Airpower."

²¹ Adams, James. The New Spies. London: Hutchinson, 1994. p.312

²² Sun Tzu. The Art of War. pp.144-5

²³ Kraus, George F., Comdr., USN (Ret); Senior Fellow, SAIC. Interview with the author. 16 December 1996.

with a knowledge of the culture and its fears, and of the people and their moods can provide such intelligence.

Again, non-state actors and even individuals certainly have access to humint, as the sophistication and success of such terrorist incidents as the 1993 World Trade Center bombing and the 1998 bombings of US embassies in East Africa attest. These acts could not have surprised the United States and its intelligence community so successfully and on such a scale unless the perpetrators employed detailed and accurate intelligence themselves. However, states, who have spent the better part of the 20th century developing modern intelligence institutions, should still derive certain advantages from their longer experience in this field. Most notably, both the training of a state's spies and their legacy of contact agents require time to develop,²⁴ and this development profits greatly from the heirloom of trial-and-error lessons passed down within each community. State actors have, in general, simply had more time to develop these legacies than non-state actors. The Great Powers, in particular, have maintained intelligence operations longer than most current non-state security threats have existed.²⁵ The benefits available from experience in intelligence should therefore fall more to state actors for the simple reason that they typically have more of this commodity from which to benefit.

The advantages states may derive from their experience in intelligence become still more pronounced at the level of intelligence analysis. Always a

²⁴ Bondanella, Cesar, Allen, et al. *Estimating The Army's Intelligence Requirements*. p.xxvi

²⁵ One of the earliest was Great Britain, which has supported a permanent intelligence apparatus since the first decade of the 20th century. Britain's intelligence community is thus older even than the IRA, which is perhaps the longest-running non-state threat still challenging a state's security. While Britain's long history in intelligence is perhaps somewhat extraordinary,

realm that requires extensive training and a depth of background knowledge, intelligence analysis will likely become a greater challenge in the information age because, as chapter three describes, the information revolution exponentially magnifies the difficulty of separating 'signals' from 'noise.'²⁶ Even before the information revolution, analysis was a crucial step in the provision of useful strategic or tactical intelligence.²⁷ In any era collected data can not become a functional intelligence product until an analyst has sorted that data to determine its relevance to a situation (and, not infrequently, its veracity), and then compared that information with intelligence from other sources in order to create a complete picture. While the information revolution's increasingly sophisticated tools for information co-ordination and management should certainly aid in this process, the analysis stage of intelligence production - which entails not only making sense of the collected data, but conveying the correct sense of that information without undue reliance on the personal biases of the analyst nor on the tendency to produce worst-case scenarios²⁸ - should require at least as fine a hand in the information age as in ages past.

In addition, the information age explosion of intelligence collection capability may further increase this established importance of analysis, and state actors' experience with this task, in two ways. First, the analyst will likely become more pivotal because he or she has more data through which to sort.

most of the other Great Powers have maintained permanent intelligence institutions at least since World War II.

²⁶ Cf. chapter three, 'Speed and Accuracy.' Jones, R. V. Reflections on Intelligence. London: Heinemann, 1989. p.159 and Toffler. Powershift. p.317

²⁷ Handel. War, Strategy, and Intelligence. p.237

²⁸ *ibid.*, p.242,246 The worst case scenario is a great temptation for intelligence analysts because it is not only the most easily quantifiable manifestation of a threat, but it is the best way to avoid being blamed for failing to predict a crisis.

No one commander or leader could digest the flood of information collected today; consequently the data which an analyst must discard before creating a final intelligence product constitutes a considerably larger proportion of collected information than it previously has. Yet the more chaff a harvest produces relative to its yield of wheat, the more valuable are the useable kernels of wheat. As the relative value of each useful kernel increases, so does the detriment from mistaking a kernel for chaff and throwing it away. As arbiters of what decision makers do and do not need to know, information age intelligence analysts sifting useful information from the growing supply of extraneous data may face an increasingly weighty responsibility for correctly identifying the relevance of the information they analyse.²⁹

Secondly, and a weightier responsibility still, the increased ease of intelligence collection may mean that the calibre of analysis will play a more crucial role in the ultimate quality of the intelligence produced. In the days when collection was more difficult, knowing everything one could was a principal aim of intelligence production, and analysts added and subtracted comparatively little of the content and sense in the final product. Since the snowballing of the information revolution, however, knowing everything one possibly could has become a ludicrous aim, replaced by the requirement to understand what is important in what one knows. The accuracy and acuity of analysts' interpretations from the raw collected data will therefore likely play a much greater role in the usefulness of the final intelligence product. Analysts with access to institutional experience, to vast catalogues of background

²⁹ Johnson and Libicki, eds. Dominant Battlespace Knowledge. Chapter 3, p.10

information, and to long histories of intelligence's effectiveness in situational context, should be far better equipped to analyse information and make decisions about what leaders need to know than are those analysts whose background knowledge extends little further than current collected information. Even more than in acquisition, then, states' long traditions of producing intelligence should provide them with a formidable advantage in analysis.

In the third phase of the intelligence process, that of disseminating and applying the intelligence product, states' established and tested communications infrastructures may enable them to retain an advantage over non-state actors. As will be demonstrated, however, this is one advantage that may be considerably reduced in the information age. Dissemination has always been a crucial step in intelligence production, because intelligence that does not reach decision-makers in time - or worse, not at all - clearly cannot aid the making of decisions.³⁰ In the information age, the capacity for *good* dissemination becomes still more vital due to the imperative for speed. Intelligence must be communicated quickly not only because it must keep up with the fast pace of battle, but because the proliferation of hi-tech communications - among enemy and ally alike - places a premium on the ability not merely to disseminate information, but to disseminate it before the other side learns what one knows.³¹

This increasingly critical role of intelligence dissemination is emphasised again and again in assessments of intelligence performance in the Gulf War. The fact that communications systems were not designed to handle the sheer volume of intelligence dissemination proved to be a constant source of

³⁰ Handel, Michael I., War, Strategy, and Intelligence. London: Frank Cass, 1989. p.237

frustration during Operation Desert Storm.³² All too often, satellite images of terrain or of Iraqi troop activity were available at crucial moments before attacks or operational manoeuvres, but the information did not reach the commanders who needed it in time.³³ The majority of these dissemination problems occurred because of simple miscalculations in preparation - such as non-interoperable communications networks wired with insufficient bandwidth to carry so much complex data, or troops deployed to the field with insufficient training to use the computer systems sent to aid them³⁴ - resulting from the fact that the coalition forces did not originally plan to fight such an information-intensive war. The ensuing frustration over the gap between intelligence collection and dissemination abilities has raised a call for the acquisition of even more and better military communication systems, despite the fact that commanders enjoyed better intelligence support in the Gulf War than in any other war.³⁵

If communications are to improve from their current high standards, states may hold an advantage in intelligence dissemination. Large, pre-established infrastructures like the Public Switched Network (which governs long-distance telephone calls) could serve as a significant building-block upon which to base further improvements. Furthermore, states typically have more capital available to invest in the researching and developing of such communications advantages as greater band-width capacity, camouflageable

³¹ Johnson and Libicki, eds. Dominant Battlespace Knowledge. Chapter 2, p.3

³² Campen. The First Information War. p.55

³³ Cf. Odom, William E., Lt.Gen USArmy, retired. America's Military Revolution: Strategy and Structure After the Cold War. Washington, DC: American University Press, 1993. p.108, also Campen. The First Information War. p.xiv

³⁴ Bondanella, Cesar, Allen, et al. Estimating The Army's Intelligence Requirements. p.xxii, p.49, also Laughridge, Gene. "Recent and Not-so-recent Thinking on Information Operations and the Knowledge War." Army Communicator. Vol20. 1 Apr 95: 32-39. p.34

signal transmitters, or un-crackable codes. Indeed, states - who hold centuries of experience in intrigue and secret-keeping - hold a potential edge in intelligence dissemination not only from their superior communications systems and research potential, but also from their long experience in equipping themselves for secure communications. While state actors are in many cases still unprepared for the magnitude of the current threat to their information security,³⁶ long years of operating under an imperative for guarding the security of state information and communications should prove a valuable guide for those states hurrying to meet and counter the information age challenge to their communications systems.

The state imperative for security in communications, however, may also prove to be a disadvantage in states' dissemination of intelligence. The exigency of using only systems that are invulnerable to penetration means that state-sponsored military development of information technologies necessarily occurs at a slower rate than that of private companies that do not need to worry about impenetrability, nor about reliability under battle conditions.³⁷ Even if military production can keep up with commercial incentives for developing information technologies, the public sector will almost certainly require additional development time to insure its systems are secure both from

³⁵ Campen. The First Information War. p.51

³⁶ As is glaringly illustrated by the success of hackers' myriad attempts to break into the United States Department of Defense's computer systems. It is worth noting, however, that to date open sources still maintain that none of these attempts has actually constituted a strategic breach of the restricted-access computer systems where classified information is stored. Waller, Douglas. "Onward Cyber Soldiers." Time. Vol46, n8. 21 Aug 95. p.6 Cf. also "Security in Cyberspace III: the Threat." US Senate Permanent Subcommittee on Investigations, Minority Staff Statement, 5 June 1996. p.3

³⁷ See chapter four, 'Strategic Civilian Tools in IAW.' Munro. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." p.3

intentional intrusion and from unintentional flaws. As a result, states' military forces may all too often rely on out-of-date and even obsolete technologies to communicate intelligence. Meanwhile, as the following section details, non-state actors can increasingly find cutting-edge technology on the shelves of Radio Shack that can perform many of the same functions and, while this technology may not fulfil even minimum security requirements, it may nonetheless prove a worrying challenge to states' advantages in intelligence dissemination.

Weakening

This circumstance is, in fact, one of several instances in which states' long history of experience may not always be to their advantage. In certain cases, where lessons learned from long experience have become so entrenched that they inhibit useful, or even necessary change, experience might actually hinder states' development of the information age war form. As the previous section illustrated, when decision-makers employ the lessons of tradition and experience constructively, with a willingness to implement reasoned changes, states' history of involvement in warfare holds certain obvious advantages that may widen their role in information age war. However, if experience instead blinds leaders to the changes around them and serves more to provide an incontestable excuse for avoiding change, that same experience may in fact present more problems than it solves. This is particularly true where experience stands in the way of replacing hierarchical bureaucratic organisation with the more stream-lined and efficient network organisational form that is more appropriate to the information age. In intelligence as well as in other

components of the state's war machine, the continuation of such obsolete, but entrenched, practices carries the potential to weaken states' position in IAW by turning the state's own experience in war against it.

As if to emphasise the paradox inherent in the dual widening and weakening of the state's role in information age war, this negative potential of experience is openly evident within the realm of intelligence where, as just demonstrated, states may enjoy many of the greatest advantages available from long experience. While experience should grant states the advantage of knowing better what to do with their intelligence, that same experience could be detrimental to the extent that it makes bureaucratic systems reluctant to change their ways even in the face of fundamental shifts in the societies around them. In intelligence communities, this reluctance to oppose tradition has stood in the way of replacing hierarchical, bottom-up dissemination regimes with horizontally networked, pull-down systems that would be much more suitable for the current practice of intelligence.³⁸ This bureaucratic inertia has, until recently, prevented many state-run intelligence communities from revising the traditional pattern of "stovepiped" intelligence. This rigid, vertical system in which one division does all the collection, analysis, and dissemination of its particular type of intelligence, encourages neither integration nor cross-sharing of information.³⁹ As a consequence, the rapidly changing use of information in warfare has, since the Gulf War, begun outstripping the structures states have built to govern this use. These out-dated, inefficient structures, as anyone who has read this far may readily understand, are highly unsuitable for information

³⁸ Campen. The First Information War. p.84

age war and, if left unchanged, would only hinder states' efforts to develop the new war form.

This unwillingness to combine experience with innovation could potentially produce a similar bureaucratic inertia in many state apparatus, to much the same detrimental effect. Among the possible negative influences of entrenched experience, perhaps the most worrying is the contention by US Representative Newt Gingrich that governments as a whole actually have a disincentive to adopt some information age changes, particularly the more efficient network form of organisation. According to Gingrich, since governments usually establish a monopoly on the services they offer (e.g. public education, postal service, etc.), they are not driven by consumer demand. In the absence of the need to please customers, governments instead serve the interest of their employees. Employees, however, are notoriously opposed to change because of the danger it presents for job security.⁴⁰ Preferring the known of established practices over the uncertainty of new ideas, employees tend to form a vociferous lobby in favour of upholding tradition, regardless of the long-term consequences from such a course of action. In the face of such a traditionalist lobby, the over-sized, inefficient, cumbersome bureaucracy that has so long characterised state government is likely to lumber into the 21st century well behind private actors who have already embraced and adapted to the information age.

By slowing state decisions and action, the continuation of hierarchical bureaucracy in state government could prove a disadvantage in information age

³⁹ *ibid.*, p.81

war in its own right. The disincentive to adopt more efficient practices, however, will likely affect the state's role in IAW most directly through government's influence on the military. Since the military is consumer driven to the extent that it must produce a saleable product in the form of effective security, one might not expect it to suffer in the same way from the disincentive to change exhibited by government bureaucracy. However, the military (in the West, at least) is still controlled by the state and subject to its decisions, especially those regarding appropriations. Legislators hold a certain sway over state-run military forces through their control of defence budgets, and attendant influence on the pace and format of procurement. As a consequence of this influence, even an organisation like the US military - which is aggressively studying the options presented by information age war - at times suffers from the excessive inertia of its controlling bureaucracy.⁴¹ This inertia constitutes a potentially formidable obstacle in the path of state actors attempting to develop information age military capabilities.

Thus, where the state's experience in warfare becomes entrenched and fosters a disinclination to capitalise on the opportunities of information age change, this experience - and the bureaucratic inertia it breeds - may prove to be a significant factor behind the weakening of the state's role in information age war. However, certain factors beyond the control of the state may prove still more detrimental to that actor's historical advantage in making war. These are

⁴⁰ Gingrich, Newt. *To Renew America*. New York: Harper Collins Publishers, 1995. p.59

⁴¹ Cf. the current debate both in the US Congress and in the Pentagon over whether the military should concentrate on selected high-technology and high cost investments for the long term, or on a larger number of lower cost, more conventional systems for the near term.

factors that contribute to the potential widening of non-state actors' role in information age war. The strengthening of non-state actors' position in IAW could serve as a challenge to the state because the war form carries the potential to alter the balance of relative advantage between the two types of actors. During the reign of conventional industrialised warfare, this balance traditionally weighed in favour of states - with their characteristic advantages in size, resources, and established organisational infrastructure. As the next section will demonstrate, however, IAW may confer certain benefits on lesser- and non-state actors that allow these actors to challenge states' historically favourable position in the balance of military power. Consequently, the weakening of the state's role in information age war will likely occur not merely as a result of the state's own reluctance to adapt to the information age, but also (and perhaps more significantly) as a mirror reaction to the widening of non-state actors' role in the information age war form.

Lesser-state and Non-State Actors

Non-state actors have, of course, held a fairly prominent position in war during the industrial age and before it. From revolutionaries to resistance movements to guerrilla insurgents, military forces unconnected to any state have proved themselves fierce opponents in countless wars. The involvement of non-state actors in information age war therefore does not introduce a new actor to the stage of warfare. Rather, the information age war form may alter the answer to 'who will wage war?' by shifting the capacity of non-state actors to compete

Aftergood, Steven. "Monitoring Emerging Military Technologies." Federation of American

against states in this contest. Since non-state actors have historically been smaller and weaker (according to traditional measurements of power) than any entity invested with statehood, their ability to compete in warfare, and particularly in full-scale warfare, has commonly been considered to be marginal, especially by scholars of war if not by practitioners.⁴² Likewise, lesser-state actors, defined as those actors possessing less than a peer capability to compete against the military great powers, have by definition been viewed as minor, of not implausible challenges to the military capacity of states.⁴³ Any improvement that IAW introduces to lesser- and non-state actors' position in warfare could therefore be significant if it successfully induces a revision of this view.⁴⁴ In such a case, IAW's changes in the 'who' of warfare might spark real changes in the established understanding of war, thus finally fulfilling one of the criteria for paradigm shift even if they introduce only small, relative shifts in the actual mechanics of warmaking.

The marginalised position of lesser- and non-state actors in the scholarship on war has been based both on empirical and theoretical grounds. Empirically, both non-state actors and young, lesser- state actors have been restricted⁴⁵ from conventional military competition by limited manpower and

Scientists, Public Interest Report. vol48, n1; January/February 1995. p.23

⁴² Although history has often proved this assumption to be a naïve one, it persists - in part because it largely holds true with regard to the kind of pitched-battle warfare which state military planners tend to prefer, if not with regard to more indirect, low-intensity conflict.

⁴³ Matthews, Lloyd J. "State on State Approaches." and Schake, Kori N. "Beyond Russia and China: A Survey of Threat to US Security from Lesser States." In Matthews, Lloyd J., ed. Challenging the United States Symmetrically and Asymmetrically: Can America be Defeated? Carlisle, PA: US Arm War College Strategic Studies Institute Web page, July 1998. pp.244, 303

⁴⁴ Any profound weakening of non-state actors' role in information age war might also spark such a revision, if they prove to be a significant departure from the status quo.

⁴⁵ though not prohibited

other physical resources, lack of sufficient industrial bases, and problematic organisational structures. A significant number of these actors are, moreover, located in the developing world, and have further been impeded from competing in large-scale warfare by struggling economies and shallow institutional infrastructure. Theoretically, the field of war studies has also largely dismissed non-state actors, in particular, as inapplicable competitors in high-intensity warfare not only by virtue of their smaller size and typically inferior access to the resources for war, but also by virtue of the conventional wisdom that only sovereign state actors have the right to wage war.⁴⁶ As such, non-state actors have been considered to be outside states' monopoly on the 'legitimate' use of military force, and thus legally unable to wage war.⁴⁷

Information age war will by no means solve the problems that have led to the marginalisation of lesser- and non-state actors; it may, however, considerably alleviate the detrimental influence of these factors on non-states' position in warfare. From the non-linearity of information and the information-intensive power IAW projects, to its decoupling of the relationship between mass and power, to the cheap and easy access nature of the war form, to the *de facto* legitimacy conferred by evident military power,⁴⁸ information age warfare carries a significant potential to level the balance between the strong and weak. This levelling is the primary force behind the widening of lesser- and non-state

⁴⁶ As Martin Van Creveld points out, conflict that does not originate with a state has customarily been denied the name 'war.' Van Creveld, Martin. Nuclear Proliferation and the Future of Conflict. Free Press, 1993. p.1 also Howard. The Causes of Wars. p.34

⁴⁷ According to the 'international laws of war' which are discussed more extensively in chapter four.

⁴⁸ In the same way that force serves as the ultimate magistrate of the international system - settling quarrels by destroying opponents' capacity to resist to one's settlement - the

actors' role in information age war. In investigating the widening of non-states' role, however, one must not forget that facets of IAW may also weaken non-state actors' position. Just as in its relationship with state actors, information age war holds the paradoxical capacity both to ameliorate and to impair non-state actors' position in warfare. Only the balance between the two effects can finally determine how non-states' role in war may change in the information age.

Widening

Information age war's first contribution to the widening of non-state actors' role in war is its potential to decrease the "correlation between the size of an input and the size of the output."⁴⁹ Though war has always been unpredictable, information age war could foster a new non-linearity in the relationship between cause and effect.⁵⁰ The nature of this war form as a product of an *information* revolution contributes to the discrepancy between cause and effect in conflict as in information age society as a whole. As chapter four explains, information, which can be endlessly exchanged and reused without degrading its significance, is itself non-linear.⁵¹ Consequently, power, increasingly dependent on information, should also become more non-linear. Signs of this non-linearity are, in fact, already becoming evident in, for instance, the disproportionate influence of small changes in production practices (like the

credibility of non-state actors' access to information age military force may buy them recognition as rightful military actors.

⁴⁹ Toffler, Alvin and Heidi. *War and Anti-War: Making Sense of Today's Global Chaos*. Boston: Little Brown, 1993. p.331

⁵⁰ Garden, Timothy. *The Technology Trap*. London: Brassey's, 1989. p.5

⁵¹ See chapter four, 'Strategic Civilian Tools in IAW' and chapter five, 'Information Age Motivations for War.' Toffler and Toffler. *War and Anti-War*. p.194

introduction of CAD-CAM, for example) on a company's economic power; and in the increasingly obvious influence of a small bit of leaked information on a leader's political power.⁵²

Such changes in the proportions of inputs and outputs in information age power are strong indications that information age war, the definitive information age power struggle, will likely also be a highly non-linear contest. Many predictions about how IAW may be waged serve to strengthen expectations of information age war's non-linearity: for instance, the prognosis that large masses of artillery or aeroplanes may not be able to insure victory in IAW without the right leveraging of information, while a few skilled computer hackers might be able decapitate an enemy's radar system sufficiently to allow a handful of precision guided missiles to destroy crucial installations. These predictions, and others like them,⁵³ lay behind the belief that the information age war form will be characterised by the fact that "a small bit of the right information can provide an immense strategic or tactical advantage, [and] the denial of a small bit of information can have catastrophic effects."⁵⁴

Secondly, the effects of information age war's non-linearity and its interference with the traditional correlation between a large military and the

⁵² Consider, for example, the potentially disastrous effect of the news story that revealed that Representative Henry Hyde - Chairman of the US House of Representatives Judiciary Committee which was in charge of investigating President Clinton's marital indiscretions - had had his own extra-marital affair. What once would have been very personal information (in both Hyde's and Clinton's cases) raised calls for Hyde to step down from his post. Luckily for Hyde, the furore quieted before anyone listened to those calls. Had it been otherwise, this piece of information might have made a considerably deeper dent in Hyde's political power. Cf. Kurtz, Howard. "Report of Hyde Affair Stirs Anger; Judiciary Chairman Admits '60s Relationship But Calls Story 'Attempt To Intimidate Me.'" Washington Post. 17 Sept 1998. Page A15.

⁵³ See chapter three.

potential for victory⁵⁵ may be further multiplied by the fact that IAW is also predicted to sever the link between mass and military power. The information age war form's emphasis on efficiency - fast and precise action that is decisive especially because it wastes nothing in hitting the enemy where it is most likely to produce an intended effect - places a higher value on how one uses what one has than on how much one has. As discussed in chapter three, by allowing military forces to create their own advantages, the integration of high-quality information throughout the spectrum of military activities should far outweigh the benefits of simple numbers alone. While mass will of course remain necessary to deliver efficient force to its target, the force-multiplying effects of information may now put the levels of mass necessary to make an impact in information age war well within the limits of lesser-state and non-state actors' ability to obtain. In a conflict where a handful of precision-guided missiles might effectively wipe out an enemy's main command posts and principal air defences, and one well-timed computer virus might decapitate an opponent's power grids at a crucial moment in military operations, lack of size should no longer present the same disadvantage it did in conventional warfare.⁵⁶

Thirdly, the role of lesser-states and non-state actors in information age war is also likely to be strengthened by the cheap, easy access nature of IAW's weapons. So many of the military technologies used in information age war

⁵⁴ Take, for example, the confusion of Saddam Hussein's army after the US-led coalition crippled its command and control infrastructure in 1991. cf. Toffler, Alvin. "Perspective on Terrorism." p. M5

⁵⁵ This has never been a guaranteed, one-to-one relationship, though larger militaries have historically been more likely to win, especially when other factors (like morale, quality of doctrine, etc.) are relatively equal.

⁵⁶ Simon, Joel. "Netwar could make Mexico Ungovernable." Pacific News Service, 1995? p.4
Cohen, Eliot. "A Revolution in Warfare." Foreign Affairs. Vol75, n2: 37-54. p.53

overlap with information technologies in high demand on the civilian market that even small, poor states and groups can afford all but the most sophisticated tools of information age war.⁵⁷ Laptop computers, mobile phones, and computer network access are obvious and readily available accoutrements used by information age soldiers and civilians alike, but the procurability and affordability of IAW's tools does not end here. Primitive but effective guidance systems can be cobbled together from remote-controlled electrical toys, fairly sophisticated sensors may be obtained with home security systems, electronic countermeasures as simple but essential as flares and chaff can be found in local hardware stores, and even satellite imagery can now be purchased commercially at high levels of resolution.⁵⁸ All of these affordable and accessible tools may allow even the smallest and poorest of non-state actors at least to compete with the great states who dominate the international system, even if they cannot compete at quite the same level.

Fourthly, information age war may also relatively increase the leverage of historically marginalised elements by eroding one of the principal advantages left to the great powers: that of experience. As the preceding sections illustrate,

⁵⁷ Cf. Munro. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." Washington Post. 16 Jul 95. p.4 The Zapatista rebels in Mexico are an apt example of just such a "disadvantaged" group that has been able to create notable advantages through accessible information technology. Cf. chapter four, 'Strategic Civilian Tools in IAW' and chapter one, 'Man.' McGrew, Anthony G. "Military Technology and the Dynamics of Global Militarisation." Global Politics: Globalisation and the Nation-State. McGrew, Anthony G., Paul G. Lewis, et al., eds. Cambridge: Polity Press, 1992. p.100

⁵⁸ The United States government sells images commercially through Landsat, an organisation managed by NASA which boasts an archive of images back to 1972. As of 1998, Landsat offered images at resolutions of up to 30 metres, for prices starting from \$475. France's SPOT earth observation satellite was set up as a commercial enterprise in 1982 and, offering a historical database of images as well as current images at 10 meter resolution, the company grossed FFr 208 million in 1995. <http://www.spot.com> The Indian Remote Sensing Satellite enterprise offers interested buyers earth resolution of 12 meters, and Russia has

experience and tradition in warfare may be something of a double-edged sword in the information age. This chapter has already demonstrated that the negative influence of overly entrenched experience might markedly detract from experience's positive influence on efficiency. In addition, information age war may still further deplete the rewards of experience by actually nullifying states' benefits from certain kinds of experience, particularly those arising from states' head-start in developing the tools for war. Information age war may negate the utility of this head-start by introducing a largely new arsenal of weapons, tactics, and strategies to replace or transform much of the old. Since these innovations will in many cases supersede their predecessors, experienced military actors' stockpiles will do little to help these actors wage an information age war themselves, and little to help them fight an enemy waging information age war.

In the case of building their own IAW capability, experienced state actors will certainly retain important benefits from knowing how to write and revise doctrine, from understanding how to train soldiers effectively, from surviving trial and error lessons in weapons production, and from appreciating the effort necessary to mobilise a people for war. However, information age warfare should considerably diminish the usefulness of the doctrine, training, weapons stockpiles, and mobilisation plans themselves, because, while these industrial age military preparations will likely comprise a valuable foundation upon which to develop IAW capabilities, a significant number of them may be useful in waging information age war only after considerable revisions adapt

begun a move to market imagery at resolutions of up to two meters. London: International Centre for Security Analysis Worldwide web page.

them to information age military methods and these methods' emphasis on the decisiveness of efficiency.

By the same token, stockpiles of industrial age military tools and weapons should be of little benefit against an enemy who is waging information age war. Larger military powers that do not develop information age military capabilities may be unable to compete effectively in such a situation, since their old attritional arsenals are unlikely to function at the necessary pace. For this reason, an IAW attack should be most effectively rebuffed by an IAW defence. Consequently, if the United States, for instance, were to remain unequipped for information age war, it might be rendered as helpless under an information age offensive as, say, Ethiopia would be under a conventional offensive. Like the military technology revolution caused by the introduction of the Dreadnought at the turn of the century, the innovations of IAW will be new for everyone. The superpowers of the Cold War and the nascent militaries of the post-Cold War states must all learn new lessons in how to conduct war for the information age.⁵⁹

The industrial age military might that today's great powers have spent decades amassing should therefore grant the experienced state powers a relatively smaller advantage in information age war than it could confer in industrial age war, where the old tools and methods were more directly relevant. This turnover should aid lesser- and non-state actors' position in war to the extent that it at least partially clears the slate of military advantage: if stockpiles

⁵⁹ As discussed in the previous section, however, established military forces should enjoy significant advantages from their experience with other forms of war. Likewise, those who adopt IAW now should have an appreciable head start over late-comers.

figure less in widening states' military power, they will also figure less in weakening the military capacity of non-states. This blanking of the slate could reset the military balance in much the same way non-linearity and the decoupling of the mass-power link do, depleting the advantage of the large and the strong in favour of the new supremacy available from the information advantage.

Non-State Actors in Particular

The factors listed above will potentially widen any small actor's role in IAW, regardless of its sovereign status as a state or non-state actor. Several separate factors, however, may also widen the role of non-state actors without directly affecting that of their small, but sovereign cousins. These factors result mainly from information age shifts in the components of advantage and in the distribution of these components among states and non-state actors. Some of these factors - such as perquisites arising from typically less bureaucratic organisational patterns and from non-sovereign status - relate specifically to the character of non-state actors, and may grant privileges to these actors that are not available to state actors under their current format. Others among these separate factors - such as access to high-quality information - may widen non-states' role in IAW but not lesser-states' role, because they confer privileges on the former that are already held by state actors. While the distribution of such factors will not directly affect states (since state actors already enjoy the benefit of them), the more general dissemination of these privileges should contribute to the widened standing of non-state actors relative to that of state actors in information age war.

Among the factors separately influencing non-state actors' role in IAW, several relate to information age changes in effective organisational patterns. First, and most prominent, smaller, non-state actors may actually possess an advantage over large, bureaucratic state actors, in that the former are more suited to the pace of the information age. In particular, non-state actors tend much more than states to favour the networked organisational form which is uniquely suited to the leveraging of information power.⁶⁰ Indeed, many non-state actors - from businesses to drug cartels - have already adopted networkised organisation. Many have in fact done so for reasons independent of information age influences and unrelated to prospects of information age benefits.⁶¹ Although such groups have not instituted networkised organisation because of a conscious decision to exploit information technology's advantages in speed and accuracy, whether they realise it or not they have already begun to adapt their functions to the information age's imperative for efficiency. Their networked structure can enable them (like those non-state actors who have deliberately chosen networkisation in order to leverage information age benefits) to optimise effort by encouraging initiative and flexibility among the components of the organisation, while insuring coherent direction for the system as a whole.

Interestingly, even a non-state actor as far from the forefront of information age development as the Peruvian terrorist group Sendero Luminoso

⁶⁰ John Arquilla and David Ronfeldt. "Cyberwar is Coming!" Santa Monica, CA: RAND, 1992. Also in Comparative Strategy. vol12, 1993: 141-65. p.17

⁶¹ For instance, networked organisation is standard for many terrorist groups and international organised crime organisations, based on the hope that isolating components into relatively autonomous cells will limit damage if any are caught. This is obviously far from an information age reason for networkisation, but the utility of these non-state actors' headstart in networkised organisation remains. Cf. Wardlaw, Grant. Political Terrorism: Theory, Tactics, and Counter-Measures. Cambridge: Cambridge University Press, 1989. p.134.

can provide a useful example of such an efficient, networked enterprise established with no intention of exploiting information age advances, yet well structured for that very purpose. The terrorists have organised their lower-level cadres into cells that operate independently of, but in concert with, cells in other parts of the country. At the same time, a centralised leadership provides the dogma and the doctrine that integrates the cells' efforts to present a credible national threat.⁶² While Sendero Luminoso has exhibited no signs of developing a capacity for waging strategic information age war, it is noteworthy that, should the group decide to do so, it would require little restructuring. Regardless of their potential military strategic capabilities, however, the significance of Sendero Luminoso's example lies in the fact that networked non-state actors (including some comparatively technologically primitive groups) are already organised to develop the efficiency for optimising their efforts. This networked efficiency could prove a notable advantage to such non-state actors because it should enable them to operate at a tempo of which more bureaucratically organised states are not yet capable.

The information age rise of networked organisation may also widen non-state actors' role in IAW not by granting them advantages over states, but by granting them the same advantages as states. For instance, as discussed in chapter one,⁶³ the information revolution's popularisation of networks and their horizontal dispersion of information is predicted to erode the hierarchical structures established to regulate the flow of information. These information

⁶² Radu, Michael and Vladimir Tismaneanu. Latin American Revolutionaries: Groups, Goals, and Methods. Washington: Brassey's International Defense Publishers, 1990. p.331

⁶³ See chapter one, 'Man.'

hierarchies (from classification of sensitive information to monopolies on spies, satellites, and other tools for information collection) have for centuries allowed the state to maintain priority access to the informational tools of decision-making. The information revolution's explosion of information technologies, however, challenges this state priority access by rendering much information readily accessible by the public. Access to information from library catalogues to government proceedings has become infinitely faster and easier not only because much more has been openly published, but also because almost all of it is less difficult to find on the internet than it was in basement filing cabinets. As a result, keen web watchers might, in some instances, enjoy an availability of information not unlike that of national leaders.⁶⁴ This undermining of state prerogative could remove one of the key obstacles to non-state actors' achievement of a wider role in military affairs, as well as in political, economic, and social matters.

In addition, information technologies like computer networking and low-cost, high-capacity long-distance communications may widen the position of non-state actors by facilitating access to the tools not only for gathering information, but also for distributing it. Before the information revolution introduced the internet, e-mail, fax machines, and other inexpensive but effective communications technologies, the means for spreading information were, in closed societies, generally monopolised by states or, in open societies, by those with the money to purchase print or broadcasting space. With information age linking technologies, however, non-state actors can cheaply

⁶⁴ Bankes, Steve, and Carl Builder. "Seizing the Moment: Harnessing the Information

build a capacity to disseminate information - as well as to mobilise action and resources - which equals, if not surpasses (especially considering the superior efficiency of networked organisation), that of entrenched state bureaucracies.⁶⁵ For instance, the Zapatista insurgency in the Chiapas region of Mexico, thanks to the strategic broadcast of propaganda on the internet, raised global popular concern hugely disproportionate to the insurgents' capacity to reach the public through more traditional broadcast media. One observer even noted that the rebels enjoyed equal or better access to the Mexico City press reporting on the conflict than did Mexico's own government.⁶⁶ In an age where public opinion may acquire a heightened importance in influencing the course of war, this improved access to information distribution, like access to information itself, may prove a useful aid to non-state actors' position in information age war.

Three final factors, relating not to information age organisational patterns, but rather to the characteristic organisation of non-state actors, may also afford these groups a certain advantage in information age war. As established in chapter four, IAW is likely to increase the involvement of civilians in conflict, requiring states to extend their efforts to protect and shield their citizens.⁶⁷ However, most non-state actors have a largely amorphous constituency which is often not readily identifiable by borders or other physical signs. While almost all non-state actors do have a certain constituency of supporters to protect, in most cases that constituency should be so difficult to

Technologies." The Information Society. Vol8, 1992: 1-59. p.5

⁶⁵ See chapter one, 'Man.'

⁶⁶ Herrera. "New Information Technologies and the Future of State Security." p.16

⁶⁷ See chapter four, 'Civilians as Strategic Targets in IAW.'

identify that it is effectively untargetable by enemy military forces.⁶⁸ This untargetability could considerably lighten non-state actors' burden of protecting civilians. In comparison to state actors' greater imperative to protect their civilians, non-state actors' relative lack of obligation to physically safeguard a civilian population could prove a useful contribution towards the widening of non-state actors' role in IAW.

Secondly, few non-state actors are connected to the international system in the same way states are. They do not have the same treaties and conventions by which to abide, nor the same trading partners and alliances to take into consideration. Consequently, they may escape many of the constraints that prevent states from launching some of the nastier components of information age war, like the truly cataclysmic information infrastructure attacks designed to sow chaos among civilian populations in order to distract military forces. Hezbollah, for instance, would likely suffer less compunction against destroying a country's standing on the international financial market than would Syria, which would be vulnerable to the same chaos if its victim retaliates in kind.⁶⁹ If a state actor were to launch such an attack, it would be susceptible to the very anarchy it inflicts. Non-state actors, lacking not only an identifiable citizenry, but possibly also an identifiable information infrastructure, trade routes, transportation systems, and other likely targets, would be much harder to deter from such a course of action, because they are unlikely to suffer the same

⁶⁸ This may be more true if an enemy is seeking to target one's population *en masse*. If, on the other hand, he is willing to seek out individual supporters, camouflage or dispersion can be only a deterrent, not a true barrier to attack.

⁶⁹ Morton. "The Information Advantage." p.18

consequences. In this scenario, retaliation in kind is simply much more difficult to inflict on non-state actors.

Thirdly, the relatively dispersed nature of many non-state actors may widen their role in information age war by rendering them still more difficult to deter. Non-state actors often have no obviously defined territory, and never clearly delineated borders; some have no evident permanent capitals or population, and some have headquarters that may be not only far removed from their area of operations, but unreachable on neutral territory. Untethered as they are to remain within set borders, non-state actors' operations are often partially covert, and tend to be carried out by members who wear no uniform and blend easily with the surrounding populus.⁷⁰ Thus, not only are many non-state actors relatively unencumbered by the need to defend population, land, or infrastructure, but many may be difficult to find to attack in the first place.⁷¹ All three of these factors unique to non-state actors may provide them with valuable advantages in information age warfare.

The Widening Role of Lesser- and Non-state Actors: in Real Terms

When assessing the credibility of lesser- and non-state actors' widening role in information age war, it is vital to remember that even a small amount of information age expertise can make an appreciable difference in a small actor's ability to challenge a traditionally stronger opponent. Although a handful of ill-trained soldiers equipped with elaborate satellite information and a computerised command and control system will be no match for a fully

⁷⁰ Van Creveld. Nuclear Proliferation and the Future of Conflict. p.125

⁷¹ The fact that the information infrastructure attack element of IAW can be carried out by remote control adds further to the non-state actors' valuable capacity to strike anonymously.

information-reliant force, the addition of information leverage even on just a few isolated levels of military activity may be enough to allow lesser- and non-state actors to present a much greater threat than they might without information age techniques.

For one example, the 1992-3 US intervention in Somalia presents persuasive, if slightly hackneyed evidence of the fact that a little information used well can sometimes go a long way. Neither the Somalis' famed use of cellular telephones to co-ordinate their evasion of American search teams, nor the psychological blow represented by the potent image of an American soldier dragged through the streets of Mogadishu delivered a decisive Somali victory over the US peacekeepers. These information-reliant tactics did, however, effectively "up the ante," raising the cost of American victory beyond what the United States was willing to pay, and eventually contributing to the US' decision to withdraw without achieving their intended objective.⁷² Lesser- and non-state actors' capacity to create even this sort of small advantage through information age techniques may foreshadow the still greater widening of their position possible through full-scale information age war.

Two further examples of the empowerment available to non-state actors from even small incorporations of IAW's methods can also be found within the field of insurgency. Both the Chechen rebellion in the former Soviet Union and

⁷² The United States' decision to withdraw was, of course, heavily influenced by the fact that the US Congress was at the time also debating the highly charged issue of health care reform. Some argue that American peacekeepers' withdrawal from Somalia was heavily influenced by the fact that winning Congressional and popular support for both efforts would have required the investment of more political capital than the White House commanded at the time. This view attributes the peacekeepers' withdrawal from Somalia to the speculation that President Clinton decided his bargaining power would be better spent on the possibility of

the Zapatista insurgency in the Chiapas region of Mexico aptly illustrate the advantages available to non-state actors from adopting information age war, even if they can only do so piecemeal. However, when considering how these cases illustrate IAW's widening of non-state actors' role in war, one must take into account the fact that, despite the cardinal role of information in the two insurgencies, neither was a true information age war. Rather, both the Chechens' and Zapatistas use of information to aid their military activities represented a primitive form of half-developed IAW. Neither of these non-state actors possessed the level of information technology or connectivity to pursue a fully integrated information age war decided on the basis of relative efficiency. Likewise, neither Russia nor Mexico yet possessed the doctrine or (especially in the case of the latter) the means to employ truly information age technologies or methods in their counter-insurgency operations. One must therefore take the lessons of these two struggles in context, remembering that they may be only vague portents of what real information age war could hold in store for the empowerment of non-state actors.

The evidence from the Chechen and Zapatista insurgencies seems to indicate that IAW's empowerment of insurgents will primarily take two forms during the early days of the information age: information age tactics could either serve to augment the power of insurgencies that already possess considerable conventional military tools, or they could act as a proxy for traditional martial resources in insurgencies that do not otherwise have access to military power sufficient to bring attention to their cause.

Congressional approval for his health care bill. Feaver, Peter. "A New Theory of Civil

The conflict between the Russian military and Chechen insurgents provides an apt example of the former instance of information age war's empowerment of insurgent non-state actors. In this case, the Chechens had ample materiel to inflict significant physical damage on the Russians,⁷³ but they increased their effectiveness still more by leveraging information to optimise the utility of the resources they had. Ironically, though the Russian army was the successor to the first military force ever to formulate the concept of information-intensive warfighting,⁷⁴ their rebel opponents proved much more adept at exploiting information to create a military advantage. The Chechens used low-cost cellular telephones and Motorola radio phones to organise a serviceable communications network which helped them outmanoeuvre Russian troops (many of whom lacked even batteries for their radios), as well as co-ordinate terror operations for maximum shock impact.⁷⁵ The insurgents also amplified the damage inflicted physically by striking a psychological blow to Russia's image in the eyes of its fellow great powers. The same collection of telephones useful for tactical command and control also allowed the Chechens to maintain high access to the media, insuring immediate war coverage, preferably slanted to favour their cause. Moreover, in a quintessentially information age approach, the Chechens actually scripted many of their operations specifically for media

Military Relations." University of St Andrews Post-Graduate seminar, 14 Oct 97.

⁷³ By the November 1994 outbreak of the conflict, Chechens had already stolen "tens of thousands" of weapons from former Soviet army stockpiles - especially those cached in contested Chechen territory where at least 21 nuclear storage sites were unguarded during the conflict. Sunday Times. 10 Nov 96. in the RAND-St Andrews Terrorism Database. also Herrera. "New Information Technologies and the Future of State Security." p.19

⁷⁴ Freedman. Information Age War: Will Battle Ever Be Joined? p.7, inter alia, originally known to them as a 'reconnaissance strike complex.'

⁷⁵ Specter, Michael. "Strolling at Will, Chechen Rebels Mock Russians." New York Times. 2 Feb 1996: A12

impact, staging events like the discovery by tipped television newscasters of radioactive material in Moscow's Ismailovsky Park⁷⁶ to turn Russian President Boris Yeltsin's intent of making the conflict a propaganda victory into deliberate popular defeat.⁷⁷

On a far smaller scale of insurgency, the Zapatista rebels in the Chiapas region of Mexico have become a famous example of the power of information even in the absence of significant traditional military power. Armed with an antique collection of guns and an almost equal number of computer diskettes, the Zapatistas were able to affect the actions of the Mexican government beyond all proportion to their conventional military power.⁷⁸ In the quintessential example of the phenomenon that Arquilla and Ronfeldt have labelled "netwar,"⁷⁹ a handful of educated, computer-savvy members of the otherwise backward rebellion were able to supplement their small-time guerrilla activities with, in the words of one observer, "a computer-enabled global media campaign that, in the context of peasant rebellions, can only be described as bizarre."⁸⁰ Out-gunned and out-manned, the Zapatista leader known as "Subcommandante Marcos" staved off defeat by posting on the internet a series of eloquent messages that captured attention world-wide, and elicited support from hundreds of scattered individuals as well as peace-minded non-governmental

⁷⁶ Sanin, Grigori, and Aleksandr Zakharov. "Kontenyeriz Ismailovskogo Parka Blagopoluchno Evakuirovam." *Segodnya* 25 Nov 95. in the RAND-St Andrews Terrorism Database.

⁷⁷ Aftergood. "Monitoring Emerging Military Technologies." p.15, Herrera. "New Information Technologies and the Future of State Security." p.19

⁷⁸ Robberson, Tod. "Mexican Rebels Using A High-Tech Weapon; Internet Helps Rally Support." *Washington Post*. 20 Feb 95: A1

⁷⁹ Arquilla, John, and David Ronfeldt. "Cyberwar is Coming!" Santa Monica, CA: RAND, 1992. especially pp. 4-6 and Arquilla, John. *The Advent Of Netwar*. Santa Monica, CA: RAND, 1996.

⁸⁰ Herrera. "New Information Technologies and the Future of State Security." p.15

organisations as powerful as the Roman Catholic Church.⁸¹ This attention was put to action in classic netwar offensives like 'fax blitzes' designed to overload government communications networks as well as to persuade the government that the rebels had too much support to be crushed brutally in the face of such international scrutiny. And indeed, the international spotlight drawn by internet activism proved a primary factor in compelling the Mexican government to halt its campaign to quash the Zapatista rebels long enough to allow the international media into Chiapas to document whether the region's people had actually been subjected to state-ordered atrocities, thus providing a valuable delay for the rebels.⁸²

In both Chiapas and Chechnya - two conflicts widely separated by geography and by means, but alike in their quest for status as legitimate autonomous governments as in their recognition of the leverage available through information age technologies - the insurgents reaped far more of an advantage from information than did opposing government forces. The lopsidedness of this advantage derives principally from the fact that both of these examples involved sophisticated information technology new to non-state actors - especially such typically disadvantaged actors as insurgents - but well within even the late-industrial age capacity of state military forces. Both the Chechens and the Zapatistas were able to lessen the odds against them (if not quite to even those odds) through new access to information technologies, as well as levels of

⁸¹ Robberson. "Mexican Rebels Using A High-Tech Weapon; Internet Helps Rally Support." p.A1

⁸² Cleaver, Harry. "The Chiapas Uprising: The Future of Class Struggle in the New World Order." University of Texas web page. 1995. Simon, Joel. "Netwar could make Mexico Ungovernable." Pacific News Service, 1995. (Discusses David Ronfeldt's views on netwar

communication, previously monopolised by states.⁸³ Yet while much was new about the way these assets were utilised, the actual technologies employed by the rebels were not new to their opponents. Since the information technologies and techniques leveraged by the non-state actors in these two situations have long been available to states, the new benefits from their use fell unevenly only to the non-states who recently gained access to them.

For this reason too, one must take the lessons from the Chechen and Zapatista insurgencies as only preliminary signs of IAW's capacity to widen non-state actors' role in war. Further integration of information and information age military tactics, as well as greater access to even more sophisticated information technologies, promises to strengthen the position of non-state actors in war still more than the availability of half-formed IAW has done. Yet the states meeting such widened future challenges from non-state actors will likely also be equipped with more sophisticated technology, as well as with more highly information-integrated forces than those that met the Zapatistas, the Chechens, and even the Somalis on the battlefield. Here again the widening of each actor's position in war will be relative, and the ultimate distribution of advantage will depend on the balances between the actors and between the information age's paradoxical influences on them.

Weakening

Before one can assess this balance, however, it is necessary briefly to consider one last influence of information age war on who can wage war: the

in Mexico.) Watson, Russel, et al. "When Words are the Best Weapon. How Rebels use the Internet and Satellite TV." *Newsweek*. 27 Feb 95: 36-40. p.39

weakening of lesser- and non-state actors' role in warfare. Just as the widening of the lesser-state and non-state actor's role in information age war served to weaken that of the state, the weakening of non-states' position in war will likely result primarily from the widening of state actors' position in war. The previous pages have already introduced the factors behind the widening of the state's role, and have detailed how these factors may grant advantages to states that lie beyond the reach of non-state actors. With this in mind, it is finally possible to address the question of how information age war's paradoxical widening and weakening of state and non-state actors' positions in war may influence the balance of relative advantage between the two sets of actors, and thus the issue of who will wage war in the information age.

On Balance: Who Can Wage IAW?

Both state actors and lesser- and non-state actors are subject to the widening and weakening influences of information age war. Neither set of actors emerges as a clear winner or loser, and both are quite obviously capable of developing some form of information age military capacity. In order to answer the question 'who can wage IAW?' therefore, one must consider how information age war may impact the balance between these two sets of actors and their capabilities for war.

State actors begin from a position of relative advantage in warfare. The great state military powers, in particular, hold an obvious superiority over lesser- and non-state actors. These states are not only larger and better equipped

⁸³ Herrera. "New Information Technologies and the Future of State Security." p.15 Cf. also

with resources, manpower, and the institutions necessary to mobilise them, but most also enjoy the benefits of long experience in waging war. As this chapter has shown, these benefits include head-starts in developing the tools for war, established organisational infrastructures which aid the smooth running of the war machine and, perhaps most importantly, a legacy of trial-and-error lessons that should greatly facilitate states' efforts - from training, strategic planning, and the writing of doctrine to the streamlining of logistics practices, the production of intelligence and the implementation of operations - to build information age military capabilities. The fact that information age war may actually heighten the value of this experience could serve to widen the state's role in IAW quite considerably. Almost in counterbalance to this widening effect, however, state actors may see their role in information age war weakened to a very similar extent. The negative influence from overly entrenched experience, and from the widening of non-states' position in opposition to states might constrain state actors' position in war almost as much as their experience may expand it. The comparatively even influence of IAW's widening and weakening should therefore leave state actors in essentially the same position of military advantage relative to that which they enjoyed before the emergence of information age war.

Lesser- and non-state actors, on the other hand, begin from a position of disadvantage in warfare, relative to that of states. Smaller, younger, and often possessing fewer resources as well as less organisational infrastructure to mobilise them, these actors have suffered a distinct inferiority of odds in waging

full-scale war against states, especially in the mass-centred contests of industrial age warfare. Where lesser- and non-state actors have traditionally excelled, however, is in employing their military arts with cunning. Information age war seems poised to reward this, because it emphasises not what a military force has, but how, and particularly, how efficiently a force uses what it has. The new war form way widen the role of lesser- and non-state actors by rendering mass less decisive than efficiency. Non-state actors typically do not possess mass in any quantity rivalling that possessed by states; they can, however, at least potentially acquire a degree of efficiency sufficient to pose a credible information age challenge to traditionally dominant state actors. In some cases, non-state actors may also benefit further because their composition - be it networked and dispersed or merely small and flexible - may make them especially well-suited for exploiting the decisiveness of efficiency. These factors carry the potential to widen lesser- and non-state actors' role in warfare very considerably.

As in the case of states, non-state actors' role in information age war is of course subject to constraint by IAW's widening effects on the other set of actors. Two factors, however, should mitigate this weakening influence in the case of lesser- and non-state actors. First, non-state actors have always been hindered from peer involvement in full-scale warfare by the superiority of state actors' military capabilities. The continuation of this circumstance, therefore, will likely represent no great change in non-state actors' military disadvantage. Consequently IAW's weakening influences should diminish non-state actors' role in war significantly less than it does states' role. Secondly, considered individually, IAW's widening influences on state and non-state actors should be

on a fairly similar par.⁸⁴ The net effect of IAW's widening, however, should be measurably greater for the lesser- and non-state actors, because its weakening effects are less. The sum of the two influences should weigh noticeably in the favour of widening non-state actors' role in information age war, whereas in the case of state actors, the two influences may virtually cancel each other out.

Since IAW should widen non-state actors' role in war more than weaken it, non-state actors' position in war should accordingly improve relative to their previous position. Moreover, since information age war seems likely to widen lesser- and non-state actors' role in war more than that of state actors, IAW should also improve non-states' standing in warfare relative to state actors. This, then, is the significance of information age war's influence on who can wage war: it can potentially shift the balance of relative advantage between state and non-state actors.

However, it is essential to emphasise that the empowerment of lesser- and non-state actors resulting from this shift is indeed relative. Information age war's reliance on efficiency rather than mass may tilt the balance of relative military advantage in favour of lesser- and non-state actors, but it will by no means make non-states more powerful than states. Information age war should grant lesser- and non-state actors greater advantages in war than they have had, and greater advantages relative to states than any modern iteration of full-scale war has allowed, but the international supremacy of states' position in war should certainly remain intact for the near future at least. Information age war's shifting of the balance of relative advantage in war is worth noting, though,

⁸⁴ If anything, a greater balance of IAW's benefits would seem to accrue to non-state actors.

because its relative empowerment of lesser- and non-state actors in war may represent one of the greatest challenges to state actors' military supremacy since the establishment of the state system.⁸⁵

This challenge is, moreover, also well worth monitoring because lesser- and non- state actors are by many accounts the most likely, and most troublesome, threats facing the international system at the turn of the new millennium.⁸⁶ While these actors are unlikely to pose a grave threat to the military giants - particularly those who have developed their own sophisticated information age war capability - there is a consensus that their threat to international stability is much more imminent than any deriving from the great powers that uphold the status quo.⁸⁷ Many scholars recently have argued that, while the security threat to states from other states seems to be in decline, non-traditional threats from non-state actors like terrorists, organised crime rings, and drug traffickers are on the rise.⁸⁸ A similar, increasingly prevalent threat arises from the danger that conflicts internal to traditionally weaker lesser-state powers - particularly in those states undergoing developmental growing pains in

⁸⁵ The other most obvious challenge being of course the existence of Weapons of Mass Destruction (WMD) and the potential of their possession by non-state actors.

⁸⁶ Kraus, George F., Comdr., USN (Ret); Senior Fellow, SAIC. Interview with the author. 16 December 1996.; Everett, Dewindt, and McDade. "The Silicon Spear." p.10; "Security in Cyberspace III: the Threat." p.9; Bartlett, Holman, and Somes. "Force Planning, Military Revolutions, and the Tyranny of Technology." p.33

⁸⁷ Snow. Uncivil Wars. p.1, Cf. also Klare, Michael T., ed. Peace and World Security Studies: A Curriculum Guide. Boulder: Lynne Rienner Publishers, 1994. p.97

⁸⁸ cf. Matthews, Jessica. (from Foreign Affairs Jan/Feb 1997: 50-66) in Builder, Carl. "Toward a Theory of Aerospace Power for a More Disorderly World." RAND, Project Air Force Briefing, 5 February 1997. p.10. Martin van Creveld goes even further to assert that "the future belongs to wars fought by, and against, organisations that are not states." Van Creveld, Martin. "Air Power 2025." New Era Security. RAAF Air Power Studies Center, June 1996.

the third world,⁸⁹ or in the post-Communist states still fraught by the transition to open government and market economy⁹⁰ - will spill over to affect the stability of the international system in general.

The contemporary literature on peacekeeping and “operations other than war” (OOTW) is a clear indication that the danger from such non-traditional threats has already become a subject of some concern.⁹¹ Running the gambit from policing domestic borders for the purpose of warding off illegal drugs traffickers to establishing a military presence in a troubled state in order to secure stability there, military preparations for Operations Other Than War implicitly recognise the danger inherent in the possible escalation of the post-Cold War era’s prolific internal conflicts. Yet this threat may become still more pressing if the non-state actors and marginalised, troubled states behind the threat develop an information age warfighting capacity, with all its attendant potential to widen these actors’ role in war.⁹² With such a capacity in hand, lesser- and non-state actors could not only be the most likely threat, but also a still more dangerous threat. The heightened danger of the threat from non-state actors arises from the likelihood that IAW’s shifting of the net balance of military power will render these actors much more formidable opponents than

⁸⁹ Holsti. International Politics. p.8, Binnendijk, Hans, and Patrick Clawson. “New Strategic Priorities.” Washington Quarterly. Vol18, n2. 1995: 109-126. p.110

⁹⁰ Odom. America’s Military Revolution. p.14

⁹¹ E.g. David S. Alberts, ed. Operations Other Than War: the Technological Dimension. Washington, DC: National Defense University Press, 1995. Taw, Jennifer M. and J.E. Peters. Operations Other Than War: Implications for the US Army. Santa Monica, CA: RAND, 1995. Sortor, R.E. Army Forces for Operations Other Than War. Santa Monica, CA: RAND, 1997.

⁹² This possibility becomes all the more believable when one realises that many rogue states have already adopted many of the advances in information systems and computer connectivity sweeping the developed world, and several of these actors may have begun

they been in previous forms of war. While this empowerment will not enable lesser- and non-state actors to prevail invariably over states in information age war, the shift could very well render them less likely to lose.

Conclusion

The importance of information age war's shift in the balance of military advantage lies ultimately in the fact that the relative empowerment of lesser- and non-state actors, together with the likelihood and increasing credibility of the threat they pose, may finally earn these actors a recognised place among the *dramatis personae* of war. This recognition could hold particular significance in the case of non-state actors. As noted above, non-state actors have played a role in war as long as warfare itself has existed. From the British Redcoats fighting the American Revolutionaries to the German Occupation Forces plagued by the Maquis resistance in World War II to the Soviet soldiers facing the Afghani Mujahedin guerrillas during the 1980's, soldiers in the field have long been confronted with this fact. Scholars, strategists, and the laws of war, however, have typically discounted the legitimacy, credibility, and indeed the viability of this threat from military forces unaccredited by any state actor. In fact, as late as 1993, Martin Van Creveld maintained that the state "might be defined as the only organisation that, in the modern world, possesses the legal right to resort to organised violence."⁹³ The world has become so accustomed

actively courting the building blocks of an information age offensive military capability. Deutch. Senate Testimony. 25 Jun 96. p.2

⁹³ Van Creveld. Nuclear Proliferation and the Future of Conflict. p.1

to this perspective that it has habitually denied the title of 'war' to any conflict that does not originate with a state.⁹⁴

However, information age war, with its tilting of the balance of relative military advantage between state actors and lesser- and non-state actors, has the potential finally to change all of that. By empowering non-state actors more than previous war forms ever have, IAW could force the world to recognise these actors' real role in warfare by presenting it as a *fait accomplis*. If this is the case, information age war would truly change the conventional answer to the question 'who can wage war?' since that answer has so long been understood to exclude actors that are not states. Compelling the recognition of lesser- and non-state actors as viable competitors on the stage of full-scale war would, therefore, change the way the world understands war. With this, information age war's changes in who can wage war would at last succeed in fulfilling one of the criterion for paradigm shift.

One should note, however, that the significance of this fulfilment remains to some extent in question, primarily because IAW's shifts in who can wage war challenge the model for understanding war only with certain qualifications. The first of these qualifications is that information age war specifically contests only the section of the paradigm that explains who can wage conventional, full-scale warfare. Information age war is likely to introduce fewer, and less significant changes to the models for understanding war below this high-intensity level of war, in particular because the military paradigm has increasingly accommodated the fact that lesser- and non-state

⁹⁴ cf. the common insistence that Vietnam was just a 'conflict' - for the almost idiotic reason

actors have for centuries successfully waged war in other guises. Most notably, the proliferation of counter-insurgency doctrines among state military forces during the second half of the twentieth century is testimony to the growing recognition of lesser- and non-state actors' especial success with those forms of war (like, for instance, guerrilla insurgencies) which favour more low-intensity approaches to conflict. Conflicts such as that in Vietnam have virtually forced state militaries to recognise that these actors' small size and reduced access to resources has clearly not prohibited them from successful participation in forms of war that fall below the full-scale threshold. 'Smaller scale' war forms of this sort have brought belligerent non-state actors a greater measure of success because these lower intensity conflicts typically de-emphasise the need for mass quantities of men and material⁹⁵ - the very factors that have prevented lesser- and non-state actors from competing as peers in more higher intensity forms of war.

Information age war's significant shift in the 'who' of warfare, therefore, lies in the fact that the war form de-emphasises mass in high-intensity conflict as well as low-intensity conflict, and thus confers on lesser- and non-state actors a more equal opportunity to compete viably on both levels of warfighting. However, because IAW's de-emphasis of mass changes little of these actors' recognised position with regard to smaller scale warfare, in order to consider information age war's empowerment of lesser- and non-state actors as a departure from past practices, one must qualify the argument that IAW will alter

that the United States government never declared war.

who can wage war with the caveat that significant change in the 'who' of war occurs primarily on the level of full-scale warfare.

The second qualification constraining the fulfilment of this paradigm shift criterion is that, as suggested above, information age war's changes in who can wage war are likely to alter the understanding of war, but not necessarily the reality of war. As this chapter explains, scholars have traditionally discounted lesser- and non-state actors' capacity to wage war, either because of their status as non-sovereign actors, or because of their inability to accumulate the mass previously necessary to compete on a level with the great power states in war. In reality, however, these actors have not been so easily dismissed from the stage of war. Actors not internationally recognised as sovereign states have not only enjoyed considerable success in low-intensity conflicts (as noted above), but have, in fact, taken part in full-scale wars throughout the industrial age. Whether non-state actors have employed full-scale war against full-scale war, as in the US Civil War, or used low-intensity guerrilla tactics against high-intensity pitched battle tactics, as in the French Resistance to German occupation in World War II, or even waged insurgent warfare against counter-insurgent strategies, as in Vietnam and El Salvador, the soldiers fighting these lesser- and non-state actors have of necessity subscribed to a model of war which allowed that lesser- and non-state actors can indeed compete with great power states in warfare. The heightened ability of these actors to wage information age war, therefore, entails a greater departure from the scholarly understanding of warfare

⁹⁵ Such war forms often capitalise instead on cunning and guile, as well as on knowledge of the land and strength of will, which small- and non-state actors typically have in comparative abundance.

than from the reality of warfare. The purpose of a military paradigm, however, is explicitly to establish a common understanding of war; hence even though IAW's changes in the 'who' of war may in reality only be a matter of degree, in principle they constitute a noteworthy change from the behaviour predicted by the current paradigm of war.

The 'who' of information age war, then, does fulfil the fourth criterion for paradigm shift. However, it must be remembered that this fulfilment applies to only one out of the four criteria for military paradigm shift. With just one quarter of the criteria only partially met, even IAW's potentially profound shift in who can wage war cannot be said to signify the emergence of a new paradigm of warfare. This, then, leaves the question of just what sort of change the information age introduces to warfare for the last chapter.

CONCLUSION

This thesis set out to establish an understanding of information age war and how it may change warfare. More specifically, this study originally intended to prove that information age war constitutes a paradigm shift of war. In an attempt to present a more rigorous examination of the information age's paradigm shift question than those previously available, the investigation detailed in these pages has combined current literature on information warfare studies with readings from the canons of international relations theory, the conventional laws of war, war causality, military strategy and doctrine, and military history. The study situated information age war within the context of the information age, and argued that this age's profound - if paradoxical - influences on society, along with their parallels to the circumstances behind previous military paradigm shifts, are evidence of information age war's potential to introduce a new paradigm of warfare. The more detailed examination of this proposal which followed, however, illustrated that, despite these indications of IAW's potential for paradigm shift, information age war is unlikely to fulfil that potential. The information age war form will certainly bring significant and important changes for the future of war, but these innovations should not actually challenge the conventional understanding of warfare to the point of requiring a new model for explaining the phenomenon of armed conflict. This concluding chapter briefly reviews the evidence that led to that conclusion, and examines its implications for the current understanding of war, and indeed for the way the world is affected by war. Lastly, the chapter

will propose areas where further research is needed in order to understand the implications of information age war more fully.

Not a Paradigm Shift

Of the four criteria identified in this thesis as the most salient barometers of military paradigm shift, information age war has failed to fulfil all but one. As chapters three through six argued, information age war's noteworthy changes in the how, what, and why of warfare do not constitute evidence of a new military paradigm because, by and large, they comply with the principles that have traditionally governed the understanding of warfare. These chapters illustrate clearly that IAW confounds all claims of paradigm shift because the changes it introduces adhere closely enough to the established paradigm to allow one to recognise the principles under which these innovations fall.

For instance, one can perceive Sun Tzu's axiom on the importance of maximising effort - "In planning, never a useless move; in strategy, no step taken in vain."¹ - in information age war's particular emphasis on the decisiveness of speedy, accurate efficiency. IAW's changes in how war is waged may in fact bring this old ideal closer to reality. One might just as easily recognise the industrial age practice of targeting civilians proportionate to their contribution to the war effort - or even the older, Grotian dictate allowing the targeting of civilians where it is both strategically expedient and unavoidable - in the civilianisation of IAW's tools and targets. This information age blurring of the civil/military distinction actually continues a trend which has waned and waxed throughout the history of war. Similarly, the long-held idea that war is

waged most fundamentally because its violent force is the final arbiter of disputes is still readily evident among the reasons for waging information age war, as are many historical motivations for war - from religion to nationalism to power. Just as the how and what - the means and targets - of war remain essentially unchanged by IAW, the reasons why people choose to wage war in the information age should continue to be on the most basic levels the same.

The who of information age war, on the other hand, may be a somewhat exceptional case. Chapter six's investigation into information age war's changes in who can wage war reveals that the new war form is likely to present one significant challenge to the current military paradigm. The chapter demonstrates that information age war may introduce its most profound changes to war by shifting the balance of relative military power to favour lesser- and non-state actors. This re-balancing should empower lesser- and non-state actors both relative to their previous standing in war, and to their previous position in relation to state actors. Although states will in all likelihood emerge from this shift still as the more powerful actors in war, this relative empowerment of non-state actors represents a potentially significant challenge to the traditional superiority of state actors, as well as an important shift in the conventional understanding of who can wage war.

At the same time, chapter six notes, IAW's empowerment of lesser- and non-state actors represents a challenge to the established paradigm only under certain conditions. First, the empowerment of non-state actors only really contradicts the paradigm on the level of full-scale war, because these actors

¹ Sun Tzu. The Art of War. Griffith, Samuel B., trans. London: Oxford University Press, 1963.

have long played a significant role in smaller-scale, more low-intensity conflicts. Secondly, the increased role of non-state actors defies the military paradigm only when that construct is interpreted strictly to refer merely to the *understanding* of war. Non-state actors' capacity to compete in information age war runs counter to the paradigm in the sense that the conventional understanding considers states to be the only actors rightfully entitled to wage war. According to this maxim, non-state actors are disqualified from rightful competition in armed conflict. However, the view that sovereign state actors hold a monopoly on the legitimate waging of war is neither a true principle of war, nor a reality of warfare. In combination with the fact that information age war failed to satisfy the first three barometers of military paradigm shift, these two constraints on IAW's fulfilment of the fourth paradigm shift criterion demonstrate persuasively that information age war does not constitute a new paradigm for warfare.

What Then?

Having fulfilled the fourth criterion of paradigm shift only with qualifications, and failing the first three criteria outright, information age war clearly does not meet the requirements for the establishment of a new paradigm of war. Yet despite the fact that IAW's changes to warfare are not sufficiently fundamental to require a new paradigm for understanding this phenomenon, the changes it is predicted to introduce should still almost certainly be far-reaching and highly significant. From efficiency's replacement of mass as the decisive component of military combat, to the increasing military importance of civilians

and civilian targets, to the relative empowerment of lesser- and non-state actors, if the potential shifts identified by this study occur as expected, information age war could alter the conduct of warfare substantially. These changes may not require a new paradigm to understand warfare but, as the current debate over information warfare attests, they would assuredly challenge many long-held assumptions about war. Yet if such shifts cannot be called paradigmatic, then one must ask, what kind of change does information age war bring to warfare?

To begin with, IAW should alter warfare at least as significantly as any military revolution. Chapter two argued that, like military revolutions, the information age war form is projected to serve as a force multiplier and a surprise advantage, as well as an augmentation of destructive power and cost-effectiveness. Moreover, militaries preparing information age war capacities have already begun to introduce not only new weapons, but new doctrines, strategies, and organisational patterns - the very innovations which are the hallmark of revolutions in military affairs. These are fairly clear indications that the emergence of information age war will revolutionise warfare at least as much as the innovations which accompanied war's first encounters with gunpowder, with railroads, rifles and telegrams, and with machine guns, radios, and tanks, among many other inventions that have transformed the face of warfare.

Military revolutions, however, typically alter only war itself. True, their changes do affect all aspects of war - from planning and training to organisation, logistics, tactics, strategy, mobilisation, and implementation - but, despite the importance of these changes to the soldiers who must adapt to them, simple

military revolutions rarely affect any aspect of war's relationship to society.² Information age war, on the other hand, seems likely to affect the context of warfare much more broadly, as the next section will examine in greater detail. Suffice it to say here that the new war form's projected empowerment of lesser- and non-state actors, its civilianisation of warfare, and its shifts in the reasons and motivations for war have the potential to bring changes not only to war itself, but also to many of the other elements of society that are affected by that phenomenon. IAW's impact promises to touch not just the soldiers who wage war, but also the political actors who employ war to achieve their aims, the civilians caught in the middle of wars, and even the international system whose stability is governed by the prevalence and danger of the wars occurring within it. The far-reaching possibilities of these effects imply that information age war may alter warfare not only on the scale of a military revolution, but on a considerably larger scale as well.

Information age war therefore constitutes a change less than that of a paradigm shift, yet greater than that of a military revolution. This leaves one with the conclusion that IAW's effect on war must lie somewhere in between. Perhaps fittingly - or ironically - this thesis maintains that the framework of the paradigm shift investigation itself best illuminates where between these two kinds of military change information age war actually falls. In establishing this framework, the introduction to this thesis notes that the current dissension over information age war does not necessarily indicate that a paradigm shift is

² The one important exception is, of course, that military revolutions frequently influence the outcomes of the wars that leverage their innovative methods, which can indirectly affect the societies that wage such wars.

imminent. Rather, this discord more accurately signifies that there is currently no accepted model, either old or new, that adequately accounts for information age war. Arriving at such a model, it was argued, would entail *either* the introduction of a new paradigm, which this thesis has already discounted, or the reinterpretation of the current paradigm to accommodate the pattern of warfare in the information age. Following this framework, then, the changes IAW may introduce to warfare do not require the world to throw out the old paradigms for understanding war in favour of new models, but rather to reinterpret these paradigms in order to achieve new explanations of war according to both the old principles and the new conditions governing warfare.

This reinterpretation should generally follow the same pattern that a paradigm shift would, adapting the established model to changes in the how, what, why, and who of warfare. Unlike a paradigm shift, however, the reinterpretation of the paradigm for war does not entail writing new principles of warfare, but instead requires translating the established principles to accommodate the new circumstances to which they apply. This reconciliation of war's principles to information age war's changes should, for the most part, be fairly straightforward, since IAW fails to fulfil its claims to the title of paradigm shift precisely because it constitutes no real challenge to the principles of war. That reconciliation will, however, be in some cases more easily accomplished than in others.

Of the former, information age war's predicted changes in the 'how' and 'what' of warfare fall should most closely to the old interpretation of the military paradigm. Indeed, as stated above, these shifts adhere closely to the

established principles, if not in exactly the way military thinkers have previously understood these principles. For instance, Sun Tzu's emphasis on winning by cunning, on knowledge of enemy and friendly troops alike, and on the importance of intelligence³ might have foreshadowed information's cardinal role of creating advantage in information age war. That same legendary strategist, had he known the capabilities of information age technologies, might also have predicted the decisive role which efficiency may play in information age war with his cautions that no military action should be wasted and no step taken in vain.⁴

Similarly, the precepts contained within the codex of the laws of war - such as the medieval principle of double effect or the Grotian axiom that civilians could be attacked only for purposes of retaliation or punishment of "obstinate resistance"⁵ - easily accommodate the information age's blurring of the civil/military distinction. These laws have long allowed for the targeting of civilians where such action is vital to military operations. Even if they did not, the practices of industrial age warfare would have required the targeting of civilians to be incorporated into the military paradigm well before the

³ On cunning, cf. "War is based on deception." and, "For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill." and "those skilled in war subdue the enemy without battle. They capture his cities without assaulting them and overthrow his state without protracted operations." On knowledge of one's own and one's enemy's forces cf. "He who knows when he can fight and when he cannot will be victorious." and "Probe him and learn where his strength is abundant and where deficient." and of course, "Know the enemy, know yourself, in one hundred battles you will never be in peril." On intelligence, "the reason the enlightened prince and the wise general conquer the enemy... is foreknowledge." and "Secret [intelligence] operations are essential in war; upon them the army relies to make its every move." Sun Tzu. *The Art of War*. pp. 106, 77,79,82, 100, 84, 144, and 149 respectively.

⁴ See also above. Sun Tzu. *The Art of War*. p.87.

⁵ For further discussion of Grotian justifications for just war, see chapter four, 'Following Historical Precedent.' Grotius. *De Juri Belli ac Pacis*. Campbell, A.C., trans. Washington: M. Walter Dunne, Publisher, 1901. p.363

information revolution was ever conceived of. As chapter four notes, industrial age war set a dangerous precedent for IAW's civilianisation by instituting a practice of targeting civilians in proportion to their contribution to the war machine.⁶ Since the importance of civilian contributions to warfare is predicted to increase considerably as a result of the information age's influences, one might construe this rule of action as almost mandating the civilianisation of warfare in the information age.

The principles governing the 'why' of warfare, on the other hand, can be classed neither as strictly easy nor as strictly difficult to reinterpret for information age, because they are likely to be both. In certain cases, the 'why' of IAW will present no challenge at all to the current understanding of war. Notably, commanders will likely base the choice to wage the information age war form on the same considerations that have always dictated which military tools and strategies would be employed in a conflict: like all forms of war, IAW will be waged fundamentally because it represents a certain extreme of violence and because, as such, it should constitute the final arbiter of disputes which cannot be otherwise resolved. The war form will also conform closely to current models of warfare in respect to the primary goals for which it will likely be waged. Whether they employ information age methods or not, wars in the near future will undoubtedly continue to be motivated by religion, by nationalism, by the quests for power and wealth, and by the ubiquitous desire for freedom and autonomy, among other time-honoured war aims. As noted

⁶ Or so it was justified. See chapter four, 'Following Historical Precedent.'

above, these should for the most part remain unchanged by information age influences.

The task of reinterpreting the 'why' of information age war is likely, however, to encounter greater difficulties in attempting to reconcile IAW's changes in the cost-benefit equations of war to the current paradigm. These calculations influence why actors choose to resort to war, rather than some other solution, to settle their disputes. This choice has usually been governed by the axiom that an actor will resort to war when he concludes that the projected benefits from going to war outweigh the projected costs of the war.⁷ While information age war is unlikely to change this axiom itself, the war form's shifts in the how and who of warfare may alter how the axiom applies to the why of war in the information age. Firstly, IAW's precision and cost-effectiveness could potentially render war less costly in terms of men, in treasure, and perhaps also in political repercussions⁸ - a shift which could very well alter popular perceptions of war's costs. Secondly, IAW may further alter these perceptions by adding new actors to the cast of those able to wage full-scale war, actors who may have new and different valuations for war's costs and benefits. Neither of these changes is likely to be drastic, or even noticeable to the casual observer, but because they effect the calculations which influence decisions to go to war, these factors together could challenge current assumptions about the cost-benefit

⁷ See chapter five, 'Why Wage War.' Howard, Michael. The Causes of Wars, and Other Essays. Cambridge, MA: Harvard University Press, 1983. p.22, Cf. also Blainey. The Causes of War. p. 119, Liddell Hart. Thoughts On War. p.43, and Brodie. War and Politics. p.3,6

⁸ Cf. chapter five, 'First Order Reasons for Waging IAW.' Both the domestic and international political repercussions of waging war may be reduced in the case of IAW if, as predicted, the warform requires less tax money and fewer troop casualties than other forms of war, as well as less collateral damage to the enemy's civilian population.

axiom and its applicability to predicting and understanding the incidence of war. This may require difficult alterations in the current models for predicting who can, and will, wage war.

Reinterpreting the current military paradigm to accommodate information age war can be expected to be most difficult, however, in dealing with the one criterion which comes closest to fulfilling the requirements for paradigm shift, IAW's changes in who can wage war. Over the course of the westphalian state-system's existence, the assumption that states are the primary, if not the only legitimate actors in full-scale war has increasingly become implicit, and in some instances explicit, throughout the literature on warfare. Testimony that this belief has become entrenched despite empirical evidence (from successful civil wars, insurgencies, and resistance movements) to the contrary, is readily found in statements like Howard's "the state has by definition a legitimate monopoly on the use of ... armed force,"⁹ Weber's "a state is a human community that (successfully) claims the monopoly of the legitimate use of physical force [i.e. war],"¹⁰ and Van Creveld's 'the Treaty of Westphalia in the year "1648 marked the beginning of a 300-year period in which the dominant form of organisation under whose banners people went to war and were supposed to go to war was the state."¹¹ Since history itself has contradicted such sentiments more than once, the idea that the state holds a monopoly on the legitimate use of war may not deserve to be called a fundamental principle of war. It is, however, certainly a widely held perception,

⁹ Howard. The Causes of Wars. p.34

¹⁰ Weber in Brown, Seyom. The Causes and Prevention of War. New York: St Martin's Press, 1994. p.40

and one which holds a notable influence over the current interpretation of the paradigm for war. The information age reinterpretation of that paradigm must therefore account for the likelihood that IAW's widening and weakening of the roles of states and lesser- and non-state actors may invalidate this assumption by conferring a greater net advantage from IAW to the latter than to the former. This invalidation should necessitate a reinterpretation of the paradigm which finally reconciles the popular understanding of war with the fact that neither an actor's lack of sovereignty, nor, especially in this age, its lack of size or resources, precludes its viable and legitimate participation in war on any scale.

Implications

The investigation of information age war's claims to the title of paradigm shift began with an inquiry into the information age changes in the context of war, and what these might foretell about coming changes in warfare. The introductory chapter noted that such contextual changes often may not only presage paradigmatic shifts in war, but also result from those shifts.¹² Yet, since this study has shown that information age war is in fact not a paradigm shift, one can infer that the war form will not influence its context as profoundly as such shifts have done, but will instead leave the role of war in society and in the international system for the most part intact. One should not assume, however, that the information age's changes in warfare hold no implications for the individuals, groups, and states who wage war, or for the system within which it is waged. On the contrary, as previously argued, the information age war form

¹²Van Creveld. Nuclear Proliferation and the Future of Conflict. p.10

should be understood to constitute a reinterpretation of the military paradigm (rather than a less pervasive change like, for example, a military revolution) precisely because it has a noticeable potential to affect not only the content, but also the context of war in the information age.

Information age war's primary implications for its context will likely follow a similar pattern to that identified in chapters one and six, affecting most noticeably the positions of individuals¹³ and states in the information age. These two sets of actors should face the same paradoxical widening and weakening that influences their positions both in information age society in general, and in the waging of war. Of the two actors, individuals seem to face a more pronounced impact from information age war. These actors will potentially be most obviously weakened by the civilianisation which may shift what war is waged at in the information age. The increased emphasis which that shift would place on targeting civilian information and information systems is likely to draw individuals further into war, placing them in even greater jeopardy from it.

This danger arises not only from the possibility that military forces will deliberately target civilians as audiences for propaganda and target civilian information infrastructures as accessories to the war effort, but also from the potentiality that IAW will have no front-line, and hence no sanctuary behind that line. IAW's trade in information, its precise, long-distance stand-off weaponry, and its tactical emphasis on dispersion and deception are likely to

¹² See the 'Interplay of Context and Content' section in the introduction.

¹³ A category which, as chapter one explains, can often be understood to include non-sovereign groups.

render the battlefield borderless, indistinct, and perhaps even difficult to identify. Moreover, information age war's potential to encourage strikes against critical information infrastructure may foster an especially dangerous extension of the battlefield into traditionally civilian space. Civilian information infrastructures will present a tempting target for information age opponents if, as expected, they offer efficient, cost-effective, and relatively easy means to facilitate the success of military attacks.¹⁴ Yet such strikes may constitute an intrusion of the 'home front' that is not only more disruptive, more direct, and more pervasive than any previous form of 'deep' offensive, but also (because infrastructures can be both anonymous and untraceable) more difficult to limit. All of these factors may significantly magnify the danger to non-combatants in war, because they could render the principle of civilian immunity in war increasingly tempting to ignore, as well as increasingly difficult to uphold.¹⁵

The set of individual and small group actors also faces the greatest potential for a widening of their role as a result of information age war. This widening would principally result from the likelihood that IAW will make warfare more readily usable by smaller actors. As described in chapter six, information age war's reliance on information-based efficiency largely removes size from the equation for military power. While true IAW requires a standard of co-ordination well beyond the capacity of a single individual or even a

¹⁴ Such as a hack attack which decapitates radar systems just as an air strike is launched, as noted previously. See chapter four, 'Civilians as Strategic Targets' and chapter two, 'IAW as Military Revolution.'

¹⁵ Some argue that IAW's potential for precise, surgical strikes should make it easier for military forces to observe the laws of civilian immunity but, as chapter four argues, many actors will have no intention of making use of that potential for such an end. See chapter four, 'Converging Trends.'

handful of individuals,¹⁶ information age war's de-emphasis of size may put a noteworthy measure of information age military capacity in the hands of larger groups of individuals and non-state actors. The comparative success of the smaller actors employing nascent IAW tactics in the Chechen and Zapatista conflicts hinted at this empowerment and provided a tantalising foreshadowing of what might become one of information age war's most influential implications for its context.

On the state level of analysis, information age war's implications follow the same paradoxical widening and weakening pattern, though the impact of these contradictory influences is perhaps less pronounced here than it is on the individual level of analysis. The most obvious weakening of the state's role arises from IAW's widening effect on that institution's closest rival for influence in the anarchical system: namely, the war form's potential to empower lesser- and non-state actors with a greater military capacity relative not only to the latter's previous position, but relative to the position of state actors as well. By granting lesser- and non-state actors greater military leverage against states than they have previously had, this empowerment could narrow the gap in military standing between states and non-state actors, and jeopardise states' accustomed supremacy in the waging of war. Moreover, to the extent that

¹⁶ Some members of the more narrow school of IW assert that an actor could launch a formidable information infrastructure attack with just a handful of hackers supplied with some pizza and a few cokes, but such an attack alone does not constitute an information age war. Winn Schwartau, for instance claimed the cost of such an attack should range around \$100 million, a pittance compared to conventional military force projections. Another member of the narrow school posited this cost could be even smaller, estimating it at closer to \$1 million. Devost, Matthew G. National Security In The Information Age. Washington, DC: Terrorism & Information Warfare Web page, May 1995. p. 18. Cf. Singer, Abe, and Scott Rowell. Information Warfare: An Old Operational Concept With New Implications. Washington, DC: National Defense University World Wide Web page, December 1996.

military power brings a voice in international affairs, this empowerment of lesser- and non-state actors might perhaps also weaken the privileged position of states in the international system as well.

Information age war's implications for individuals also lie behind a second factor that may weaken states in the information age. Somewhat incongruously, however, in this case state actors may be constrained by a factor which also weakens the position of individual actors. This factor is the predicted civilianisation of information age war and the heightened danger it would bring to individuals. By increasing states' difficulty in fulfilling their obligation to protect their citizens, this civilianisation may prove as much a threat to the authority of the state as it is to the safety of the individuals the state must protect. The consequent weakening effect civilianisation could have on the state may not at first seem to be an implication that is particularly unique to information age war, since military opponents have long targeted civilians in attempts to distract state military forces from war. However, if, as projected, information age war presents even higher incentives for targeting non-combatants in war, the greater effort required for states to protect them adequately could prove an important detraction from states' capacity to wage war effectively in the information age.

The greatest potential widening state actors can expect from information age war is likely to arise primarily from the new warform's potential to alter the utility of war; that is, the feasibility of using war as a means to some political ends. Firstly, the heightened emphasis which IAW places on experience (where it is employed wisely in reasoned decision-making) should widen state actors'

positions by raising the value of states' longer experience with war, and thus adding to states' faculty to achieve their ends through military means.¹⁷

Secondly, IAW may widen states' positions by rendering war more useful as a means to political ends. As discussed above, the fact that information age war should theoretically be cheaper, in lives lost and in taxes spent, may render it a more politically acceptable solution to intractable international disputes within the context of both domestic and international politics. The relatively low projected cost of IAW holds an obvious appeal for decision-makers concerned with domestic politics and its attendant preoccupations with national morale and the economic price-tag of war. In addition, by decreasing the possibility of alienating allies with diplomatically untenable military actions, IAW's potential for surgical strikes and lower collateral damage in enemy territory may also make the war form more politically acceptable in the international arena. Consider, for example, the fact that the United States' August 1998 bombings of weapons facilities in Sudan and Afghanistan raised a relatively small outcry from the international community. An industrial era bombing - which would have had to destroy much of a city in order to accomplish the same objective of incapacitating the chemical factories that were the target of this strike - would likely have caused a much greater furore among the US' opponents and allies alike.

These signs that information age war may increase the usability of warfare also hint at one of information age war's most potentially far-reaching

¹⁷ This study predicts that states will enjoy less of a net widening in their military role than non-states. However, because they are beginning from a position of relative superiority, state

implications for the international system within which individuals and states wage war. This is the theoretical possibility that the less costly, more politically acceptable information age war form could heighten the incidence of war in the system. If IAW makes the waging of war more attractive as a solution to the many extra-legal disputes in the anarchical international system, one might reasonably expect that there may be more war in the information age. This conclusion seems to be further supported by the likelihood that the information age will render more actors capable of waging full-scale war, a potentiality which could significantly challenge the stability of the international system by adding to the uncertainty within that system. One should remember, however, that such projections remain highly theoretical (in no small part because, failing the occurrence of a true information age war, reliable empirical evidence is in short supply) and that some theorists in fact make precisely the opposite prediction, that increases in the number of viable military actors could actually add to the stability of the international system.¹⁸ Hence those who study information age war and its implications can at this point only study the possibility of an information age increase in the incidence of war, and thereby attempt to come to terms with the potential consequences of such a shift.

Information age war's second conspicuous influence on the international system is similarly uncertain and difficult to predict. This is the potentiality that IAW's empowerment of lesser- and non-state actors will not only endanger states' traditional military supremacy, but will also challenge perhaps even the

actors should still enjoy a noteworthy enhancement of their abilities to wage war as a result of information age influences.

composition of the international system as a predominantly state-based institution. Of course, according to the Pluralist school of international relations theory this state-based view of international relations has been growing increasingly anachronistic since long before the information revolution. This is certainly true to an extent: non-state actors from multi-national corporations to trans-national security alliances to sub-national terrorists have already gained much of their increasingly prominent voice in global affairs independently of the information age and its influences. As chapter one explains, however, the connectivity of information technologies clearly ameliorates the efforts of such actors to build a more global presence.¹⁹ For its part, information age war's primary implication for this trend and its influence on the international system lies in the possibility that the war form's accessibility to non-state actors may magnify the trend by granting these smaller, non-sovereign actors the physical power to back up the voice they are already building in international affairs with military force. In allowing these actors access to the final arbiter of political affairs in the anarchical system, IAW's empowerment of non-states may have a significant widening effect on their role in the international system, and a consequent weakening effect on that of the state. This empowerment, when considered in combination with the already growing influence of non-state actors, may introduce information age war's most profound impact on the context within which it is waged: the hastening of the end to state actors'

¹⁸ Levy. "The Causes of War: A Review of Theories and Evidence." p.214, 234. See also chapter five, note 115, 'Information Age Motivations for War.'

¹⁹ See chapter six's section on 'Widening' under the heading 'Small State and Non-State Actors.'

monopoly over the workings of the international system which governs the order of war's context in the present age.

Future Directions

Having established what kind of change information age war should bring to warfare, and identified some of its most salient potential implications, the field of information warfare should ideally be able to move onto developing and deepening the understanding of the information age war form and, particularly, its implications for war and for those touched by war. Several steps, however, must be taken before the field can progress beyond its current preoccupations.

First, and most importantly, the field of information warfare studies as a whole must establish a recognised consensus on what war in the information age is. This thesis has proposed one such definition of IAW; one which, as argued in chapter one, carries the benefits of defining the relationship between information and war within much more distinct and explicit parameters than those offered by other available definitions. This factor distinguishes the definition offered here as one well-suited for identifying how information age war differs from other forms of war. Other definitions offered by the military and by prominent members of IW's wide school, however, have become well entrenched, and will be difficult to depose despite their inability adequately to explain war in the information age and foster a consensus in support of that explanation.

If the members of the information warfare field can ever hope to reach a realistic consensus on what they study, however, they will need not only one more usable definition, but two. Those who study the relationship between information and warfare are unlikely ever to agree until they agree to disagree; that is, until they recognise that they are talking about two different phenomena. The field of information warfare studies could make a very positive step towards establishing a consensus if its members would only acknowledge that information infrastructure attacks against information and information systems are not the same thing as information age warfare that leverages information and information systems to some strategic (and by definition at least potentially violent) end. If they could also accept that the former is one significant component of the latter, that would be so much the better for the understanding of information's changing relationship to warfare.

Once those definitions and their differentiations have finally been established and accepted, future research into information age war would be most usefully directed toward investigating the war form's probable consequences more thoroughly. As this thesis has argued, the implications of IAW that most require further research are the questions of war's frequency in the information age, and its effect on the balance of power between great power states and lesser- and non-state actors. These are perhaps the most urgent subjects for further research because they are not only among the most ambiguous and uncertain of information age war's consequences, but also potentially the most profound and far-reaching. If the emergence of information age war could make warfare more, or even less frequent, such a fundamental

shift may influence not only the governance of stability in the international system, but also the stability of states and the lives of their citizens. Similarly, if information age war's empowerment of traditionally weaker actors alters the distribution of influence between them and the great powers that have customarily held primary custody of international stability, this too could have far-reaching repercussions, extending perhaps even to changes in the composition of the international system and in the kind of institutions to which individuals give their 'national' allegiance.

Many questions clearly remain unanswered about information age war and what it may mean for the world. It is hoped, however, that this study's establishment of a more distinct conception of what information age war is, and what it means for war, has answered some of the more fundamental questions that have plagued the information warfare debate. If this is indeed the case, this thesis's argument that information age war should require not an entirely new paradigm for understanding war, but rather a reinterpretation of war's current paradigms ought then to serve as a more substantial foundation for further investigation into the war form and its wider implications. That investigation, in turn, will hopefully help prepare the world not only to wage war in the information age, but also to meet the consequences of doing so.

ABBREVIATIONS

AWACS	Air-borne Warning and Control System
CAD-CAM	Computer Assisted Design and Computer Assisted Manufacturing
DBK	Dominant Battlespace Knowledge
GPS	Global Positioning System
IAW	Information Age War
IBW	Information-Based Warfare
IO	Information Operations
ITs	Information Technologies
IW	Information Warfare (used most often in this study to represent the general field of information warfare studies; also the narrow information infrastructure attack interpretation of that field)
JSTARS	Joint Surveillance and Target Attack Radar System
MTR	Military Technology Revolution
PGM	Precision Guided Munitions
RMA	Revolution in Military Affairs

BIBLIOGRAPHY

A

- Adams, James. "The Role of the Media." in Campen, Alan D., Douglas H. Dearth, and R. Thomas Goodden. Cyberwar: Security, Strategy and Conflict in the Information Age. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, May 1996.
- . The New Spies. London: Hutchinson, 1994.
- . "Anoraks' Apocalypse." Sunday Times. 16 Mar 97: 5.9
- Aftergood, Steven. "Monitoring Emerging Military Technologies." Federation of American Scientists, Public Interest Report. Vol48, n1. January/February 1995.
- "Air Force Grounds Fleet of B2 Stealth Bombers." CNN Interactive. 8 Aug 1998.
- Alberts, David S., and Daniel S. Papp. Information Age Anthology. Volumes 1-4. Washington, DC: National Defense University Press, 1997.
- Alberts, David S. Defensive Information Warfare. Washington, DC: National Defense University Press, 1996.
- Alford, Jonathan, ed. The Impact of New Military Technology. Hampshire: Gower Publishing Company, Ltd., 1981.
- Alleyne, M.D. "Thinking About the International System in the Information Age." Journal of Peace Resolution. Vol31. Nov 94: 407-24.
- Anderson, Robert H., Tora K. Bikson, Sally Ann Law, and Bridger M. Mitchell. Universal Access to E-Mail: Feasibility and Societal Implications. Santa Monica, CA: RAND, 1995.
- Aron, Raymond. "War and Industrial Society." pp.359-403 in Bramson, Leon, and George W. Goethals, eds. War: Studies from Psychology, Sociology, and Anthropology. New York: Basic Books, 1968.
- Aron, Raymond. The Great Debate: Theories of Nuclear Strategy. Pawel, Ernst, transl. Garden City, NY: Anchor Books, 1965.
- Arquilla, John. RAND Corporation and Naval Post-Graduate School. Interview with the author. August 1997.
- . The Advent of Netwar. Santa Monica, CA: RAND, 1996.
- . "The Strategic Implications of Information Dominance." Strategic Review.

Vol22, n3. Summer 94: 24-30.

Arquilla, John, and David Ronfeldt. "Cyberwar Is Coming!" Santa Monica, CA: RAND, 1992. Also in Comparative Strategy. Vol12, 1993:141-65.

---. Information, Power, and Grand Strategy: In Athena's Camp. Santa Monica, CA: RAND, 1995.

Asprey, Robert B. War in the Shadows: The Classic History of Guerrilla Warfare from Ancient Persia to the Present. London: Little, Brown, and Company, 1994.

Atwood, J. Brian. "Towards a New Definition of National Security: The New Strategic Threats." Vital Speeches. 15 Dec 95, Vol62, n5: 135-39.

B

Bankes, Steve, and Carl Builder. "Seizing the Moment: Harnessing the Information Technologies." The Information Society. Vol8, 1992: 1-59.

Barglow, Raymond. The Crisis of Self in the Age of Information: Computers, Dolphins, and Dreams. London: Routledge, 1994.

Bartlett, Henry C., G. Paul Holman, Jr., and Timothy E. Somes. "Force Planning, Military Revolutions, and the Tyranny of Technology." Strategic Review. Vol 24, n4. Fall 1996: 28-40.

Baylis, John, and Steve Smith, eds. The Globalization of World Politics: An Introduction to International Relations. Oxford: Oxford University Press, 1997.

Baylis, John, Ken Booth, John Garnett, and Phil Williams. Contemporary Strategy: Theories and Concepts. New York: Holmes and Meier, 1987.

Bell, Daniel. The Coming of Post-Industrial Society: A Venture in Social Forecasting. New York: Basic Books, 1973.

Bell, David V.J. "Global Communications, Culture, and Values: Implications for Global Security." pp. 159 - 184. in Dewitt, David, David Haglund, and John Kirton, eds. Building a New Global Order: Emerging Trends in International Security. Toronto: Oxford University Press, 1993.

Benedikt, Michael, ed. Cyberspace: First Steps. Cambridge, MA: MIT Press, 1991.

Beniger, James R. The Control Revolution: Technological and Economic Origins of the Information Society. Cambridge, MA: Harvard University Press, 1986.

Bennett, Bruce W., Christopher Twomey, and Greg Treverton. "What are

- Asymmetric Strategies?" Santa Monica, CA: RAND, 1999.
- Best, Geoffrey. Humanity in Warfare: The Modern History of the International Law of Armed Conflicts. London: Weidenfeld and Nicolson, 1980.
- Beyerchen, Alan. "Clausewitz, Nonlinearity, and the Nature of War." International Security. Vol17. Winter 1992-93: 59-90.
- Bially, Janice. Information: Conceptual Considerations for the Analysis of State Power. Santa Monica, CA: RAND, 1997. P-7998.
- Biddle, Stephen. "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict." International Security. Vol21, n2. Autumn 1996: 139-79.
- . "The RMA and the Evidence." Institute for Defense Analyses. Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996.
- Binnendijk, Hans, ed. Strategic Assessment 1996. Washington, DC: National Defense University Web page, 1996.
- . Strategic Assessment 1995. Washington, DC: National Defense University Web page, 1995.
- . America's Military Priorities. Washington, DC: National Defense University Web page, February 1995.
- Binnendijk, Hans, and Patrick Clawson. "New Strategic Priorities." The Washington Quarterly. Spring 1995, v18, n2: pp109-127.
- Blainey, Geoffrey. The Causes of War. 3ed. New York: Free Press, 1988.
- Blair, Bruce G. and John D. Steinbruner. The Effects of Warning on Strategic Stability. Washington, DC: Brookings Institution, 1991.
- Bonchek, Mark S. "Grassroots in Cyberspace: Using Computer Networks to Facilitate Political Participation." Working Paper 95-2.2: Presented at the 53rd Annual Meeting of the Midwest Political Science Association, 6 Apr 95.
- Bondanella, J., E.M. Cesar, Jr., P.D. Allen, et al. Estimating the Army's Intelligence Requirements and Capabilities for 1997-2001. Santa Monica, CA: RAND, 1993.
- Bowker, John, ed. The Oxford Dictionary of World Religions. Oxford: Oxford University Press, 1997.
- Brodie, Bernard. War and Politics. New York: Macmillan Publishing Co., Inc., 1973.

- . Strategy in the Missile Age. Princeton, NJ: Princeton University Press, 1965.
- Brown, Michael. Senior Fellow, SAIC. Interview with the author. 16 Dec 1996.
- Brown, Robin. "Globalisation and the End of the National Project." Boundaries in Question: New Directions in International Relations. MacMillan, John, and Andrew Linklater, eds. London: Pinter Publishers, 1995.
- Brown, Seyom. The Causes and Prevention of War. New York: St Martin's Press, 1994.
- Buchan, Alistair. War in Modern Society: An Introduction. London: C.A. Watts, 1966.
- Builder, Carl. "Toward a Theory of Aerospace Power for a More Disorderly World." RAND, Project Air Force Briefing slides, 5 February 1997.
- Bull, Hedley. The Anarchical Society. London: Macmillan, 1995.
- Bull, Hedley, Benedict Kingsbury, and Adam Roberts. Hugo Grotius and International Relations. Oxford: Clarendon Press, 1992.
- Burton, Daniel F., Jr. "The Brave New Wired World." Foreign Policy. No 106, Spring 1997: 23-38.
- Buzan, Barry. An Introduction to Strategic Studies: Military Technology and International Relations. London: Macmillan Press, 1987.
- . People, States, and Fear: The National Security Problem and International Relations. London: Harvester Wheatsheaf, 1983.
- . "Change and Insecurity: A Critique of Strategic Studies." Change and the Study of International Relations: The Evaded Dimension. Buzan, Barry, and R.J. Barry Jones, eds. London: Frances Pinter Ltd., 1981.

C

- Calvocoressi, Peter. Top Secret Ultra. London: Cassell, 1980.
- Campen, Alan D., Douglas H. Dearth, and R. Thomas Goodden. Cyberwar: Security, Strategy and Conflict in the Information Age. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, May 1996.
- Campen, Alan D., ed. The First Information War: The Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1992.

- Castells, Manuel. The Information Age: Economy, Society and Culture - Volume I, The Rise of the Network Society. Cambridge, MA: Blackwell Publishers, 1996.
- "China On-line." CNN Interactive. 12 Mar 98.
- Clausewitz, Carl von. On War. Michael Howard and Peter Paret, eds, trans. Princeton: Princeton University Press, 1976.
- Cleaver, Harry. "The Chiapas Uprising: The Future of Class Struggle in the New World Order." Texas: University of Texas Web page, 1995.
- Clinton, William J.. "Executive Order 13010--Critical Infrastructure Protection." Washington, DC: Terrorism and Information Warfare Web page, 15 July 1996.
- Coates, Joseph F. and Jennifer Jarratt. What Futurists Believe. Mt Airy, MD: Lomond Publications, 1989.
- Cohen, Eliot. "A Revolution in Warfare." Foreign Affairs. Vol75, n2: 37-54.
- Cohen, William S. "Remarks Prepared for the Defense University Joint Operations Symposium, QDR Conference." Fort McNair, Washington, DC: Defenseink Web page, 23 June 1997.
- Coll, Albert R. James S. Ord, and Stephen A. Rose, eds. Legal and Moral Constraints on Low-Intensity Conflict. Newport, RI: Naval War College, 1995.
- Cooper, Jeffrey. "Understanding Information Warfare: Another View." Transcript of the Center for Information Strategy and Policy Inaugural Seminar. 30 Aug 95. in Arquilla, John, and David Ronfeldt, eds. In Athena's Camp: Preparing for Conflict in the Information Age. Santa Monica, CA: RAND, 1998.
- Cooper, Pat. "War Game Reveals IW Vulnerabilities." Defense News. 4 Mar 96:32.
- Corn, David. "The Pentagon Trolls the Net." The Nation. 4 Mar 96: 3-5.
- Curtis, Ian. "Misinformed about Information War? The Three-Wave Theory Is Under Fire." Defense and Foreign Affairs Strategic Policy. 31 Mar 96: 4-5.
- "Cyber Wars." Economist. v3, 13 Jan 96: 89
- Czerwinski Thomas J. The Third Wave: What the Tofflers Never Told You Washington, DC: National Defense University World Wide Web page, April 1996.

D

- Da Landa, Manuel. War in the Age of Intelligent Machines. New York: Zone Books, 1991.
- Davidson, Keay. "In-house Analyst Urges Pentagon to Stand Guard on Internet." Washington Times. 28 Feb 96.
- Defense Investigative Service. "Computer Espionage." The American Reporter. No. 288, 15 May 96.
- Delbrück, Hans. History of the Art of War, Within the Framework of Political History. Vol. 4, "The Modern Era." Renfroe, Walter J., Jr., trans. Westport, CT: Greenwood Press, 1975.
- Dellums, Ronald V. "Toward the Post-Transition World: New Strategies For A New Century." SAIS Review. Winter-Spring 1995, Vol15, n1: 93-112.
- Der Derian, James. Anti-diplomacy: Spies, Terror, Speed, and War. Cambridge, MA: Blackwell, 1992.
- . On Diplomacy: A Genealogy of Western Estrangement. Oxford: Basil Blackwell, 1987.
- Deutch, John. "Remarks to the Senate Governmental Affairs Committee's Permanent Subcommittee on Investigations." Washington, DC: Federation of American Scientists, 25 June 1996
- Deutsch, Karl W. The Analysis of International Relations. Englewood Cliffs, NJ: Prentice Hall, Inc., 1968.
- Devost, Matthew G. National Security in the Information Age. Washington, DC: Terrorism and Information Warfare Web page, May 1995.
- Devost, Matthew G., Brian K. Houghton, and Neal A. Pollard. "Information Terrorism: Can You Trust Your Toaster?." National Defense University Sun Tzu Art of War Research Award in Information Warfare. Washington, DC: Terrorism and Information Warfare Web page, 1996.
- Devries, Kelly. Medieval Military Technology. Peterborough, Ontario: Broadview Press, 1992.
- Dewar, James A. The Information Age and the Printing Press: Looking Backward to See Ahead. Santa Monica, CA: RAND, 1997.
- Din, Allan M. "Strategy, Security, and Advanced Computing." in Jacobsen, Carl G., Ed. The Uncertain Course: New Weapons, Strategies, and Mind-Sets. Oxford: Oxford University Press, 1987.
- DiNardo, R.L. and Daniel J. Hughes. "Some Cautionary Thoughts on Information

Warfare." Air Chronicles. 1996.

Drucker, Peter F. "The Economy's Power Shift." Wall Street Journal. 24 Sept 92: A16.

---. The Frontiers of Management. New York: Dutton, 1986.

Dunn, Martin. "RMA = Revolution in Military Acronyms? A Contrary View." Research and Analysis. Canberra, Australia: Australian Directorate of Army Research and Analysis Web page, March 1996.

Dunnigan, James F. How to Make War, A Comprehensive Guide to Weapons and Warfare. New York: William Morrow, 1988.

Dunnigan, James F. and Austin Bay. A Quick and Dirty Guide to War: Briefings on Present and Potential Wars. New York: William Morrow and Co., Inc., 1985.

Dupuy, Trevor N., Col., US Army Retired. The Evolution of Weapons and Warfare. New York: Da Capo Press, 1984.

---. The Almanac of World Military Power. Dunn Loring, VA: T.N. Dupuy Associates, 1970.

E

Earle, Edward Mead. Makers of Modern Strategy: Military Thought from Machiavelli to Hitler. Princeton: Princeton University press, 1943, 1971.

Eisenstein, Elizabeth L. The Printing Press as an Agent of Change. New York: Cambridge University Press. 1979.

Ellis, John. The Social History of the Machine Gun. London: Pimlico, 1976.

Epstein, Robert M. Napoleon's Last Victory and the Emergence of Modern Warfare. Lawrence, KS: University Press of Kansas, 1994.

Evans, Peter. "The Eclipse of the State? Reflections on Stateness in an Era of Globalization." World Politics. Vol 50, n1. October 1997: 62-87.

Everett, Charles D., Moss Dewindt, and Shane McDade. "The Silicon Spear: An Assessment of Information-based Warfare and US National Security." Winner of the 1997 National Defense University's Sun Tzu Art of War in Information Warfare Prize. Washington, DC: National Defense University Press, 1997.

F

Farrell, T. "Weapons Don't Make War: Policy, Strategy, and Military Technology." International Affairs. Vol70, n1: 134-35.

Farson, A. Stuart, David Stafford, and Wesley K. Wark, eds. Security and

Intelligence in a Changing World: New Perspectives for the 1990s. London: Frank Cass and Co., Ltd., 1991.

Fast, William R. Lt. Col. "Knowledge Strategies: Balancing Ends, Ways, and Means in the Information Age." National Defense University Sun Tzu Art of War in Information Warfare Prize. Washington, DC: National Defense University Press, 1997.

Fastabend, David. "The Categorization of Conflict." Parameters. Summer 1997: 75-87.

Feaver, Peter. "A New Theory of Civil/Military Relations." University of St Andrews Department of International Relations Post-Graduate Seminar, 14 Oct 97.

Fischer, Stanley. First Deputy Managing Director of the International Monetary Fund. "The Asian Crisis: A View from the IMF." Address at the Midwinter Conference of the Bankers' Association for Foreign Trade. Washington, DC. International Monetary Fund Web page. 22 Jan 98.

Fitzsimonds, James R. "The Coming Military Revolution." Parameters. Vol25, Summer 1995: 30-36.

Fogleman, Ronald R. Gen., Chief of Staff, USAF. Horizon. Washington, DC: US Air Force Web page, August 1995.

Fogleman, Ronald R. And Sheila E. Widnall. Cornerstones of Information Warfare. Washington, DC: US Department of Defense Web page, 1995.

Franck, Raymond E., Jr. and Gregory G. Hildebrandt. "Competitive Aspects of the Contemporary Military-Technical Revolution: Potential Military Rivals to the US." Defense Analysis. Vol 12, n2. 1996: 239-58.

Franks, Frederick M., Jr., Gen USArmy. "Winning the Information War." Vital Speeches. 15 May 94, v60, n15: 453-459.

Freedman, Lawrence. "The Revolution in Strategic Affairs." Adelphi Paper #318. London: Institute for International Strategic Studies, 1998.

---. Information Warfare: Will Battle Ever Be Joined?. London: International Centre for Security Analysis, October 1996.

---. The Evolution of Nuclear Strategy. London: Macmillan, 1981.

Fried, Morton, Marvin Harris, and Robert Murphy, eds. War: The Anthropology of Armed Conflict and Aggression. Garden City, NY: Natural History Press, 1968.

G

- Garden, Timothy. The Technology Trap. London: Brassey's, 1989.
- Garigue, Robert, Lieut. USN. "Information Warfare: Developing a Conceptual Framework." IASIW Web page.
- Giboney, Thomas B. "Commander's Control from Information Chaos." Military Review. Vol71. Nov 91: 34-38
- Gingrich, Newt. To Renew America. New York: Harper Collins Publishers, 1995.
- Goldman, Emily O. and Richard B. Andres. "The Geopolitical Effects of Revolutions in Military Affairs." University of California, Davis. Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996.
- Gray, Colin S. "The American Revolution in Military Affairs: An Interim Assessment." Camberley, England: Strategic and Combat Studies Institute, 1997.
- Gray, Colin S.; Libicki, Martin. "A Debate on Geopolitics: The Continued Primacy of Geography vs. The Emerging Primacy of Information." Orbis. Vol 40, no2. Spring 1996: 247-277.
- Green, L.C. The Contemporary Law of Armed Conflict. Manchester: Manchester University Press, 1993.
- Grotius, Hugo. The Rights of War and Peace (De Jure Belli ac Pacis). Campbell, A.C., transl. Washington: M. Walter Dunne, Publisher, 1901.
- Gurr, Ted Robert. Why Men Rebel. Princeton: Princeton University Press, 1973.
- ## H
- Haeni, Reto E. "An Introduction to Information Warfare." Washington, DC: George Washington University Web Page, Dec 95.
- Hale, J.R. War and Society in Renaissance Europe, 1450-1620. Leicester: Leicester University Press, 1985.
- Handel, Michael I., War, Strategy, and Intelligence. London: Frank Cass, 1989.
- , ed. Clausewitz and Modern Strategy. London: Frank Cass, 1986.
- Harley, Jeffrey A., Lieut. Cmdr, USN. "Information, Technology, and the Center of Gravity." Naval War College Review. Winter 1997.
- Hauss, Charles. Beyond Confrontation: Transforming the New World Order.

- Westport, CT: Praeger, 1996.
- Hays, Peter L., Brenda J. Vallance, and Alan R. Tassel, eds. American Defense Policy. Baltimore: Johns Hopkins University Press, 1997. (7th ed.).
- Herrera, Geoffrey L. "New Information Technologies and the Future of State Security." Monterey, CA: Proceedings of the Security Studies Conference on Revolutions in Military Affairs, Naval Post-graduate School, August 1996.
- Hewish, Mark. "Wearable Information Tailored to Battlefield." International Defense Review. Jane's Information Group, Ltd. Vol 1, no11. 1 Nov 96: 1-12.
- . "Military Medicine Goes Digital." International Defense Review. Jane's Information Group, Ltd. Vol 1, no5. 1 May 96: 1- 5.
- Hobson, J.A. Imperialism: A Study. London: George Allen and Unwin, Ltd., 1902.
- Hoffman, Bruce and Jennifer Taw. Defense Policy and Low-Intensity Conflict: The Development of Britain's "Small Wars" Doctrine During the 1950's. Santa Monica, CA: RAND, 1991.
- Hollister, C. Warren. Medieval Europe: A Short History. New York: McGraw-Hill, Inc., 1994.
- Holsti, K.J. Change in the International System: Essays on the Theory and Practice of International Relations. Aldershot: Edward Elgar, 1991.
- . International Politics: A Framework for Analysis. Englewood Cliffs, NJ: Prentice Hall, 1983.
- Holzer, Robert. "Tactics in Taiwan Cast Mold of Future Warfare." Defense News. 28 Jul 97: 7.
- Howard, Michael. The Causes of Wars, and Other Essays. Cambridge, MA: Harvard University Press, 1983.
- ., ed. Restraints on War: Studies in the Limitation of Armed Conflict. Oxford: Oxford University Press, 1979.
- . The Franco-Prussian War: The German Invasion of France, 1870-71. London: Rupert Hart-Davis, 1968.
- Howard, Michael, George J. Andreopoulos, and Mark R. Shulman, eds. The Laws of War: Constraints on Warfare in the Western World. New Haven: Yale University Press, 1994.
- Hudson, G.F. The Hard and Bitter Peace: World Politics Since 1945. New York:

Praeger Publishers, 1976.

Hynes, William G. The Economics of Empire: Britain, Africa, and the New Imperialism, 1870-1895. London: Longman Group, Ltd., 1979.

I

Information Warfare: Legal, Regulatory, Policy, and Organizational Considerations for Assurance. Washington, DC: Joint Chiefs of Staff, 1995.

"Information War and Cyberspace Security." RAND Research Review. Vol19, n2. Autumn 95.

"Internet Neo-Nazi Suspect Arrested in Britain." Times. 19 Feb 98.

J

Jablonsky, David. "The Owl of Minerva Flies at Twilight: Doctrinal Chance and Continuity and the Revolution in Military Affairs." Carlisle, PA: US Army War College Web page, May 1994.

James, Lieut. Shawn D., USN. "Information Warfare: A Phenomenon, an Innovation, or a New Paradigm?" Monterey, CA: US Naval Post-Graduate School Web page, 24 March 1995.

Jensen, Owen. "Information Warfare: Principles of Third-Wave War." Airpower Journal. Vol8. 1 Jan 94: 35-44.

Johnsen, William T., and Douglas V. Johnson II, James O. Kievit, Douglas C. Lovelace, Jr., and Steven Metz. "The Principles of Warfare in the 21st Century: Strategic Considerations." Web Page, 1995.

Johnson, Jeff. "The Information Highway from Hell: A Worst-Case Scenario." Computer Scientists for Social Responsibility Web Page, 1996.

Johnson, Stuart, and Martin Libicki, Eds. Dominant Battlespace Knowledge. Washington, DC: National Defense University Web page, 1996.

Johnson, Stuart, and James Blaker. The FY 1997-2001 Defense Budget. Washington, DC: National Defense University Web page, July 1996.

Jones, R. V. Reflections on Intelligence. London: Heinemann, 1989.

Judis, John B. "Newt's Not-So-Weird Gurus." The New Republic. Vol213, 1995: 16-18.

K

Keegan, John. A History of Warfare. New York: Alfred A. Knopf, 1994.

Keen, M.H. The Laws of War in the Late Middle Ages. London: Routledge and

- Kegan Paul, 1965.
- Kissinger, Henry. Diplomacy. London: Simon and Schuster, 1995.
- Klare, Michael T., ed. Peace and World Security Studies. Boulder, CO: Lynne Rienner, Publishers, 1994.
- Klare, Michael T., and Daniel C. Thomas, eds. World Security: Trends and Challenges at Century's End. New York: St Martin's Press, 1991.
- Knorr, Klaus. Military Power and Potential. Lexington, MA: D.C. Heath and Company, 1970.
- Koelsch, Frank. The Infomedia Revolution. Toronto: McGraw-Hill Ryerson, 1995.
- Kozłowski, Eugeniusz. "Influence of Technical Progress on Changes in Military Art During WWII." Military Technique, Policy, and Strategy in History. Gieganski, Witold, et al, eds. Warsaw: Ministry of National Defence Publishing House, 1976.
- Kraus, George F., Cmdr, USN (Ret). Senior Fellow, SAIC. Interview with the author. 16 Dec 1996.
- Krepinevich, Andrew F. Jr. "The Coming Military Revolution." Delivered at the JCISS and Security Studies Revolution in Military Affairs Conference, Monterey, CA: 26-29 Aug 1996.
- Kuhn, Thomas. "The Structure of Scientific Revolutions." International Encyclopedia of Unified Science. Vol 2, n2. Ed.2. Chicago: University of Chicago Press, 1970.
- Kurtz, Howard. "Report of Hyde Affair Stirs Anger; Judiciary Chairman Admits '60s Relationship But Calls Story 'Attempt To Intimidate Me.'" Washington Post. 17 Sept 1998. Page A15.
- L**
- Lambert, Andrew, Cmdr, RAF. "The Psychological Impact of Airpower." Presentation to the Department of International Relations, University of St Andrews. 10 March 1997.
- Langer. Diplomacy of Imperialism. New York: Knopf, 1951.
- Laughridge, Gene. "Recent and Not-so-recent Thinking on Information Operations and the Knowledge War." Army Communicator. Vol20. 1 Apr 95: 32-39.

- Larson, Eric V. Casualties and Consensus: The Historical Role of Casualties in Domestic Support For U.S. Military Operations. Santa Monica, Ca: RAND, 1996.
- Levi, Werner. The Coming End of War. Beverly Hills, CA: Sage Publications, 1981.
- Levin, Carl. (Senator, D-Michigan). "Statement Before the Senate Permanent Subcommittee on Investigations on the Department of Defense's Vulnerability to Information Warfare." Washington, DC: Senator Carl Levin's Web page, 22 May 1996.
- Levy, Jack S. "The Causes of War: A Review of Theories and Evidence." in Tetlock, Philip E., Jo Husbands, Robert Jervis, Paul C. Stern, and Charles Tilly, eds. Behavior, Society, and Nuclear War. New York: Oxford University Press, 1989.
- Libicki, Martin C. Professor, National Defense University. Interview with the author. 10 September 1997.
- . Information and Nuclear RMA's Compared. Washington, DC: National Defense University Web page, July 1996.
- . "What Is Information Warfare?" Washington, DC: National Defense University Web Page, 1995.
- . The Next Enemy. Washington, DC: National Defense University World Wide Web page, July 1995
- . The Mesh and the Net: Speculations on Armed Conflict in a Time of Free Silicon - McNair Paper 28. Washington, DC: Institute for Strategic Studies, National Defense University Web Page, March 1994.
- Libicki, Martin, and CDR James Hazlett. The Revolution in Military Affairs. Washington, DC: National Defense University Web page.
- Libicki, Martin C., and Richard Szafranski. Tomorrow's Air Force. Washington, DC: National Defense University Web page, July 1996.
- Liddell Hart, Basil. Thoughts on War. London: Faber and Faber, Ltd., 1944.
- Lider, Julian. Military Theory: Concept, Structure, Problems. Aldershot, Hants: Gower Publishing Co. Ltd., 1983.
- . On the Nature of War. Farnborough, Hants: Saxon House, 1979.
- Loader, Brian D., ed. The Government of Cyberspace: Politics, Technology, and Global Restructuring. London: Routledge, 1997.

Lovelace, Douglas C., Jr. "The Evolution in Military Affairs: Shaping the Future US Armed Forces." Carlisle, PA: US Army War College Strategic Studies Institute Web page, 16 Jun 97.

LTTE in the Eyes of the World: Collection of Newspaper Articles. Colombo: Sri Lanka Ministry of Foreign Affairs, December 1997.

Luard, Evan. War in International Society: A Study in International Sociology. London: I.B. Tauris and Co, Ltd., 1986.

Lynn, John A., ed. Tools of War: Instruments, Ideas, and Institutions of Warfare, 1445-1871. Chicago: University of Illinois Press, 1990.

M

Magsig, Daniel E. "Information Warfare in the Information Age." Washington, DC: George Washington University Web Page, 1995.

"Master Hacker 'Analyzer' Held in Israel." CNN Interactive. 19 Mar 98.

Matthews, Jessica. (from Foreign Affairs Jan/Feb 1997: 50-66) in Builder, Carl. "Toward a Theory of Aerospace Power for a More Disorderly World." RAND, Project Air Force Briefing, 5 February 1997.

Matthews, Lloyd J., ed. "Challenging the United States Symmetrically and Asymmetrically: Can America Be Defeated?" Carlisle, PA: US Army War College Strategic Studies Institute Web page, July 1998.

Mayfield, Terry; Senior Fellow, IDA. Interview with the author. 17 Dec 1996.

Mazarr, Michael. Analyst, Center for Strategic and International Studies. Interview with the author. 10 September 1997.

Mazarr, Michael J., Don M. Snider, and James A. Blackwell, Jr. Desert Storm: The Gulf War and What We Learned. Boulder: Westview Press, 1993.

McLuhan, Marshall. Understanding Media: The Extensions of Man. London: Routledge, 1964.

McGrew, Anthony G. "Military Technology and the Dynamics of Global Militarisation." Global Politics: Globalisation and the Nation-State. McGrew, Anthony G., Paul G. Lewis, et al., eds. Cambridge: Polity Press, 1992.

Miller, John H. "Information Warfare: Issues and Perspectives." Washington, DC: National Defense University Web page, March 1995.

Modelski, George. Long Cycles in World Politics. Seattle: University of Washington Press, 1987.

Moisy, Claude. "Myths of the Global Information Village." Foreign Policy. No. 107, Summer 1997: 78-87.

Molander, Roger C., Andrew S. Riddle, and Peter A. Wilson. "Strategic Information Warfare: A New Face of War." Santa Monica, CA: RAND, 1996.

Morgenthau, Hans J. Politics Among Nations: The Struggle for Power and Peace. Thompson, Kenneth W., revised. New York: McGraw-Hill, Inc., 1985.

Morton, Oliver. "The Information Advantage: Defence Technology Survey." Economist. v335, 10 Jun 95: 8-17

Mueller, John. "The Perfect Enemy: Assessing the Gulf War." Security Studies. Vol5, n1. Autumn 1995: 77-117.

Munro, Neil. "The Pentagon's New Nightmare: An Electronic Pearl Harbor." Washington Post. 16 Jul 95.

N

Naval Operations Strategic Planning Office. "Copernicus Forward: C4I for the 21st Century." Navy Public Affairs Library, Jun 95.

"Neo-Nazis Carving out Fiefs in Eastern Germany." New York Times. 8 Feb 98.

New World Vistas: Air And Space Power For The 21st Century. Information Applications Volume. Washington, DC: US Government Printing Office, July 1996.

Nichiporuk, Brian and Carl Builder. Information Technologies and the Future of Land Warfare. Santa Monica, CA: RAND, 1995.

Nicholas, David. The Evolution of the Medieval World: Society, Government, and Thought in Europe, 312-1500. London: Longman, 1992.

Nosworthy, Brent. The Anatomy of Victory: Battle Tactics, 1689 - 1763. New York: Hippocrene Books, 1992.

Nye, Joseph S. Bound to Lead: The Changing Nature of American Power. New York: Basic Books, 1991.

Nye, Joseph, and William Owens. "America's Information Edge." Foreign Affairs. Vol75, n2: 20-37.

O

Odom, William E., Lt.Gen USArmy, retired. America's Military Revolution: Strategy and Structure After the Cold War. Washington, DC: American University Press, 1993.

Office of The Under Secretary of Defense for Acquisition and Technology.
Report of the Defense Science Board Task Force on Information Warfare -
Defense (IW-D). Washington, DC: Terrorism and Information Warfare
Web page, November 1996.

O'Hanlon, Michael E. "Beware the RMA'nia!" Washington, DC: Brookings
Institution Web page, September 1998.

Organski, A.F.K. and J. Kugler. The War Ledger. Chicago: University of Chicago
Press, 1980.

Organski, A.F.K. World Politics. New York: Knopf, 1968.

Owens, William A., Adm., USN. The Emerging U.S. System-of-Systems.
Washington, DC: National Defense University Web page, February 1996.

P

Paige, Emmett, Jr. "Directive 3600.1 - Information Operations." Arlington, VA:
Office of the Assistant Secretary of Defense for Command, Control,
Communications, and Intelligence, 9 December 1996.

Palmer, Alan. Penguin Dictionary of Modern History. Hammondsworth,
Middlesex: Penguin, 1985.

Paret, Peter, ed. Makers of Modern Strategy: from Machiavelli to the Nuclear
Age. Oxford: Oxford University Press, 1986.

Parker, Geoffrey., ed. The Cambridge History of Warfare: The Triumph of the
West. Cambridge: Cambridge University Press, 1995.

Pearton, Maurice. The Knowledgeable State: Diplomacy, War, and Technology
Since 1830. London: Burnett Books, 1982.

Pollard, Neal. Researcher, SAIC. Interview with the author. 15 December
1996.

Posen, Barry R. The Sources of Military Doctrine. Ithaca, NY: Cornell UP,
1984.

Pruitt, Dean G., and Richard C. Snyder. Theory and Research on the Causes of
War. Englewood Cliffs, NJ: Prentice-Hall, 1969.

R

Radu, Michael and Vladimir Tismaneanu. Latin American Revolutionaries: Groups,
Goals, and Methods. Washington: Brassey's International Defense Publishers,
1990.

RAND Research Review. Vol19, n2. Autumn 95.

Rapoport, Anatol. The Origins of Violence: Approaches to the Study of Conflict. New York: Paragon House, 1989.

Rathmell, Andrew. "Cyber-Terrorism: The Shape of Future Conflict?" Royal United Service Institute Journal. October 1997: 40-46.

---. "CyberWar: The Coming Threat?" National Criminal Intelligence Service (NCIS) Pointer. No2, July 1997: 1

Rathmell, Andrew, Richard Overill, Lorenzo Valeri, and John Gearson. "The IW Threat from Sub-State Groups: an Interdisciplinary Approach." Presented at the Third International Symposium on Command and Control Research and Technology, National Defense University, Washington DC. 17-20 Jun 97.

Record, Jeffrey. Ready for What and Modernised Against Whom? A Strategic Perspective on Readiness and Modernization. Carlisle, PA: Strategic Studies Institute of the US Army War College Web page, 10 April 1995.

Reisman, W. Michael, and Chris T. Antoniou, eds. The Laws of War: A Comprehensive Collection of Primary Documents on International Laws Governing Armed Conflict. New York: Vintage Books, 1994.

Renner, Michael. Fighting for Survival: Environmental Decline, Social Conflict, and the New Age of Insecurity. Worldwatch Environmental Alert Series. New York: W.W. Norton and Company, 1996.

"Reno Announces New Center to Combat Cyber-Terrorism." CNN Interactive. 28 Feb 1998.

Reynolds, Charles. The Politics of War: A Study of the Rationality of Violence in Inter-State Relations. New York: St Martin's Press, 1989.

Robberson, Tod. "Mexican Rebels Using A High-Tech Weapon; Internet Helps Rally Support." Washington Post. 20 Feb 95: A1

Roberts, Adam, and Richard Guelff. Documents of the Laws of War. Oxford: Clarendon Press, 1982.

Rogers, A.P.V. Law on the Battlefield. Manchester: Manchester University Press, 1996.

Rohwer, Jürgen. "The Operational Use of 'Ultra' in the Battle of the Atlantic." in Andrew, Christopher, and Jeremy Noakes, eds. Intelligence and International Relations, 1900-1945. Exeter: University of Exeter Press, 1987.

Ronfeldt, David F. Senior researcher, RAND Corporation. Interview with the

author. 24 June 1997.

---. "Cyberocracy Is Coming." Information Society. Vol8, 1992: 243-296. Santa Monica, CA: RAND Reprints, 1996.

---. Tribes, Institutions, Markets, Networks: A Framework About Societal Evolution. Santa Monica, CA: RAND, 1996.

Ronfeldt, David F., and Cathryn L. Thorup. North America in the Era of Citizen Networks: State, Society, and Security. Santa Monica, CA: RAND, 1995. P-7945.

Rosenau. James N. Public Opinion and Foreign Policy: An Operational Formulation. New York: Random House, 1961.

Rostow, Walt W. The United States in the World Arena. New York: Harper and Row, 1960.

Rothgeb, John M., Jr. Defining Power: Influence and Force in the Contemporary International System. New York: St Martin's Press, 1993.

Round, Oscar W. and Earle L. Rudolph. Civil Defense in the Information Age. Strategic Forum n46. Washington, DC: National Defense University Press, September 1995.

Rowen, Henry S. "The Evolution of Strategic Nuclear Thought." in Martin, Laurence. Strategic Thought in the Nuclear Age. London: Heinemann, 1979.

Runde, Carl Peter, and Greg Voss. Intelligence and the New World Order: Former Cold War Adversaries Look Toward the 21st Century. Buxtehude, FRG: International Freedom Foundation, 1992.

S

Sanin, Grigori, and Aleksandr Zakharov. "Kontenyeriz Ismailovskogo Parka Blagopoluchno Evakuirovam." Segodnya 25 Nov 95. in the RAND-St Andrews Terrorism Database.

Schwartau, Winn. Information Warfare: Chaos on the Electronic Superhighway. Thunders Mouth Press, 1994.

---. Class III Information Warfare: Has It Begun?. Infowar.com Web page, 1996.

Schwartzstein, Stuart J.D., ed. The Information Revolution and National Security: Dimensions and Directions. Washington, DC: Center for Strategic and International Studies, 1996.

- Schwarz, Benjamin C. Casualties, Public Opinion and US Military Intervention: Implications for US Regional Deterrence Strategies. Santa Monica, CA: RAND, 1994
- Scott, William B. "Information Warfare Policies Called Critical to National Security." Aviation Week and Space Technology. 28 Oct 96.
- Seabury, Paul, and Angelo Codevilla. War: Ends and Means. New York: Basic Books, Inc., 1989.
- "Security in Cyberspace III: The Threat." US Senate Permanent Subcommittee on Investigations, Minority Staff Statement, 5 June 1996.
- Security Policy Board. "White Paper on Information Infrastructure Assurance." Washington, DC: Federation of American Scientists, Project on Government Secrecy Web Page, Dec 95.
- Shalikashvili, John, M. Chairman, Joint Chiefs of Staff. Joint Vision 2010. Washington, DC: United States Department of Defense, 1997.
- Shapiro, Michael J. and Hayward R. Alker, eds. Challenging Boundaries: Global Flows, Territorial Identities. Minneapolis: University of Minnesota Press, 1996.
- Silvasy, Stephen, Jr., Maj. Gen., USArmy. "AirLand Battle Future: The Tactical Battlefield." Military Review. Vol71, n2. Feb 91: 2-61.
- Simon, Joel. "Netwar Could Make Mexico Ungovernable." California: Pacific News Service Web Page, 1995.
- Singer, Abe, and Scott Rowell. Information Warfare: An Old Operational Concept With New Implications. Washington, DC: National Defense University Web page, December 1996.
- Smith, Michael. "Modernization, Globalisation, and the Nation-State." Global Politics: Globalisation and the Nation-State. McGrew, Anthony G., Paul G. Lewis, et al., eds. Cambridge: Polity Press, 1992.
- Snow, Donald M. Uncivil Wars: International Security and the New Internal Conflicts. Boulder: Lynne Rienner Publishers, 1996.
- "Somalia Rescue Begins; US Troops Pour Ashore." USA Today. 9 Dec 92.
- Sorensen, Georg. "An Analysis of Contemporary Statehood: Consequences for Conflict and Cooperation." Review of International Studies. Vol23, n3. July 1997: 253-270.
- Sortor, R.E. Army Forces for Operations Other Than War. Santa Monica, CA:

RAND, 1997.

Specter, Michael. "Strolling at Will, Chechen Rebels Mock Russians." New York Times. 2 Feb 96: A12

---. "Ten Days that Shook Russia: Siege in the Caucasus." New York Times. 22 Jan 96: A1

Spero, Joan E. and Jeffrey A. Hart. The Politics of International Economic Relations. New York: St Martin's Press, 1997.

"State Charges Italian Computer Bulletin Board with 'Subversion.'" Chiapas 95 Web page, Mar 95.

Stein, George J. "Information War - Cyberwar - Netwar." Battlefield of the Future, 21st Century Warfare Issues. Air Chronicles. March 1996. CDSAR Web page.

Stoessinger, John G. Why Nations Go to War. 5th edition. New York: St Martin's Press, 1990.

Strachan, Hew. European Armies and the Conduct of War. London: George Allen and Unwin, 1983.

Sun Tzu. The Art of War. Griffith, Samuel B., trans. London: Oxford University Press, 1963.

Swett, Charles. "Strategic Assessment: The Internet." Federation of American Scientists, Project on Government Secrecy. Washington, DC: Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict, 17 July 1995.

Szafranski, Col. Richard, USAF. "A Theory of Information Warfare: Preparing For 2020." Air University Web page, 1995.

T

"Targeting Iraq's Dictator." Times on Sunday. 22 Feb 98.

Taw, Jennifer M. and J.E. Peters. Operations Other Than War: Implications for the US Army. Santa Monica, CA: RAND, 1995.

Taylor, Philip M. War and the Media: Propaganda and Persuasion in the Gulf War. Manchester: Manchester University Press, 1992.

"Technology and Human Nature: Ethics On-Line." Washington Post. 17 Feb 96.

Thompson, Loren B., ed. Low-Intensity Conflict: The Pattern of Warfare in the Modern World. Lexington, MA: Lexington Books, 1989.

- Thompson, Mark. "If War Comes Home." Time. Vol146, n8. 21 Aug 95.
- Tirpak, John A. "The New World of Information Warfare." Air Force Magazine. Vol79, n6. June 1996: 30-36.
- Toffler, Alvin. "Perspective on Terrorism: The Info Explosion Turns Lethal." Los Angeles Times, Home Edition. 2 Apr 95: M5.
- . Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. New York: Bantam Books, 1990.
- . The Third Wave. New York: Bantam, 1980.
- Toffler, Alvin and Heidi. Creating a New Civilization. Turner Publishing, 1995.
- . War and Anti-War: Making Sense of Today's Global Chaos. Boston: Little Brown, 1993.
- The 21st Century Army: Roles, Missions, and Functions in an Age of Information and Uncertainty. Ann Arbor, MI: Vector Research, 1995.
- Tyrrell, Patrick, OBE, Capt, Royal Navy. "Information Integrity: The Challenge of Cyberspace." Royal College of Defense Studies, 1996.
- U**
- United States Congress, Office of Technology Assessment. American Military Power: Future Needs, Future Choices - Background Paper. OTA-BP-ISC-80. Washington, DC: US Government Printing Office, October 1991.
- United States. Department of the Army. US Army Field Manual 100-6: Information Operations. Washington, DC: ATSC-Army Web page, 27 August 1996.
- United States. Department of the Army. FM 100-5: Operations. Washington, DC: Government Printing Office. June 1993.
- United States. Department of Commerce. Report of the National Critical Technologies Panel. PB91-156869. Springfield, VA: National Technical Information Service, March 1991.
- United States. Department of Defense. Office of the Director of Defense Research and Engineering. Defense Science and Technology Strategy. Washington, DC: US GPO, September 1994.
- United States. Department of Defense. Office of the Director of Defense Research and Engineering. Defense Technology Plan. Washington, DC: US GPO, September 1994.

United States. Department of Defense. Report of the Quadrennial Defense Review. Washington, DC: DefenseLink Web page, 20 May 1997.

"US: Return Our Men." USA Today. 6 Oct 93.

V

Van Creveld, Martin. Nuclear Proliferation and the Future of Conflict. Free Press, 1993.

---. The Transformation of War. New York: Free Press, 1991.

---. Technology and War: From 2000 BC to the Present. New York: Free Press, 1991.

---. Command in War. Cambridge: Harvard University Press, 1985.

Verbruggen, J.F. The Art of Warfare in Western Europe During the Middle Ages. Willard, Sumner, and S.C.M. Southern, trans. Amsterdam: North-Holland Publishing Co., 1977.

Vogler, John. "Technology and Change in International Relations: On the Independence of a Variable." Change and the Study of International Relations: The Evaded Dimension. Buzan, Barry, and R.J. Barry Jones, eds. London: Frances Pinter Ltd., 1981.

W

Waller, Douglas. "Onward Cyber Soldiers." Time. Vol146, n8. 21 Aug 95.

Waltz, Kenneth N. Man, the State, and War: A Theoretical Analysis. New York: Columbia University Press, 1954.

Wardlaw, Grant. Political Terrorism: Theory, Tactics, and Counter-Measures. Cambridge: Cambridge University Press, 1989.

Warren, Peter. "City Surrenders to 400 Million Gangs." Sunday Times. 2 Jun 96: p1, 24.

Watson, Russel, et al. "When Words Are the Best Weapon. How Rebels Use the Internet and Satellite TV." Newsweek. 27 Feb 95: 36-40.

Wehling, Jason. "RAND Warns US Against CyberWar' from the Left." Cy.Rev. Vol3, Sep 95: 23-29.

---. Netwars and Activists Power on the Internet. Wehling's Information Warfare Web page, March 1995.

Weigley, Russell F. The Age of Battles: The Quest for Decisive Warfare from Breitenfeld to Waterloo. London: Pimlico, 1991 (1993).

- . "War and the Paradox of Technology." International Security. Fall 1989: 192-202.
- Weltman, John J. World Politics and the Evolution of War. Baltimore, MD: Johns Hopkins University Press, 1995.
- Wheatley, Gary F. Information Warfare and Deterrence. Washington, DC: Institute for National Strategic Studies, 1996.
- Whittle, David B. Cyberspace: The Human Dimension. New York: W.H. Freeman and Company, 1997.
- Wight, Martin. Power Politics. Bull, Hedley and Carsten Holbraad, eds. Harmondsworth, Middlesex: Penguin Books, 1978.
- Winterbotham, F.W., C.B.E. The Ultra Secret. London: Weidenfeld & Nicolson, 1974.
- Wirtz, James J. "RMA: Caveat Emptor." Monterey, CA: Naval Postgraduate School RMA Conference Proceedings, August 1996.
- Wright, Quincy. A Study of War. Vol2. Chicago: University of Chicago Press, 1942.
- Wriston, Walter B. "Technology and Sovereignty." Foreign Affairs. 1988-89: 63-75.