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SDI: the social shaping of a nuclear umbrella

Ian David McNicol

University of Wollongong

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SDI: THE SOCIAL SHAPING OF A NUCLEAR UMBRELLA

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MASTER OF ARTS (HONOURS)

from

THE UNIVERSITY OF WOLLONGONG

by

ABSTRACT

In this thesis I consider the development of space-based ballistic missile defence in the late 1970's and early 1980's, leading up to President Reagan's speech on 23 March 1983, in which he announced a research and development programme to make nuclear weapons "impotent and obsolete". I focus on four groups, which I call the 'space-weapons lobby', which were pushing for the development of ballistic missile defence during this period: the 'laser lobby', High Frontier, Edward Teller and his colleagues, and a group of strategists from the Hudson Institute. The study of these groups is used for two purposes. Firstly, to explain how and why space-based ballistic missile defence came to be a national priority in the United States. Secondly, to explore and extend a model of the weapons development process based mainly on the work of Mary Kaldor, Donald MacKenzie and Graham Spinardi, and Langdon Winner.

I trace the evolution and progress of the 'space-weapons lobby', paying particular attention to the ideology of the different groups, the interests which they brought to bear on the problem of ballistic missile defence, and the way in which the ideology and interests of the different groups influenced the technologies which they were advocating for ballistic missile defence. I also consider the way in which the groups comprising the 'space-weapons lobby' attempted to sell the idea of space-based ballistic missile defence to the Reagan Administration, and the way in which the Army and the Air Force reacted to the proposals which they were putting forward.

An interesting feature of this case study is that all of the groups which comprised the 'space-weapons lobby' shared a common ideology which led them to advocate ballistic missile defence. This ideology was just that of the Committee on the Present Danger, which formed in the mid-1970's and set as its mission the revival of concern about the Soviet threat, and the reassertion of US military superiority. Although the different groups shared a common ideology, they were all pushing for essentially different technologies to implement this BMD system. The reason for this seems to have been the interests that these groups brought to bear on the problem. Thus, while the broad nature of the BMD system was largely shaped by the ideology of the groups, the components of the system were largely shaped by the interests. The final 'shape' of the ballistic missile defence system that the different groups advocated reflected an interplay between the ideology and the interests.
ACKNOWLEDGEMENTS

As this thesis involved the case study of weapons development in the United States, I am indebted to a number of individuals and organizations in the US who supplied me with information. I would especially like to thank Mr. Robert McCoid, Correspondence Coordinator of the High Frontier organization, who supplied me with the transcript of an interview with Daniel Graham and other material on the High Frontier study. I would also like to thank Senator Jake Garn, a member of the 'laser lobby', for responding to some questions concerning the activities of his group.

I am also indebted to Professor Gregg Herken, California Institute of Technology, who supplied me with the original draft of his article on the origins of 'Star Wars'; Mr. Kent Lee for supplying me with a copy of his thesis on the role of science advisers in the 'Star Wars' decision and some important articles; Senators J. Bennett Johnston and William Proxmire and their staff for supplying me with material on the progress of the Strategic Defense Initiative and the Pentagon's response to the High Frontier proposal; Rip Bulkeley, Department of War Studies, Kings College London, and Graham Spinardi, Science Studies Unit, University of Edinburgh, for supplying me with a copy John Bosma's memo and information about the 'Madison Group'; Professor Kosta Tsipis, Massachusetts Institute of Technology, and Professor Franklin Long, Program on Science Technology and Society, Cornell University for supplying me with references and copies of articles; and the Institute for Space and Security Studies, Spacewatch, Arms Control Association, John Hanrahan and Common Cause Magazine, American Association for the Advancement of Science, and the Strategic Defense Initiative Office for supplying me with information and copies of articles.

I would also like to thank the Strategic and Defence Studies Centre, Australian National University, for allowing me access to their library, and the staff of the University of Wollongong Library, the various libraries at the Australian National University, and the National Library for assistance with finding material.

Finally, I would like to thank my supervisor Dr. Brian Martin, for providing encouragement, advice and constructive criticism throughout the lifetime of this thesis. And the fellow postgraduates and staff in the STS Department who provided encouragement and support, and a few laughs along the way.
It is often true, in history, that the 'normality' of one time turns out -- a few decades later -- to have been absurd. The comfortable and powerful, who thought that they were actors, were only puppets whose arms and heads were moved by other strings.

[E. P. Thompson, *The Heavy Dancers.*]
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<td>Anti-Ballistic Missile</td>
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<td>ALL</td>
<td>Airborne Laser Laboratory</td>
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<td>ARPA</td>
<td>Advanced Research Projects Agency</td>
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<td>ASAT</td>
<td>Anti-Satellite</td>
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<td>ASC</td>
<td>American Security Council</td>
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<td>AWST</td>
<td>Aviation Week and Space Technology</td>
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<td>BMD</td>
<td>Ballistic Missile Defence</td>
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<td>BMDA</td>
<td>Ballistic Missile Defense Agency</td>
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<td>CDM</td>
<td>Coalition for a Democratic Majority</td>
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<td>CIA</td>
<td>Central Intelligence Agency</td>
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<td>CPD</td>
<td>Committee on the Present Danger</td>
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<td>DARPA</td>
<td>Defense Advanced Research Projects Agency</td>
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<td>DIA</td>
<td>Defense Intelligence Agency</td>
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<td>DSARC</td>
<td>Defense Systems Acquisition Review Council</td>
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<td>DSB</td>
<td>Defense Science Board</td>
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<td>ECAUD</td>
<td>Emergency Coalition Against Unilateral Disarmament</td>
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<td>GNP</td>
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<td>Intercontinental Ballistic Missile</td>
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<td>LoADS</td>
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<td>MAD</td>
<td>Mutual Assured Destruction</td>
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<td>MAP</td>
<td>Multiple Aim Point</td>
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<td>MAS</td>
<td>Mutual Assured Survival</td>
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<tr>
<td>MeV</td>
<td>Million electron Volt</td>
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<td>MHV</td>
<td>Miniature Homing Vehicle</td>
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<td>MPS</td>
<td>Multiple Protective Shelter</td>
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<tr>
<td>MV</td>
<td>Miniature Vehicle</td>
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<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
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<td>Reentry Body Identification Group</td>
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<td>Senate Armed Services Committee</td>
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<td>SDI</td>
<td>Strategic Defense Initiative</td>
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<td>SLBM</td>
<td>Submarine Launched Ballistic Missile</td>
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<td>TDS</td>
<td>Terminal Defense System</td>
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<td>TEL</td>
<td>Transporter-Erector-Launch</td>
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CH. 1: INTRODUCTION

1.1 THE 'STAR WARS' SPEECH

What if free people could live secure in the knowledge that their security did not rest upon the threat of instant U.S. retaliation to deter a Soviet attack; that we could intercept and destroy strategic ballistic missiles before they reached our own soil or that of our allies?

... I call upon the scientific community who gave us nuclear weapons to turn their great talents to the cause of mankind and world peace; to give us the means of rendering these nuclear weapons impotent and obsolete.

A world free of the threat of nuclear annihilation. Such was the vision that was offered by President Reagan in his "Address to the Nation" on the evening of March 23, 1983. This vision has since become the Strategic Defense Initiative (SDI), a multi-billion dollar research and development programme to develop an ensemble of land-based and space-based, conventional and exotic ballistic missile defence weapons in an attempt to erect a 'nuclear umbrella' over the United States. The SDI or 'Star Wars', has become the focus of a national, and indeed international, debate which has concentrated on the technical merits of such a system, on the economic implications of such a massive research and development project, and on the strategic implications of space-based ballistic missile defence.

There has been much less debate on how and why the Strategic Defense Initiative came about. Many of Reagan's advisers seem to have been unaware that the President was going to make the speech. John Gardner, Director of Defensive Systems at the Pentagon, and Robert Cooper, Director of the Defense Advanced Research Projects Agency, who together supervised most of the United States' research on ballistic missile defence, listened in surprise as the President elevated this research to a national priority. The assumption that has been drawn is that the decision to implement this new policy was largely taken by President Reagan. As Dr. George Keyworth, the President's Science Adviser, has said: "This was not a speech that came up; it was a top-down speech ... a speech that came from the President's heart".¹

It is the questions of how and why space-based ballistic missile defence came to be a national priority which will form one of the two main axes around which this thesis revolves. The other main axis is how technology in general, and military technology in

the United States in particular, comes to be shaped. I start by developing in section 1.2 a model of how the weapons development process in the United States operates, based largely on the work of Mary Kaldor, Donald MacKenzie and Graham Spinardi, and Langdon Winner. It is this model which is used to inform my analysis of the development of space-based ballistic missile defence in the late 1970's and early 1980's, leading up to President Reagan's March 23 speech. At the same time, I shall use the questions of how and why space-based ballistic missile defence came to be a national priority as a case study of the weapons development process, and thus to shed light on the model that has been developed.

1.2 THE SOCIAL SHAPING OF MILITARY TECHNOLOGY

Encapsulated within the term "arms race" is the notion that the weapons development process is driven by international competition between two or more states, such as the United States and the Soviet Union, through an action-reaction phenomenon. However, most of the recent writing on weapons development, particularly in the United States, has come down strongly on the side of domestic influences as being the most important determining factor, particularly in peacetime. Kaldor has noted that pressures for increases in military expenditure in the United States do indeed coincide "with growing fears about the Soviet Union, and with, perhaps, a wider sense of economic and social insecurity". But the type of weapons produced, she argues, "can only be explained in the terms of the structure of the military industrial institutions - the competitive dynamic of the armourers combined with the conservatism of the armed forces".

In peacetime, the weapons that are developed do not have to respond to actual military threats, and so do not undergo the "test of war". This is particularly so if we are considering the development of nuclear weapons and their supporting systems. Domestic influences tend to prevail in peacetime, Kaldor points out "because there are so many different ways of assessing and responding to the circumstances in which armaments might be used". In the absence of the "test of war" the quantity and nature of the weapons

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1 Former Secretary of Defense Robert McNamara is one of the strongest proponents of this view. In a speech in September 1967 in which he announced the plan to deploy the Sentinel ABM system, McNamara concisely stated this theory: "What is essential to understand here is that the Soviet Union and the United States mutually influence one another's strategic plans. Whatever their intentions or our intentions, actions - or even realistically potential actions - on either side relating to the build-up of nuclear forces necessarily trigger reactions on the other side. It is precisely this action-reaction phenomenon that fuels the arms race". (Lawrence Freedman, The Evolution of Nuclear Strategy, MacMillon Press, London, 1983, p. 254.)

the United States acquires is determined "as much by the environment in which we take decisions as it is by the posture of a potential adversary".¹

If domestic factors are taken to be the most important determinant influencing the weapons development process, then weapons technology can be analysed in much the same way as civilian technologies, albeit with different domestic institutions and social factors shaping the development of the weapons technology. MacKenzie and Spinardi, amongst others, have pointed out that discussions concerning the domestic influences on the development of weapons are characterized by two extreme views. On the one hand there is the 'hard' "technological determinist"² viewpoint which holds that weapons are out of control, that they are an independent variable which develop autonomously, driving the arms race and determining military strategy.³ An alternative to this 'hard' determinism, so-called 'soft' technological determinism, allows for slightly more human agency, but essentially still sees the development of weapons as being out of control. There are two slightly different forms of this 'soft' determinism. Firstly, the "technologist-out-of-control" argument holds that it is the weapons designers and developers (i.e. scientists and engineers) who, because of their expertise, take control of weapons development, and "build up a personal and institutional momentum" around various projects.⁴ Another form of 'soft' technological determinism has been called "technology creep".⁵ This is where the "advance of science and technology on a broad front will quietly but inexorably change the strategic landscape". For example, Dietrich

² MacKenzie and Wajcman define "technological determinism" as the view that firstly "technological change is in some sense autonomous, 'outside' of society, literally or metaphorically", and secondly that "technological change causes social change". See 'Introduction' to Donald MacKenzie and Judy Wajcman (ed), *The Social Shaping of Technology*, Open Uni. Press, Milton Keynes, 1985, pp. 4-5.
⁴ *Ibid.* MacKenzie and Wajcman point out that according to this view these technologists are "indeed members of society, but their activity is in an important sense independent of their membership of society. In the most common version of technological determinism, these technologies are seen as 'applying science', as working out the practical implications of new scientific discoveries. ... Scientists discover, technologists follow the logic of those discoveries in turning them into new techniques and new devices, and these techniques and devices are then introduced into society and have (often unpredicted) 'effects'". (D. MacKenzie & J. Wajcman, 1985, op. cit., p. 4.)
Schroeer has claimed that the advance of computer technology has been the major driving force behind the improvement of missile accuracy, calling forth new strategic doctrines.¹

At the other extreme of the spectrum are the 'hard' social determinist arguments, or the "politics-in-command" view in which technology is claimed to be merely a 'dependent factor' in the arms race, the technology and the technologists being under the control of the political leaders. According to this view, elite groups, such as the President and his Executive or the Office of the Secretary of Defense, consciously shape technology to meet their goals.²

MacKenzie and Spinardi, in exploring the development of weapons in the US Navy's ballistic missile programme, have concluded that the truth is much more complex than either of these two extreme views would suggest, and that it lies somewhere between the two:³

Technological change appears to be the outcome of a complex, interactive, and sometimes contradictory process. There is no single dominant determining factor which can be distinguished. Indeed, the social and the technical are hard to differentiate, and paths of influence are neither unidirectional nor stable in their effects through time.

They have argued, in a general way, that the development of weapons is influenced by both social and technological factors. In the social realm, technical choices are influenced by the 'macro politics' of US defence policy, by organizational politics of the different armed services (Army, Navy, Air Force), and by the 'micro politics' of the technical community.⁴ They point out that "the social' does not simply operate at the level of preferences between pre-defined technical options. It also shapes the options that are available, and may on occasion actually eliminate the possibility of explicit choice. The social can enter into the definition of what is possible".⁵ Russell has made a similar point. He argues that because the research and design processes are controlled by certain interests this means that "a limited number of trajectories are accepted as progress, that some criteria for 'improvement' are taken as given and others are ignored, that 'needs' are interpreted, and thus that many options never surface for 'selection' in any conscious sense". Such direction may take place, Russell claims, through institutional or financial means, "or more subtly through the training and ideology of personnel".⁶

¹ D. MacKenzie & G. Spinardi, "Politics and Technology ..", op. cit., p. 3.
² Ibid., p. 4.
³ Ibid., pp. 31-32.
⁴ Ibid., p. 12.
⁵ Ibid., p. 13.
While 'hard' technological determinism, or even the 'soft' versions of this cannot be sustained, MacKenzie and Spinardi argue that technology "is not simply a dependent variable either, as a simplistic 'social shaping of technology' view might have it. Instead, technology can sometimes be important as an enabling capability or a limiting constraint".\(^1\) Similarly, Winner points out that the extreme social shaping view, while it might provide an "antidote to naive technological determinism", has its own shortcomings. Taken literally, Winner argues, "it suggests that technical things do not matter at all".\(^2\)

'Enabling' technologies, MacKenzie and Spinardi argue, provide possibilities for the development of new weapons, but need not determine the actual course that is followed. It is important to remember that these technologies have themselves been socially shaped.\(^3\) Similarly, MacKenzie and Spinardi argue that technology can provide a limiting constraint to the weapons development process. They give as an example the physical size of submarine missile tubes, (which are related to the size of the submarine), which serve to limit the size of missile possible. However, such technical constraints may also be social.\(^4\) They conclude that: "Technological development thus has the potential to follow a number of different courses, rather than one single pathway. It provides capability and sets some constraints, but is profoundly shaped by social factors".\(^5\)

It is these domestic "social factors" which "profoundly shape" the weapons development process which I seek to map out. MacKenzie and Spinardi have not set them out explicitly, but point towards theories of 'bureaucratic politics' (albeit modified) as being the way forward. There is a need now, I think, to move beyond the knocking down of the "straw men" of 'technological determinism' and to a lesser extent that of 'social determinism', and to move towards a more sophisticated theory of how the weapons development process operates and how weapons are actually shaped, or at least to set out a methodological framework through which the weapons development process can be more sensibly analysed. Empirical studies would then serve to sharpen this model.

MacKenzie and Wajcman have argued that the 'bureaucratic politics' model has become the best developed approach to the shaping of military technology. According to this approach, countries are not seen as single actors, and weapons development is seen largely as the outcome of a process of bargaining and competition between bureaucratic

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\(^4\) Ibid., pp. 15-16.
\(^5\) Ibid., p. 17.
organizations. While the individuals within these organizations may see their goal as being the enhancement of national security, those with different 'institutional locations' may approach this goal in quite different ways. Given that it is the 'bureaucratic politics' model which is considered to be the best developed, one useful way to proceed is, I think, to pick up on one of the more sophisticated theories of weapons development that has been cast in the 'bureaucratic politics' mould and to move forward from this point. One such model is the notion of the "baroque arsenal" which has been put forward by Mary Kaldor.

I have chosen to adopt the 'bureaucratic politics' approach to the shaping of military technology in preference to the so-called "new sociology of technology" approach for two reasons. Firstly, I am interested in studying military technology at the systems level, in this instance the development of a ballistic missile defence system, and the general features of this system, such as the different types of weapons that are employed - ground-based and space-based, conventional and exotic. I am not interested in how the fine detail of these systems has been shaped. The "new sociology of technology" approach which is oriented towards micro-sociology would seem to be more appropriate to this latter endeavour. Secondly, I believe that it is important to study the shaping of technology at the systems level because this provides a context for studying the shaping of the components of the system.

MacKenzie and Spinardi point out that 'bureaucratic politics' is sometimes taken to mean that only domestic considerations have an effect on the development of weapons, the 'Russian Threat' being only an "image conjured up by domestic forces - and conjured up in a form that best suits domestic forces". This, they point out, may be partially true, but it is neither "theoretically logical or empirically supportable" to discount all 'external factors'. "Empirically it seems beyond dispute that Soviet behaviour has made a difference". Kaldor has resolved this conundrum by distinguishing between a systemic aspect of the demand for weapons, that is, the "potential requirement for weapons as defined by the international situation", and the institutional aspect of the demand for

3 D. MacKenzie & G. Spinardi, "Politics of Technology ..", op cit, p. 27.
weapons, that is, the way in which the systemic aspect is "mediated by the perceptions of the armed services, various bureaucratic departments and politicians".\(^1\)

Mary Kaldor has applied a 'bureaucratic politics' approach to the weapons development process in Western, industrialized, capitalist nations - in particular in the United States. The starting point for Kaldor's argument is her notion of the 'weapons system', around which the armed forces have become functionally organized.\(^2\) The 'weapons system' is both a technology\(^3\), and a social organization. At the level of technology it consists of the weapon delivery system, or delivery platform, and the weapon, combined with the means of command and communication. In addition, the 'weapons system' includes the body of "interrelated knowledge, and a set of linked techniques" needed to develop, produce and operate the weapons hardware. At the level of social organization it consists of "people and institutions who possess the knowledge and are responsible for the technology - scientists, engineers, workers managers, soldiers, technicians, bureaucrats" and so on. "They possess their knowledge as members of the social organization and not as individuals".\(^4\)

Kaldor argues that the major weapons systems serve two functions. Firstly, they act to differentiate the individual armed services as military units "through independent strategies associated with particular weapons systems". Secondly, they serve to define the lines of command within the different armed services.\(^5\) For example, the US Navy is organized hierarchically into task forces. At the apex of each task force is the aircraft carrier, which requires destroyers, submarines and aircraft for protection, and supply ships of various kinds for replenishment. The bomber and the battle tank are held to play a similar role in the Air Force and the Army.\(^6\)

It is to these weapon systems - a technological system interlinked with a social organization - that Kaldor applies the theories of bureaucratic politics. She points out that bureaucratic politics models cannot, in themselves, explain technological change. They point only to the "overwhelming conservatism of military institutions, armed services and 

\(^3\) Kaldor uses 'technology' in the same way that it is defined by MacKenzie and Wajcman, to have three 'layers' of meaning: (i) hardware; (ii) technique, or how to use the hardware; and, (iii) technical know how. (D. MacKenzie & J. Wajcman, op cit, pp. 3-4.)
\(^6\) M. Kaldor, "The Armament Process", op. cit., p. 204.
bureaucratic departments"; all they can show is "that the future will look much like the past".¹ This conservatism, Kaldor argues, "can partly be explained by the uncertainties that exist in the absence of the test of war", the military clinging to the technologies that have been proven in past use. As each service, and military unit, is associated with a certain military mission, and the capabilities required to undertake this mission have become embedded in both the weapons and the social organization of that military unit, any radically new technologies pose a risk for organizational survival, and so tend to be resisted.²

What bureaucratic politics models can explain is how "bureaucratic politics mediates an impetus for technological change". Such an impetus might come from the political leadership (for reasons of demand) or from other domestic institutions, although "evolutionary" technological change might occur in the absence of other pressures for technological change. In the absence of wars Kaldor argues that "impulses for radical technical change" must come from what she calls supply-side factors.³ Kaldor argues that there are two types of supply-side institutions: "those associated with the invention stage of the weapons succession process and those associated with the innovation stage". Those associated with the invention stage are primarily government, university, or private non-profit laboratories. From these institutions new military technologies emerge, "some of which may be 'revolutionary' in the sense that they challenge existing doctrine and organization". Kaldor argues that many of these "revolutionary" technologies emerge from the defence laboratories, "and sometimes acquire maverick constituencies within the armed forces".⁴ However, she does not go into detail as to how this process might operate.

At the innovation stage, Kaldor argues that, in general, it is necessary to differentiate between institutions for development and production. In the case of the US, she points out, the so-called "prime contractors" generally undertake responsibility for both the development and production of complete weapons systems.⁵ These prime contractors are the manufacturers of weapons platforms, usually large aircraft, shipbuilding, automobile

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³ Ibid., p. 583.
⁴ Ibid., pp. 583-584.
⁵ Ibid., p. 584.
or engineering companies. The 'primes' assemble the complete weapon system, and subcontract out the subsystems - like the weapons and the electronics - thereby creating an interdependent network of big and small companies. They tend to specialize in particular types of weapons systems. For example, Boeing, General Dynamics, and Rockwell make bombers; Grumman and Vought make fighters for the Navy; McDonnell Douglas and General Dynamics make fighters for the Air Force.¹

The prime contractors and their related subcontractors tend to dominate particular regions, and thus the economic impact of producing a particular weapons system may be very great within these regions. Many thousands of people may work on a single defence contract. "And", Kaldor points out, "if we also take into account the fact that many small firms which produce both military and civil goods are dependent on the military market to ensure their survival, then it is evident that the defence industry is deeply embedded in the economy as a whole". This means that large defence contracts and the large defence contractors can build up a political constituency in these regions, which will act to pressure Congress for the continuation of existing weapons programmes and the development of new ones.²

The prime contractors expect their defence divisions to be profitable. They are thus constantly seeking to maintain or increase profit margins and searching for new markets. Kaldor points out that US defence contractors frequently testify to the intensity of competition over defence contracts.³ Although they are in some sense "commercial" enterprises, the defence divisions of the prime contractors are also dependent on the military - or, more specifically, on one branch of the armed services - for the bulk of their contracts. Thus they must obtain continuous contracts to ensure capacity employment.⁴ The technical and management personnel who work on defence programs become geared to the advanced military technology and complex equipment. The firms are not oriented towards civilian technologies, and do not have a true commercial orientation. "By the time a firm has developed the personnel, facilities and equipment to handle large defence programs, management must keep the company operating at or near full strength or risk serious losses".⁵

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¹ M. Kaldor, "The Armament Process", op. cit., p. 265; M. Kaldor, The Baroque Arsenal, op. cit., pp. 10-11; Kaldor points out that there are "literally thousands of subcontractors, some of whom are very large and are prime contractors themselves. In addition to the subcontractors there are also many suppliers. (Ibid., p. 11)
² Ibid., pp. 11-12.
⁴ Ibid.
⁵ M. Kaldor, The Baroque Arsenal, op. cit., p. 50.
This, according to Kaldor, is "particularly important with respect to research and development", as "in practice, production capacity fluctuates substantially". On the other hand, research and development makes use of more specialized equipment and more highly skilled workers than does production. The defence contractors, who depend on their technological capabilities in order to obtain contracts, cannot afford to disband design teams. "Hence", Kaldor argues, "whereas military units may be preoccupied with continued operation, the main supply enterprises are concerned with continuous development and, to a lesser extent, production".\(^1\) That this is so, Kaldor argues, "is suggested by the fact that the useful life of weapons systems tends to correspond to the manufacturing cycle. As development ends on one weapons system, development begins on another, and as production ends on one system, it begins on another".\(^2\)

In order for the prime defence contractors to ensure the continuous development that they require, they must obtain new orders "as soon as development of a particular weapons system is completed". Because the contractors are dependent on the military, the new orders are for new weapons systems. This process Kaldor has called the follow-on imperative.\(^3\) As part of this process, the defence contractors "all" have planning groups who attempt to "predict what a particular branch of the armed services might require when current projects come to an end; and the various ways the corporation might meet that requirement". These planning groups work closely with similar groups in the military, and, Kaldor claims, "Because of the relationship with the armed forces, particularly during the so-called concept-definition phase, the prediction tends to become a self-fulfilling prophecy".\(^4\) It is this effort to obtain follow-on orders which generates the intense competition between the contractors which has already been alluded to. The competition between the defence contractors takes on a technological rather than a price form and, Kaldor argues, is directed toward product rather than toward process improvement. "That is why the companies compete by offering technological improvements that will appeal to their customers, the armed forces".\(^5\)

Kaldor points out that the "shape" of the follow-on system is "severely constrained by the organizational rigidities of the armed forces". The new technologies will "only get through the innovation and integration stages if they conform to the requirements" of the particular branch of the service they are being developed for. It is acceptable for these technologies to be quite radical in themselves, but they must fit within the framework that

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\(^1\) M. Kaldor, "The Weapons Succession Process", op. cit., p. 266.
\(^2\) M. Kaldor, The Baroque Arsenal, op. cit., p. 50.
has been established by the weapons system. The designers themselves are the products of their military-industrial environment. Although it is the competition between the prime contractors which tends to drive the weapons development process, "this technological dynamism is confined within certain limits - limits that are defined by the stability of military and industrial institution, and stability which is guaranteed by the planning system". The result is an entirely introverted form of technological change; Kaldor has termed this "contradictory conservative but dynamic" form of technological change "baroque".¹

MacKenzie and Spinardi, while arguing that the 'bureaucratic politics' model "captures much of the complexity of organizational interactions which result in the formulation of policy, and the production of technology" level a number of criticisms at the theory as it has been formulated so far, and point to a number of factors which "need to be woven into the 'bureaucratic politics' framework to provide a satisfactory explanation of technological change".²

Firstly, they argue that neither the Executive Branch nor Congress have been irrelevant to the weapons development process, as a simplistic reading of 'bureaucratic politics' might imply.³ Kaldor, to a certain extent seems to fall into this trap, concentrating mainly on the relationship between the military and the defence contractors. The importance of Congress has been studied most closely by Gordon Adams. Adams argues that the arms race is driven by an 'iron triangle', that is, "a political relationship that brings together key participants in a clearly delineated area of policy making". The three sides of this triangle are the "Defense Department (plus NASA and the nuclear weapons branch of the Department of Energy); the House and Senate Armed Services Committee and Defense Appropriations Subcommittee, as well as Congressional members from defense-related districts and states; and the firms, labs, research institutes, trade associations and trade unions in the industry itself".⁴ Adams seems to underrate the importance of the President and the Executive Branch. MacKenzie and Wajcman argue that the President and the Office of the Secretary of Defense are also "key actors" in the weapons development process, and are in some sense 'above' the other organizational actors. However, the armed services are not under the direct political control of their political superiors, but lobby actively for their goals. The relationship between the President and the Office of the Secretary of Defense and the armed services "is more appropriately described as

¹ Ibid., p. 585; M. Kaldor, The Baroque Arsenal, op. cit., p. 49.
³ Ibid.
'bargaining' than as political command", MacKenzie and Wajcman argue. Other "actors" which perhaps should have a place in the 'bureaucratic politics' model of weapons development are the State Department, and organizations within this such as the Arms Control and Disarmament Agency.

Schurmann has argued that the office of the President of the United States is of prime importance in the policy making process, particularly in the area of foreign policy and defence. This is so, Schurmann argues, partly because of the President's constitutional powers, but also because it is the American public's "sense of security" which is important in determining the level of support which can be obtained for a change in defence policy. The President is "in the most decisive position to influence the public's sense of security" according to Schurmann. Further, the President occupies a special position at the apex of all the federal government bureaucracies. He is therefore in a position to arbitrate in disputes and competition between the armed services and other bureaucracies, and to impose a decision upon them.

The bureaucratic politics model is further complicated, MacKenzie and Spinardi claim, by the need to consider the different levels at which the organizational actors operate. They delineate three such levels for the weapons development process in the United States: (i) rivalry between the different armed services; (ii) intra-service rivalry between the various military units within the one service; and, (iii) bureaucratic disputes which occur between groups within a certain military unit. These latter arise, they claim, because a complex weapons system is usually divided into subsystems which are worked on by small groups.

Secondly, they point out that in addition to focusing on the organizations directly involved in weapons development the 'bureaucratic politics' model must take into account the wider political context. Any analysis of the weapons development process needs to take into consideration the fact that during the 1970's and 1980's there was a shift away from the liberal 'dovish' stance - typically supportive of arms control and the doctrine of mutual assured destruction - towards more conservative 'hawkish' stance which is opposed to arms control and favours the development of offensive weapons as part of a war-fighting

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1 Ibid.
3 Ibid., pp. 21, 25.
strategy. To this could be added the need to set the weapons development process in the international context as well.

Thirdly, MacKenzie and Spinardi argue that 'bureaucratic politics' as ordinarily understood tends to underestimate the significance of the production of military technology. They argue that issues of producibility and reliability have an influence on the technical choices that are made in the weapons development process.

Although Kaldor's concept of 'baroque' technology extended to handle the criticisms put forward by MacKenzie and Spinardi goes a long way to explain the type of technology that is developed by the United States and the reasons for this, it does not take into account the fact that the weapons may serve a function beyond their military or economic role. That is, that the weapons may have an ideological content, and serve, in part, some ideological mission. Merritt Roe Smith argues that it is important to emphasize "that technologies necessarily reflect the values and aspirations of their makers. Such norms, whether consciously espoused or not, pervade the entire spectrum of the development and are particularly important in setting the subsequent course of new technologies."

The notion that technologies might come contain the ideologies of those in control of the development process has been expressed forcefully by Langdon Winner. Winner argues that we need to "pay attention to the characteristics of technical objects and the meaning of these characteristics". He identifies two ways in which "artifacts can contain political properties". Firstly there are "instances in which the invention, design, or arrangement of a specific technical device or system becomes a way of settling an issue in a particular community". Secondly there are cases of what Winner calls 'inherently political technologies', that is, "man-made systems that appear to require, or be strongly compatible with particular kinds of political relationships". For our purposes, it is Winner's first argument about the way in which technology has a political nature that is important. Winner argues that the greatest latitude of choice exists "the very first time a particular instrument, system, or technique is introduced. Because choices tend to become strongly fixed in material equipment, economic investment, and social habit, the original flexibility vanishes for all practical purposes once the initial commitments are made".

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2 Ibid., p. 29-30.
5 Ibid.
6 Ibid.
1.3 OVERVIEW OF THE THESIS

In this thesis I shall use the development of space-based ballistic missile defences in the late 1970's and early 1980's, what eventually became President Reagan's Strategic Defense Initiative, to explore, refine and extend the model of the weapons development process that I have developed in section 1.2. With reference to this model, the case study that has been chosen is somewhat limited because it does not deal with the whole weapons development process - from conception through to development and deployment - but only with the early formative stages, leading up to the decision, announced by President Reagan on March 23, 1983, to launch a research and development programme to make nuclear weapons "impotent and obsolete".

In studying the early development of space-based ballistic missile defence I will focus on the factors that shaped the weapons development at this very early stage, and the factors that drove the process along. According to the model, the main driving factors should be the weapons laboratories and the prime defence contractors. I shall study four groups which were providing the "impulse" for weapons development: the 'laser-lobby' which was pushing for the development of space-based chemical lasers; High Frontier which was pushing for the deployment of orbiting 'space-trucks' which fired 'conventional missiles'; Edward Teller who was pushing for the development of space-based x-ray lasers; and, a group of strategists from the Hudson Institute who were pushing for the deployment of terminal defence systems to protect MX missiles. The first two of these groups were linked to defence contractors, the third to the weapons laboratories, and the final group to the military. These groups, which I have called collectively the 'space-weapons lobby' are studied in Chapter 2.

Based on the model of the weapons development process that has been developed it would be expected that the "impulse" provided by the 'space-weapons lobby' would be mediated by the military bureaucracy. In Chapter 4 I investigate the way in which the Army and the Air Force reacted to, and in fact opposed, the proposals that were being put forward by the 'space-weapons lobby'. I also focus on the role that was played by the Executive Branch and Congress in the early development of space-based ballistic missile defence, and the way in which this role was influenced by the wider political context and the public perception of the 'Russian threat'. This is dealt with mainly in Chapter 5, in which I investigate that factors which led to President Reagan making his March 23 speech.
One theme which it is my intention to pursue specifically is Winner's notion that technology comes to embody the ideology of the groups which have control over the shaping process. Thus, one of the main aims of my study will be to map out the ideology of these different groups. An interesting feature of the case study is that the different groups which comprised the 'space-weapons lobby' all operated within a similar ideological framework. This ideological framework was that of the Committee on the Present Danger, a group which was influential in publicly selling the notion of a growing Soviet threat throughout the second half of the 1970's, and which had close connections with the Reagan Administration. The link between the 'space-weapons lobby' and the Committee on the Present Danger is explored in Chapter 3. Even though sharing the same ideological framework, these groups were all pushing for different technological solutions to the problem of ballistic missile defence - largely because of the different interests which were represented within the groups - and so to a certain extent were in competition with each other. Within each of these groups I shall seek to examine the interplay between their ideology and interests, and the consequence that this has for the weapons development process.
CH. 2: THE SPACE WEAPONS LOBBY

2.1 INTRODUCTION

A new push for the development of ballistic missile defences emerged in the United States towards the end of the 1970's, partly in response to some of the new technologies that were being developed in the weapons laboratories and by defence contractors, and partly in response to a new perception of the Soviet threat that had been popularized by groups such as the Committee on the Present Danger. In this chapter I concentrate on four main groups that were involved in the new push for ballistic missile defences: the so-called 'laser lobby' led by Senator Malcolm Wallop and his aide Angelo Codevilla; Daniel Graham and the High Frontier study group; Dr. Edward Teller and his colleagues from Lawrence Livermore National Laboratory; and, a group of strategists from the Hudson Institute, Colin Gray and Keith Payne in particular.

All of these groups were advocating some form of ballistic missile defence, though based on different technologies. The 'laser lobby' advocated laser battle stations in space; High Frontier advocated orbiting 'space trucks' which fired missiles at ICBMs as they rose above the atmosphere; Edward Teller advocated x-ray lasers based in space or popped up from a patrolling submarine; and lastly, Colin Gray and Keith Payne advocated the point defence of MX missile silos using fairly conventional technologies that were being developed by the Army, perhaps followed by space-based laser weapons at some stage in the future. In this chapter an attempt is made to trace the evolution and progress of these groups, noting in particular the ideologies and assumptions which inform their advocacy of ballistic missile defence, and the form that such a defence should take. I also consider the interests which these different lobby groups brought to bear on the problem of ballistic missile defence, and the way in which these interests helped to shape the technical form of the system that was proposed. Finally, I consider the links which the different groups had with the Reagan Administration, which in 1983 initiated a national research and development programme incorporating all of the different technologies that the space weapons lobby was proposing.

2.2 THE LASER LOBBY

On Hallowe'en 1977 Dr. Maxwell Hunter, an executive of Lockheed Missiles and Space Company, in Sunnyvale, California, wrote a paper entitled "Strategic Dynamics and Space-Laser Weaponry", which outlined his views on the international balance of power. Hunter, who was familiar with Lockheed's secret research on space-lasers, had

become captivated by their "revolutionary potential", and when classification rules allowed, wrote his paper and sent it to a few key defence planners and federal officials. Hunter's paper apparently created a small sensation at this time, but it was not to be until a year and a half later that his ideas would be actively pushed by what came to be known as the 'laser lobby'.¹ The central idea in Hunter's paper was that new technologies, particularly laser-weapons, held the promise of being able to shoot down Soviet ballistic missiles in flight, thus ending the reign of MAD and its concomitant "balance of terror".² "It would be a terrible thing", said Hunter, "to condemn the human race to live forever in a grotesque world of Mutual Assured Destruction, if in fact, the advance of technology had given us the means to create more human alternatives".³

Hunter was concerned that under the doctrine of MAD, ballistic missiles with nuclear warheads had come to be considered the "ultimate weapon", against which defence was well nigh impossible. It had become dogma, argued Hunter, "that there was no way to stop ballistic missiles after their launch", this having the unfortunate consequence of preventing the United States⁴ from launching its weapons through fear of retaliation.⁵ He argued that through the advance of technology, the time had come to implement a new strategic posture. Space transportation would be used to place high energy lasers in space, so that an effective defence against "massive ballistic missile exchanges" and high altitude bombers would soon be possible. Further, this system would have the added advantage that it "would utilize no weapons of mass destruction. Instead, a small but very adequate amount of energy would be placed very precisely at great ranges upon the necessarily flimsy vehicles which deliver the weapons of mass destruction".⁶

Survival, Baen Books, 1984. Hunter, then 61 years of age, was an aeronautical engineer with a long association with the defence industry. He had started at Douglas Aircraft Co. where he had worked on missiles, including the first anti-missile and anti-satellite programmes. Hunter began working for Lockheed in 1965, where he had helped design the fore-runners of the space shuttle. He had spent two years on the National Space Council advising Presidents Kennedy and Johnson. ("Maxwell Hunter: The Force Behind Reagan's Star Wars Strategy", Business Week, June 20, 1983, p. 40.)

² "Maxwell Hunter: The Force ...", op. cit.
⁴ In this thesis I use the terms United States, US military, US government, Soviet Union, Soviet military, Soviet government, and so on as a form of short hand. It is not meant to imply that any of these can be viewed as a single actor, it is just done for simplicity.
⁶ Ibid., p. 228.
It was in January 1967 Maxwell Hunter first realized that lasers in space presented a "spectacular new strategic option". He was familiar with studies that had been conducted in the 1960's which considered the use of rockets launched from orbiting satellites to intercept missiles in their boost-phase, but he considered that such a scheme would require "vast quantities of interceptors for effective defense coverage", and that it was both economically and technically unfeasible. However, with the emergence of the Space Shuttle, and its potential for greatly reducing space transportation costs, and of high energy lasers which could deliver their destructive energy with precision and at the speed of light, Hunter thought that it would be possible to overcome the shortcomings of the conventional technologies. According to Hunter's calculations for laser weapons in polar orbits, it would require 406 orbiting battle stations if the lasers had a range of 1,000km, 21 if the range could be extended to 5,000km and only 9 if the range could be extended even further to 10,000km. To Hunter, these laser battle stations represented a revolution in weapons development:

The ability to concentrate beams of energy moving at the velocity of light so narrowly that they overwhelmingly exceed nuclear bomb energy density delivery capability should be recognized as a weapons achievement with implications every bit as shattering as the development of the monstrous but uncontrolled energy release of the nuclear bombs themselves. This is interception par excellence.

Laser weapons in space had the added advantage of being weapons of discrete destruction, rather than of mass destruction, which, argued Hunter, "is crucial for the human decision process".

Hunter did not have purely defensive applications in mind for his orbiting laser weapons. As well as their potential to circumvent MAD, he argued that laser weapons in space could be used to gain tactical advantages, by beaming down from above to destroy airplanes, helicopters and tanks, and other such targets that one would want to destroy with pin

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1 Ibid., pp. 228, 232-233.
2 Hunter thought that it would also be possible to generate directed energy beams using electrons or larger particles, but he considered only the use of lasers as these were likely to be the most effective directed energy weapon. (Ibid., p. 234.)
3 Ibid., pp. 234-235.
4 Ibid., p. 235.
5 Ibid., p. 235. By placing laser weapons in space, it would be possible to intercept enemy missiles during their boost-phase when the missiles were most vulnerable as (1) minimum energy was required to destroy the missile as it was at maximum internal pressure and the tank walls were at maximum temperature; (2) they generated massive exhaust plumes which enhanced detection; (3) the destruction of the missile would destroy all of the MIRVed warheads that it contained; and (4) kill assessment would could be achieved reliably and accurately by measuring a change in the missile's velocity. (Ibid., pp. 236-237.)
6 Ibid., pp. 234-236.
point accuracy. Another motive seems to have been to lure wars away from earth and out into space. "If one must fight", argued Hunter, "it would be desirable to fight decisive strategic battles in an arena where no human lived. Space is that arena ... one where an advanced strategic arsenal can be detonated in its entirety with no direct damage to the earth or its peoples". Orbiting laser weapons would act as a magnet that attracted wars into space, by "strongly upsetting the opposing earth-bound strategic force balance".

The United States was, argued Hunter, the nation that was best placed to take advantage of these new technologies, and would stand to benefit most from them, being the strongest nation - both technologically and economically - but also running into diplomatic and military problems maintaining its overseas forces and base structure. Hunter realized that it would not be an easy matter to convince either the military or arms controllers of the wisdom of his high-technology strategic vision, the military having a vested interest in a "violent offensive capability", and the arms controllers arguing that all weapons technology was bad. "Both parties would much rather hold all peoples, young and old, as hostages to the Balance of Terror." For Hunter, the position taken by the arms controllers was most worrying. If his strategic vision was ignored and arms control blindly pursued, he thought that it might place the United States in a disastrous position with respect to the future. Laser weapons in space, on the other hand, had the potential to place the US in a commanding position compared to its current situation. Lasers in space could fight and win the "impossible battle", stopping a full-scale ballistic missile attack with little cost to the defended area. However, once taken up, this strategic option required permanent vigilance against the possibility that "such a space weapon force could be defeated in space by a superior ... force of like composition. One would have to maintain his space laser force second to none into the future in order to remove the Balance of Terror permanently from this land".

Early in 1979 Maxwell Hunter visited Senator Malcolm Wallop (R - Wyoming), and, reportedly, found him reading a copy of his 1977 paper. According to Hunter, Wallop looked up and exclaimed: "By God we're going to do something to defend this country!" Wallop had been impressed by Hunter's paper so Wallop and his aide Angelo Codevilla

1 Ibid., pp. 238-239.
2 Ibid., pp. 231-232.
3 Ibid., pp. 233-234.
5 Ibid.
6 Ibid., p. 244.
7 I will use the common short-hand form of indicating which political party a politician belongs to and which area they represent. In this case Wallop is a Republican senator from Wyoming. If a politician is a Democrat then the abbreviation D will be used.
8 "Max Hunter; The Force ...", June 20, 1983, op. cit.
urged Hunter to join with other proponents of laser weapons to take his proposal further. By November 1979 Codevilla and Hunter had put together a group of experts from private industry: Joseph Miller from TRW, which was building large chemical lasers, Norbert Schnog of Perkin-Elmer, which was building large precision optics, and Gerald Ouelette of Charles Stark Draper Laboratories, which was working on pointing, tracking and fire control, who without their companies' blessings prepared a classified briefing on how orbiting laser battle stations could be used to destroy missiles. Then, under Senator Wallop's auspices, Hunter's team conducted a series of briefing sessions. Firstly, there were two dry runs for 10 congressional aides, and then a group of four followed by another group of eight senators from the Senate Intelligence and Armed Services Committees.

The members of the Hunter's team all came from companies which were working on contracts for the Defense Advanced Research Projects Agency's (DARPA) Space Laser Triad, a programme to develop on the ground the subsystems that would be required for a space-based chemical laser battle station. It was planned that these subsystems would be tested in 1983-1985. This programme consisted of three elements. Alpha was a project to develop a 5-megawatt hydrogen-fluoride chemical laser. There had originally been three companies competing for the Alpha project, TRW, Rockwell's Rocketdyne Division and Bell Aerospace Textron, but by 1980 Bell had been eliminated. Talon Gold was a project to develop technologies to acquire targets in space and for the pointing and tracking of space-based lasers. Two teams of contractors were competing on this project, one comprised of Rockwell International and Hughes Aircraft as associate contractors, and the other of Lockheed as the prime contractor with GTE Sylvania, Ford Aerospace and Hughes Aircraft. Lode was the Large Optics Demonstration Experiment which aimed to fabricate and control on the ground a 4-meter diameter mirror of the type required for a space-based laser. Two teams of contractors were competing on this project, one comprised of Hughes Aircraft with Perkin-Elmer, and the other of Lockheed Missiles and Space Company with Itek.
At the Senate briefings Maxwell Hunter provided information on the systems aspects of a space-based laser and the engagement of Soviet missiles; Joseph Miller provided information on chemical lasers; Gerald Oulette provided information on pointing and tracking technology for space-based lasers; and, Norbet Schnog provided information on the optical systems necessary for space-based lasers. The group claimed that an effective ballistic missile defence of the United States could be provided by the mid to late 1980's at a cost of US$10 billion, by placing 18 high-energy laser battle stations in polar orbits at an altitude of 1750km.¹ Conservative senators were reported to have shown the most interest, especially Senators Henry Jackson (D-Washington), Jake Garn (R-Utah), John Tower (R-Texas), and Harrison Schmitt (R-New Mexico), although a number of liberals too were supposed to be "flirting with the idea" of backing a space based laser defence on the grounds that it might be cheaper than building more offensive weapons.²

As well as the congressional briefings, Hunter's so-called 'gang of four' conducted briefings for Pentagon officials. Their proposals were reported to have been widely denounced as being "premature and unrealistic". Officials from the Army and the Defense Department charged that the group had not considered countermeasures, and that state-of-the-art technology for the sensors and complex battle management required was not available. They ran into further trouble when they conducted a briefing for two Army generals who were in charge of conventional ballistic missile defence programs.³ The generals were outraged by the civilian lobbyists who were advocating exotic technologies in competition to their own, more conventional, programmes. The Defense Department put pressure on the group's employers to keep the members of the briefing team out of Washington. As the members of Hunter's team had no official standing, and as Hunter's employer (Lockheed) was an Army BMD contractor⁴, the team soon disbanded. The Senate forces were not so easily distracted. Led by Senator Wallop and his aide Angelo Codevilla, they continued to lobby Congress and the Pentagon, arguing that the pursuit of strategic defence based on laser weapons in space was a saner policy than MAD.⁵

¹ 1982, pp. 15-16. In 1980 DARPA selected Boeing for a follow-on effort to integrate the three triad subsystems for an overall "end-to-end" demonstration, in a programme called Systems Integration of Triad Technology (SITT). ("Laser Applications in Space ...", op. cit.)
⁴ One of these was almost certainly Major General Grayson Tate, Ballistic Missile Defense Programme Manager.
Wallop's first lobbying effort in the Senate, an attempt in 1979 to pass a bill appropriating money for laser development, apparently also ran into trouble when it was rebuffed by Senator John Tower of the Senate Armed Services Committee and the Air Force as being premature. Frustrated, Wallop went public with his campaign in an attempt to muster more support. One example of this campaign was a paper under the authorship of Malcolm Wallop that appeared in the Fall 1979 edition of *Strategic Review*. The main point that Wallop was trying to get across in this paper was that technology was making the "balance of terror" obsolete, and now promised a "considerable measure of safety from the threat of ballistic missiles".

According to Wallop, between 1966 and 1979 America had been in the "iron grip" of the doctrine of Mutual Assured Destruction, and the possibility of a nuclear conflict was not taken seriously. This meant that both strategy and weapons development aimed to inflict damage on the Soviet Union, rather than limiting the Soviets' ability to inflict damage on the United States. However, he argued, proponents of MAD, and especially of arms control under the guise of SALT, had now been discredited. Not only were the Soviets involved in a massive arms build up, but they were also working on antiballistic missile defences with more verve than the US. Wallop reflected nostalgically on a period when the US military possessed "unquestioned strategic nuclear superiority" over the Soviet military, when "even with its then inaccurate missiles" it could have launched a "disarming strike at Soviet missiles deployed in 'soft' launch pads, while retaining most of its force in reserve". The strategy of MAD was the main vehicle through which this situation had been reversed, so much so that "a small portion of the Soviet missile force [was now] capable of destroying nearly all American land-based missiles in their silos, thereby blunting the United States' capability to inflict retaliatory destruction upon Soviet society".

Wallop argued that through the SALT I treaty the US government had bargained away an ABM system, *Safeguard*, which even though it possessed certain faults was, nonetheless, superior to the Soviet ABM system. The Soviet military, argued Wallop, had

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2 Malcolm Wallop, "Opportunities and Imperatives of Ballistic Missile Defense", *Strategic Review*, Fall, 1979. (It is claimed by Gregg Herken that this paper was actually written by Angelo Codevilla. Gregg Herken, letter to Ian McNicol, 15 December, 1987.)
3 Malcolm Wallop, "Opportunities and Imperatives ...", op. cit., p. 13.
no system comparable to *Sprint* (one of the components of the *Safeguard* system); their phased array radars were primitive, and computers too slow to handle the data rates required to track and discriminate incoming missiles.\(^1\) However, new technologies were now being developed which promised to overcome the problems experienced by the early ABM systems. But these were just technical possibilities, the reality of the situation being that since the signing of the ABM Treaty in 1972 the US military had actually dismantled its only ABM site and had not moved to capitalize upon the new technologies.\(^2\)

In contrast, argued Wallop, "since SALT I the Soviet Union not only has sustained its allotted ABM site, ... but it has constructed the foundation for a nationwide ABM system". It was constructing four huge phased-array radars, and had continued to conduct ABM research, bringing them to a level of technology comparable to that of the United States at the start of the seventies. All that was now needed to install a nationwide ABM system of the *Safeguard* type was to mass-produce the missiles and the small radar involved. While such a system, in American hands, was not all that threatening, Wallop argued that in Soviet hands it "looms as more significant", because of their contrasting strategic posture: \(^3\)

If the Soviets, following the path inherent in their strategic deployment, were to aim a disarming strike at the vulnerable land-based U.S. Minuteman force, they could then concentrate their ABM's against the residual American force of submarine-launched missiles. If by the late 1980s the United States were to go ahead with the production and deployment of modernized MX land-based missiles, Soviet ABMs could provide a respectable point defense of Soviet weapons against the MX.

The new technologies that Wallop thought looked promising for the defence against long-range ballistic missiles were directed energy weapons, in particular laser weapons, because it was "far from clear" that particle beam weapons could ever "figure conclusively" in ballistic missile defence. Further, these laser weapons would be required to be based in space where they could attack the missiles in their boost-phase (where they were slower, more detectable and softer, and the multiple warheads had not been deployed), thus rendering a "radical improvement" in performance over the conventional ABM systems. Stationed in space, Wallop argued, "each of these weapons may project its

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1 *Ibid.* The *Safeguard* system was claimed by Wallop to be "potent but obviously limited" because its radars and computers could handle only a limited number of incoming missiles and could be easily overwhelmed; the cost of the defence required to shoot down an extra missile was greater than the cost of the extra missile; and, it would not provide a perfect defence, some warheads always getting through. (*Ibid.*, pp. 15-16)


energy for thousands of miles, only a few dozen of these weapons could conceivably destroy a whole fleet of ballistic missiles".\(^1\)

The ABM system that Wallop advocated was comprised of several dozen laser weapons systems deployed in space, a system he argued which would "revolutionize the strategic equation as we have known it for nearly two decades - above all by decisively tipping the balance of modern warfare in favor of the defense and radically mitigating the potential destructive effects of war". There were two possible lasers that could be used as the active element of such a system: chemical lasers which produced an infrared beam or Eximer lasers which produced an ultraviolet beam. Wallop felt that the chemical lasers should be used, as they were "much closer to being ready for use in space because they require relatively little heavy equipment".\(^2\) Other elements of the system included a large main mirror to focus the beam over long distances, an accurate tracking and pointing mechanism to point the infrared beam at a target missile some three to four thousand miles away and to hold it there for the few seconds required to destroy the missile, and sensors to detect that the missiles had been launched and a computer and communications system to assign each target to the laser battle station that was in the best position to engage it. Wallop argued that each of these technologies was now in place in the United States and could be integrated into a potent ABM system and placed in orbit by the mid-1980's if the political will to do so existed.\(^3\)

What was necessary, argued Wallop, was an all-out effort to build a space-based laser ballistic missile defence system on the scale of the Manhattan Project. What stood in the way of this were those in the scientific and technical community, and the Carter Administration and its congressional allies, who were committed to the doctrine of Mutual

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1 *Ibid.*, p. 17. Wallop argued that particle beams were peculiarly ill suited to deployment in space as (i) they would require such an enormous power source to drive them that deployment in space would be impractical, and (ii) the beam would be bent by the earth's magnetic field making accurate firing difficult. However, even though Wallop thought them impractical he argued that "despite their limitations, particle beam weapons could join the Soviet weapons inventory in the mid-1980's". (*Ibid.*, p. 18.)

2 *Ibid.*. Chemical lasers produced an infrared beam by burning hydrogen and fluorine. The products of this reaction needed to diffuse quickly into an area of low pressure. The vacuum of space provided an ideal working environment for such a weapon. Eximer lasers produced an ultraviolet beam by exciting molecules of xenon and krypton with electricity or nuclear radiation. They would thus require large power sources. (*Ibid.*)

3 *Ibid.*, p. 19. This system would comprise about two dozen laser battle stations, each in an earth orbit of 800 miles, and with an effective range of some 3000 miles. Each laser battle station would carry enough fuel to fire 1000 'shots', and thus would be able to cope with a full-scale attack launched by the Soviet Union.
Assured Destruction. What Wallop's project stood for was a new strategic doctrine. It was not a weapon of mass destruction: "The laser does not loom as a weapon of mass destruction", Wallop claimed, "it threatens nothing except weapons of mass destruction". In light of the Soviet military's emerging offensive superiority vis-a-vis the US military, "what responsible American official", asked Wallop, "could counsel rationally that the U.S. forfeit the opportunity of effective defense? And, for that matter, what sincere advocate of arms control could not bring himself to admit that 'Assured Protection' would be preferable to 'Assured Destruction'?"^2

Wallop and his allies kept the fight for space-based laser weapons alive in congress, pushing the same line that Wallop had put forward in his paper, and arguing that such a system "could dramatically boost defenses against land- and sub-launched missile attacks". This fight, which pitted a "cadre of Senate Republican staffers plus their allies in the aerospace industry against the Carter Administration Defense Department establishment" was about how fast such weapons should be developed. In 1980 Wallop was seeking a US$10 billion crash development programme over three to five years to develop a space-based laser BMD. He introduced an amendment to add US$160 million to the fiscal 1981 defence budget, and Jake Garn an amendment to add US$60 million for space-based laser BMD. In early July 1980, the Senate group lost this skirmish by a vote of 52-39, the Administration arguing that the weapons should not be brought into the military inventory until the 1990's. However, a small group of aerospace analysts led by Maxwell Hunter "did manage to persuade the Senate in top secret briefings to add [US]$22 million to the defense appropriation for laser development" and to generate support for the laser weapon concept as a way of redressing the "deteriorating balance of power between the US and the Soviet Union".4

The "cadre of senate staffers" was otherwise known as the 'Madison Group', a "particularly well-connected, powerful but discreet" group of "ultra-conservative" congressional aides, who came together on January 4th 1980 in Room 607 at the Madison Hotel at the initiative of Senator Jesse Helm's assistant, John Carbaugh, who, in 1979 had helped organize successfully the opposition to ratifying the proposed SALT II

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1 Ibid., p. 20.
2 Ibid., p. 21.
The group consisted of about a dozen men, all present or former Congressional staffers, and all hawks on foreign policy and defence issues. They met every other Friday for lunch, to devise strategies to oppose arms control, increase military spending, and provide assistance to anti-communist forces in South America. Besides John Carbaugh, the group is reported to have included Angelo Codevilla, Tidal McCoy and Mark Schneider (Senator Jake Garn), Sven Kraemer (Sen. John Tower), Richard Perle (ex-Sen. Henry Jackson), William Schneider (Representative Jack Kemp), Quentin Crommelin (Sen. Strom Thurmond), David Sullivan (Sen. Gordon Humphrey), Jack Davis (Sen. Stone), Robert Andrews (Sen. Glenn), Margo Carlisle (Sen. McClure), and Michel Pillsbury. Also, Charles Kupperman of the Committee on the Present Danger was a member, as were Seymour Weiss and William Van Cleave, and Maxwell Hunter is reported to have been associated with the group. Eugene Rostow claimed that the 'Madison Group' was a group of young neo-conservative ideologues who wanted no arms control with the Soviets, were "neo-isolationist", and distrustful of all foreigners, even America's allies. This was in contrast to what he called 'old-line conservatism' espoused by himself and Paul Nitze. As well as having close links with the members of the 'laser lobby', the 'Madison Group' was also well placed to influence the Reagan Administration in the early 1980's, through membership of the President-elect's transition team.

Eugene Rostow considered Richard Perle to be the "intellectual leader" of the 'Madison Group'. Perle was both an ABM supporter and a hawk from way-back. In 1969 he was hired as the chief research assistant for the Committee to Maintain a Prudent Defense Policy, which had been set up by Albert Wohlsetter, Paul Nitze and Dean Acheson to counter the anti-ABM campaign that was being waged at the time. After this he moved on

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3 Ibid.
4 Ibid.
5 Identified by Eugene Rostow in an interview in Gregg Herken, *Counsels of War*, op. cit., pp. 394, 326.
7 Ibid., pp. 325-326, 329.
8 Carbaugh, Kraemer, McCoy, Perle and Schneider were on Reagan's Defense Transition Team; Pillsbury and Sullivan were on the Arms Control Transition Team; Carbaugh and Perle were on the State Department Transition Team; and Codevilla and Schneider were on the CIA Transition Team. (William Safire, "The Madison Group", *op. cit.*)
9 Gregg Herken, *Counsels of War*, *op. cit.*, p. 326.
to work for Senator Henry Jackson and became notorious for his strong opposition to the SALT treaties.¹

The failure of the 'Madison Group' to win the Senate battle for immediate full scale development funding for chemical laser weapons in 1980 reportedly made them more determined than ever to succeed under the Reagan Administration. Their opposition to arms control was redirected from SALT II to the ABM Treaty. After Reagan had been elected, the Group continued to meet for its weekly lunches, despite being driven out of the Madison Hotel for short time by the glare of unwanted publicity.²

The group known as the 'laser lobby' seems to have been a fairly loose coalition of mainly Republican Senators - who supported space-based lasers for a variety of reasons - linked through the membership of their aides in the 'Madison Group', and through a shared world view, in which the Soviets were seen as a growing and ominous threat, and space-based laser BMD the best way to curb this threat. The group was led by Senator Malcolm Wallop (R-Wyoming) and also included Senators Harrison Schmitt (R-New Mexico), Henry Jackson (D-Washington), Jake Garn (R-Utah), John Tower (R-Texas), William Roth (R-Delaware) and Representative Jack Kemp (R-New York). Jake Garn has suggested that Senator Pete Domenici (R-New Mexico) was a member of this group also.³

Although the 'laser lobby' seems to have been a loose coalition, all members shared a common ideology. They argued that SALT I was a bad and fundamentally flawed treaty, and that SALT II was even worse. A typical view was that expressed by Jack Kemp, who contended that SALT I had "done something worth doing - badly (limiting offensive

¹ Fred Kaplan, The Wizards of Armageddon, Touchstone, New York, 1983, pp. 387-388. An example of Perle's thinking at this time is provided by an article in Strategic Review. In this he argues that the SALT II Treaty will constrain the US but allow the Soviets to forge ahead with the development of offensive weapons, so that eventually they will have the capability to stage a "knock-out-blow" against US land-based ICBMs. Perle blames this situation on arms control advocates who have lobbied against new weapons programmes and the CIA who, he claims, have constantly underestimated the Soviet capabilities. Perle argues that the situation that the US faces in the early eighties is comparable to that of the British facing the Germans in the 1930's. (Richard Perle, "Echoes of the 1930's", Strategic Review, Winter 1979, pp. 12-13.)

² Rip Bulkeley & Graham Spinardi, op. cit., p. 64. 18 months later John Carbaugh resigned from congressional service, his role in the group reportedly being taken up by Angelo Codevilla. (Ibid., p. 330)

³ Rip Bulkeley & Graham Spinardi, op. cit., p. 69; Kent D. Lee, op. cit., p. 68; Jake Garn, letter to Ian McNicol, 10 December, 1987. (Garn claims that his role was "confined to support for the Senators who were actively lobbying the Administration").
weapons), while doing something not worth doing - too well (limiting ABM deployment)."¹ It had not constrained the build-up of the Soviet military's offensive power but had bargained away the US military's superior ballistic missile defence system. Throughout the 1970's the Soviet government had outspent the US government and indulged in a massive build up in offensive strategic weapons, while the US had stood still, or even gone backwards, so much so that the Soviet military was considered to be vastly superior, and the United States vulnerable to a first strike attack. If the SALT II treaty were to be adhered to, this would only set this dangerous vulnerability in concrete.²

To make matters worse, not only were the SALT treaties bad treaties, but the Soviets were held to cheat on them, especially the 1972 ABM Treaty. Three main supposed violations were frequently cited: (1) the Soviet military had constructed a number of large phased-array radars; (2) they had deployed a semi-mobile ABM radar, the ABM-X-3 - comprised of the Flat Twin radar and SH-04 and SH-08 missiles - at a site on the Kamchatka Peninsula; and, (3) they had conducted more than fifty tests of the SA-2 and SA-5 SAM air defence interceptors in the ABM mode.³ Much of this world view was based on publications put out by the Committee on the Present Danger, and by writers such as Paul Nitze and Richard Pipes who were prominent in this committee. The answer to the problem of the Soviet threat was seen to lie in the deployment of space-based laser ABM defenses, and possibly also more conventional systems such as LoADS being developed by the Army.

Jake Garn provides an interesting example of the diverse reasons that brought the various senators to align themselves with the 'laser lobby'. In Garn's case, although he undoubtedly shared the world view of the other members, it seems to have been largely in response to the strong opposition which arose in his state to the basing of the MX missile in the so-called race-track mode, the mode preferred by the Air Force.⁴ The Air Force's

⁴ Race-Track involved a US$30 Billion construction programme to build 4,600 barn sized concrete and steel missile shelters in 200 clusters of 23 each, scattered throughout the Great Basin Desert of Utah and Nevada. One MX missile would be located in each of these clusters and
own environmental impact statements showed that the project would place a severe strain on already scarce water supplies, lead to a permanent increase in air pollution, destroy vast areas of vegetation, and encourage the spread of the noxious weed halogeton which was poisonous to sheep and cattle, and could contaminate the soil for up to 50 years. In addition the project was to be built on land considered sacred by the Duckwater Shoshone Indian tribe. Not surprisingly, this particular MX basing mode met strong opposition from local activist groups - environmental groups, the Shoshone Indians, and groups of cattlemen and ranchers - and national environmental groups, especially in Utah, which was also feeling the effects of a huge energy project to extract oil from tar sands and oil shale, and to mine coal and uranium.¹

The opposition of the environmental movement was joined on 5th May 1981 by a strong moral sanction from the Mormon Church. Church President Spencer Kimball came out strongly against the MX missile, arguing that it was a "denial of the very essence" of the church's gospel of "peace to the peoples of the earth". They argued not only to keep the missiles out of Utah and Nevada, but to find an alternative plan altogether: "With the most serious concern over the pressing moral question of possible nuclear conflict", the church elders said, "we plead with our national leaders to marshal the genius of the nation to find viable alternatives which will secure ... protection from possible enemy aggression, which is our common concern". The message was wired to the Utah and Nevada Congressional delegations and to President Reagan whose Administration was, at the time, reviewing options on how to deploy the MX.²

The public impact of the statement by the Mormon leader was significant. In a survey commissioned in Salt Lake City in June 1981, shortly after the release of the statement, 76% of those questioned were opposed to the basing of the MX in Utah, whereas only a few months earlier it had been about 50%.³ Initially the Congressional delegation in Utah, shuttled between the shelters by gigantic 26-wheeled mobile transports.

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³ Many Mormons regard statements made by the President of the Church to be divine direction. Utah had a population of 1,460,000, with about 1 million of these being Mormons. Nevada with a population of 800,000 had about 56,000 Mormons. William E. Schmidt, "Public Mood in Utah and Nevada Turns Sharply Against MX Plan", New York Times, June 8, 1981, p. 1.
all of whom were Republicans and active Mormons, reacted cautiously to the statement. Likewise the Nevada delegation. All supported the MX programme, but withheld judgement on the basing mode. Eventually, the weight of public opinion became too much, and Senators Jake Garn of Utah and Paul Laxalt of Nevada, both hawks with direct access to the White House, came out strongly against the MX deployment plan. On June 25th, 1981, Garn and Laxalt publicly rejected the Air Force's MX plan and presented an alternative plan to Deputy Defense Secretary Frank Carlucci, who passed it on to the President. Prominent in their list of several alternative basing modes was a plan to deploy 200 MX missiles in existing Minuteman silos and protect them with BMD, and to accelerate ABM research so that a full-scale ABM system could be deployed by the mid 1980's. This proposal seems to have been in accord with the Reagan Administration's own thinking at the time.

Senator Harrison Schmitt, a former astronaut, and Senator William Roth (R-Delaware) were attracted to the notion of BMD for economic reasons. In June 1981, they came out strongly against the MX race-track basing mode, arguing that it was an "ill-considered scheme of monstrous economic and societal proportions and of questionable economic and technical validity". What was required was a strategic defence system that would "make weapons of mass destruction obsolete". Allocating US$40 to $50 billion to the race-track scheme would be a waste of money, they argued, and would direct funds away from the development of ballistic missile defence. Senator Pete Domenici, a member of the 'laser lobby' who seems to have become active in early 1982, took a very much similar position to Schmitt and Roth. By this time, the Reagan Administration had abandoned the race-track basing mode, and had identified three alternative basing modes for the MX missile: (1) stationing them in deep underground silos; (2) basing them on continuous airborne patrol; and, (3) protecting them with ballistic missile defences. Domenici was Chairman of the Senate Budget Committee, and was an advocate of BMD

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1 Paul Laxalt was considered to be President Reagan's closest friend and adviser in the Senate.
3 When first in office, members of Reagan's Defense Transition Team were reported to be concerned that the Utah-Nevada basing plan would take so long to complete that most US land-based ICBM's would remain vulnerable until the 1990's. They favoured a plan in which more underground silos were built and the missiles shuffled between these. (Walter S. Mossberg, "MX Missile Plan ...", op. cit.)
as it promised to be the most cost-effective way to protect the MX missile against the threat of Soviet attack.\(^1\) In 1980 Domenici had requested the Los Alamos National Laboratory to conduct a study of the advances that had been made in BMD technology since the signing of the ABM Treaty in 1972. The study concluded that the "future of ballistic missile defense is dominated by the potential for directed-energy weapons to intercept ballistic missiles in the boost phase".\(^2\)

Even though they suffered set-backs, the 'laser lobby' led by Wallop and backed up by groups such as the 'Madison Group' kept pushing their concept, with some success. They argued that it may be possible to create a "laser umbrella" much more cheaply that previously imagined\(^3\), some supporters such as Senator Harrison Schmitt going so far as to claim that "a really fool proof system, possibly using satellite-borne laser weapons, would end the nuclear-arms race once and for all".\(^4\) The 'laser lobby' now had much more support, as a dozen of the senators who had voted against Wallop's 1980 proposal had now been replaced.\(^5\) In 1981, Wallop's group proposed that an extra US$250 million be spent on laser weapon research in 1982, in addition to the US$136 million the Administration was proposing. In early May 1981, Wallop sent a "dear colleague" letter to other senators indicating that he would introduce an amendment to the Armed Services Authorization Bill to add US$152.5 Million to DARPA's budget for its laser triad programme and US$97.5 million to the Air Force budget to "expedite the building of a space laser weapon". According to Wallop: "Laser battle stations [were] not something out of 'Star Wars'", but that "Actual physical pieces of the system exist". Only the money and the political will to build them was missing. Wallop estimated that such a system could be developed by 1985 and in orbit the following year, for a cost of US$2-3 billion.\(^6\)

When introduced, Wallop's amendment was supported by about 10 other Senators, and the chances of the bill passing looked quite promising.\(^7\) But the 'laser lobby' ran into

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2 "Technology Eyed to Defend ICBMs, Spacecraft", op. cit., p. 34.
5 Henry S. Bradsher, "Pentagon, Contractors at Odds...", op. cit., p. 5.
7 Supporting Wallop's amendment were: Jesse Helms (R-North Carolina), John East (R-North Carolina), Steve Symms (R-Idaho), Orrin Hatch (R-Utah), Paul Laxalt (R-Nevada), Barry Goldwater (R-Arizona), William Armstrong (R-Colorado), Robert Dole (R-Kansas), S. Hayakawa (R-
problems with the Pentagon. A briefing on space-based lasers prepared by DARPA was held up in the Pentagon, which seems to have stopped the White House adding its approval to the amendment, and a report by the Defense Science Board (DSB) was not favourable on the near-term prospects of space-based lasers. The DSB report did recommend that US$50 million be added to the budget for research in this area. Wallop's original proposal was rejected in favour of a US$50 million add on - US$20 million for DARPA and US$30 million for the Air Force - for laser system integration and the establishment of a space-laser program office within the Air Force, passing in the Senate by a margin of 91 to 3. This compromise amendment was put by Harrison Schmitt and Malcolm Wallop.¹

The following year the group ran into major problems in its quest to promote space-based chemical lasers, the so-called 'laser-wars' erupting on Capitol Hill. The 'laser-wars' took place between factions in the Senate and House Armed Services Committees who were advocating lasers of different wavelengths for use in space-based BMD. The House committee fired the first shot when it said that the Administration's US$156 million programme for fiscal 1983 for the development of space-based lasers might well result in a technical fiasco. The report on the Defense Authorization Act from the House committee released in April 1982 argued that "emphasis is being focussed on the wrong laser technology", as short wavelength lasers were more lethal.² They were joined in their opposition to chemical lasers by the Defense Science Board. The laser programme that the House was objecting to was DARPA's Space Laser Triad based on a 5-megawatt infrared chemical laser. They argued that the shorter the wavelength of the laser, the more lethal the beam would be as the beam would be more concentrated and could deliver more energy to the missile. Chemical infrared lasers would be easy to defeat by using ablative coatings on the missile, or by polishing the surface of the missile to reflect the beam, it was argued.³

In its April report the House Armed Services Committee called for a cut of US$121 million from the Administration's request, including the termination of the Alpha and Lode projects and US$41 million that had been allocated to the Air Force for research on

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³ Ibid.
space-based laser weapons. In place of these the committee called for a US$50 million programme to explore short wavelength lasers, in particular free-electron lasers, and the addition of US$2 million to the Advanced Test Accelerator at Lawrence Livermore laboratory, so that it could be modified for free-electron laser experiments. Malcolm Wallop, who was now advocating a 10-megawatt laser with a 10 meter mirror, and who had managed to insert an amendment in the original Senate legislation calling for the testing of DARPA's space laser triad in space, led the fight against the House. Wallop asked from the Senate floor whether we should wait "to build the infra-red lasers we know how to build, and instead put our money on the short wavelength lasers we do not yet know how to build? ... We are faced with two sharply contrasting sets of claims in this field. The bureaucracy's claims which are reflected in the [House] Armed Services Committee's report, and my claims, backed by the only source of facts in the field: the aerospace industry".1 DARPA Director Robert Cooper told the Senate Defense Appropriations Subcommittee that the House action would end the deployment of space-based laser weaponry for the time being and would push deployment back to the mid to late 1990's. Eventually a compromise was reached between the two committees whereby the funding for the Alpha and Lode projects was restored, but US$40 million for the Air Force and US$2 million for the Advanced Test Accelerator was left out of the budget. These funds were divided between a US$20 million study of laser "vulnerability and lethality" and a US$20 million addition to short wavelength laser research by DARPA. The joint committee also deleted language inserted by Senator Wallop which directed DARPA to test the Alpha, Lode and Talon Gold projects in space rather than on land.2 Members of the Senate claimed that the joint Senate-House meeting was called in the wake of lobbying efforts by George Keyworth, the President's Science Adviser, and Robert Cooper, both of whom were said to be in favour of increasing development of short-wavelength lasers at the expense of chemical lasers.3

Once the Reagan Administration was in power, the arguments of the 'laser lobby' no longer fell on deaf and unsympathetic ears. The administration was reported as early as 1981 to be studying the potential of ballistic missile defence as a way of making "weapons of mass destruction practically obsolete by neutralizing them".4 Both Senators John Tower and Harrison Schmitt discussed the possibilities of the new defensive

1 Ibid.
technologies with President Reagan early in his first term. Schmitt met with Reagan on 12 December 1980, and after the meeting said that Reagan had voiced concern that the policy of MAD held "tens of millions of people hostage to annihilation in order to maintain a deterrent". He had, according to Schmitt asked about the technological possibility of altering that policy towards one of protection rather than mutually assured destruction. Schmitt told the then president-elect that alternative weapons could indeed be developed if it became national policy. According to Schmitt, Reagan "expressed a strong interest in the possibility of developing a laser defense against ballistic missile attack". The president-elect's Defense Transition Team was reported to have told key congressional Republicans that one of its top priorities was to increase spending on a laser weapon to shoot down ballistic missiles in their boost phase. Schmitt is also reported to have discussed with Defense Secretary Caspar Weinberger the need for space-based ballistic missile defence.

Malcolm Wallop and his aide Angelo Codevilla also lobbied the President and his advisers on the need for a space-based ballistic missile defence. In late 1980, Wallop spoke of the "vigorous attempts" that had been made to gain the support of Reagan, then President-elect. Wallop was keenly aware that Congress would "support an Executive Branch decision to move into this new area, but without presidential support, it will be difficult to get support in Congress". In mid 1981 Wallop discussed with Weinberger the prospects for space-based laser systems, and Weinberger was reported to be "open-minded", but not so sure that it could be accomplished within the next decade and was worried about the cost.

In October 1981, Dr. George Keyworth, the President's Science Adviser, told an audience of two hundred aerospace executives that he had spent most of his time trying to head off the public pressure for building space weapons. In mid-November 1981, Wallop and Codevilla sent a letter to White House Chief of Staff James Baker urging that Keyworth be reprimanded for opposing space-based lasers and for professing to be

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1 Ibid.; Rip Bulkeley & Graham Spinardi, op. cit., p. 69.
4 C. Robinson, "Beam Weapons Technology Expanding", op. cit., p. 43.
"fundamentally frightened" at the idea of developing laser ballistic missile defenses. The duo also urged the administration to make clear its position on strategic defense.¹

Wallop and Codevilla met with Weinberger again in early September 1982. Also present at the meeting were Richard DeLauer, Undersecretary of Defense for Research and Engineering, Fred Ikle, Undersecretary of Defense for Policy, and Alan Pike, the Acting Director of DARPA's Directed Energy Office. After the meeting Wallop said that he was impressed with Weinberger's position on strategic defense. It was claimed that Weinberger had endorsed a US space-based ballistic missile defence system and that he had directed the Defense Department to pursue this technology as rapidly as possible.²

2.3 HIGH FRONTIER AND THE HERITAGE FOUNDATION

Lt. General Daniel Graham, US Army (Ret.), was one of the earliest, and remains one of the strongest proponents of strategic defence. Graham's interest in the need for strategic defence arose while he was Director of the Defense Intelligence Agency (DIA), where he began to be concerned that the strategy of Mutual Assured Destruction (MAD) was not working because the Soviets were taking advantage of the United States, particularly in respect of the ABM Treaty. In a study undertaken by Graham shortly before he left the DIA in 1976 he argued that:³

... everything I can see with regard to Soviet activities in the strategic defense field indicates that they are preparing to break out of the ABM Treaty. I indicated that I couldn't make the case for whether they think we are going to give up on the idea of no defense or whether the Soviets themselves will simply break out of the treaty ... that was not evident to me. But it was evident from their defense activities which already violated the ABM treaty, particularly using SAM radar sets against ballistic missiles that the Soviets didn't believe that the ABM treaty ... was going to hold up.

Graham pursued this theme in a number of books he wrote after retiring from the army, the first called *New Strategy for the West* written for the right-wing Heritage Foundation, and the second, in 1979, *Shall America Be Defended?* In this latter book Graham did not make a case for any specific type of strategic defence, but argued that "the strategy of deterrence based strictly on offensive forces was wrong, and that strategic defenses were required".⁴

¹ Gregg Herken, "The earthly origins ...", op. cit., pp. 20-21.
³ Transcript of interview with Lt. General Daniel O. Graham by Lt. Col. Baucom, 7 July 1987, pp. 1-2. (Interview supplied by the High Frontier organization.)
⁴ Ibid., p. 2. Graham, in the interview with Baucom, claims that *Shall America Be Defended?* was co-authored with Angelo Codevilla of 'laser-lobby' fame. The actual book does not mention Codevilla at all. The
In 1979 General Graham began to focus more on the possibility of space-based defence systems, setting up, with Brigadier General Robert Richardson, USAF (Ret), a small group to look at the space aspects of strategic defence. This group also included the Hon. John Morse, who had been Assistant Secretary in ISA during the Nixon Administration, and later expanded to include Dr. Peter Glaser of Arthur D. Little Company, Arnold Kramish, who had been a physicist on the Manhattan Project, and Fred "Bud" Redding Jr. of Stanford Research Institute (SRI) International. Bud Redding, who was interested in pushing the concept of a small space vehicle, was to play an important part in the early shaping of what was to become the High Frontier project. "It was from his work", said Graham, "that the idea for these little space "garages" that housed the little rockets that would serve as kinetic kill vehicles [came]."

By the end of 1979 this informal discussion group of six had reached two conclusions, one technical and the other political. Firstly, they concluded that a combination of ground- and space-based systems would provide an adequate approach to missile defence; secondly, that "the MAD strategy could be changed", and further, that "the technology to make this change was not way off in the future, but relatively close in". It was this initial study group that eventually led to the setting up of the High Frontier study group, which arose out of a disagreement between members of President Reagan's Transition Team after his 1980 election.

Daniel Graham was one of the first to make contact with Ronald Reagan to discuss his ideas about strategic defence. Shortly after retiring from the Army, Graham received a call from Edwin Meese asking him to be an adviser on military matters in Reagan's 1976
campaign to win the Republican nomination. Graham claims that even at this time Reagan had doubts about the efficacy of MAD: "He said it didn't make any sense to him. It was like two men with cocked pistols pointed at each others head; if either man even flinched, then you blew each other's brains out". In the lead up to Ronald Reagan's 1980 Presidential campaign Graham was again asked to be an adviser. It was during this time, in February 1980 in Nashua, New Hampshire, that Graham first briefed Reagan on the ideas about space-based strategic defence that had been developed by his informal study group. Before a debate between Reagan and George Bush, Graham broached the idea of strategic defence with the future President. Reagan was, according to Graham, very interested, taking out his cards and writing notes to himself on the subject.

Although Reagan may have been interested in Graham's ideas about strategic defence, other members of Reagan's advisory team were quite hostile. Early in the campaign Graham was among those arguing that the only viable approach to cope with growing Soviet superiority was to implement a basic change in US strategy and make a "technological end-run on the Soviets". According to Graham, all of Reagan's advisers agreed with this initially, "in principle" at least. But as time passed they began to concentrate on the amounts of money needed to resurrect old and revitalize on-going Pentagon programs, and on the "quick fixes" necessary if the United States were to hold its own within the doctrine of MAD. New offensive weapons programs were recommended to "plug as quickly as possible the strategic gaps between the U.S. and Soviet capabilities which [were] known collectively as 'the window of vulnerability'." According to Graham, a certain level of coolness developed in the Reagan camp between his school and the one led by Paul Nitze and William Van Cleave. Graham's school was advocating the use of space based strategic defence as a vehicle to implement a change of strategy away from MAD, whereas the other school was advocating a more conventional strategy, the strengthening of deterrence through a massive build-up in conventional and nuclear weapons. Both schools saw their strategies as ways of regaining American military superiority. Graham argued that this latter strategy would just lead to bankruptcy, and would not be supported in Congress. Further, it was futile, accelerating

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1 Transcript of Graham interview, 7 July 1987, op. cit., pp. 2-3.
2 Graham met with Reagan and Paul Laxalt and a few others toward the end of 1979, and Reagan asked him to be an adviser. (Ibid.)
3 Ibid., pp. 4-5.
an arms race in offensive weapons that the US could not win "because the Soviets [were] already producing weaponry like sausages".¹

Throughout the campaign, and in the transition period after Reagan's election, Daniel Graham continued to press his case, an endeavour that would place him outside the circle of Reagan's close advisers. Graham, in a letter to General Edward Meyer, Chief of Staff, US Army, tells Meyer that he "continued to insist that such an end-run was both vital and feasible and got myself and others who agreed with me cut out of the pattern" in about mid-1980.² After this, in early 1981, Graham discussed his ideas with Representative Newt Gingrich (R-Georgia), who shared Graham's conviction that large increases in the military budget would not negate the Soviet threat and would not receive public support, and who was working in conjunction with Representative Ken Kramer (R-Colorado) to establish a Consolidated Space Command within the Air Force. They argued for a new strategic approach and a technological end-run on the Soviets to meet the President's commitment to a "margin of safety".³

After the Reagan campaign was over, Graham was determined to "flesh out" the idea of space-based strategic defence by bringing together some scientists and engineers who knew more about the subject than his initial 'gang-of-six'. Graham attended a meeting at the White House with President Reagan and his advisers in February 1981 and told the President that he thought he had found an answer to the issue of strategic defence, and sought a meeting with Defense Secretary Casper Weinberger to brief him on this. The meeting was arranged by James Baker, and according to Graham Weinberger's response was:"That is very interesting and I would like to hear more about it as you develop the concept".⁴

Even in these early stages, before the High Frontier study proper was set up, Graham and his colleagues seem to have had the proposal fairly well fleshed out, although the exact technologies that would be used was still in some doubt. Graham, in 1981, then Co-Chairman of the hawkish Coalition for Peace Through Strength, was arguing that if pursued vigorously the United States could "create space-borne capabilities which would neutralize the Soviet strategic nuclear threat" by the mid-1980's. This was part of a "Peace Through Strength" strategy, which required that Mutual Assured Destruction be rejected,

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¹ Ibid.
strategic defence reemphasized, the notion of strategic balance be deemed unacceptable, and a technological end-run be launched on the Soviet Union.\(^1\) According to Graham superiority was a perfectly reasonable objective for the United States to pursue. "One day", he said, "one nation or ... a consortium on nations is going to establish the same kind of domination out there that the British once had over the high seas".\(^2\)

In terms of technology, Graham was advocating a fleet of unmanned space vehicles ("cruisers") which would destroy large numbers of Soviet missiles in their boost phase. Early in 1981, Graham thought that these would use high-energy laser weapons to destroy ICBMs\(^3\), but by mid-1981 he thought that they would use heat-seeking missiles or missiles that fired a cloud of ball bearings, and then change over to laser weapons when these became available. Such a system would require a fleet of some 200 to 300 orbiting space cruisers as well as a manned space vehicle to control and maintain them.\(^4\) As well as these space-based battle stations Graham thought that it would be prudent to deploy, as quickly as possible, some of the least expensive ground-based BMDs being developed by the Army, and also had notions of placing large solar power panels in space, using them to sell power to third-world countries in return for their "raw materials and their good behaviour, for that matter".\(^5\) He thought that the American public would find this proposal most attractive: "Some public support would be based on a well-founded displeasure with a business-as-usual approach to defense and an understanding of the technological possibilities. But much would be based on the general interest in space and a partly romantic inclination enhanced by enormously popular fictional space adventure stories such as Star Trek, Star Wars, etc."\(^6\)

Shortly after the meeting with Weinberger, Graham made a speech at Frank Barnett's National Strategy Information Center. In the Audience was Karl Bendetsen, Chairman of the Board of Champion International Corporation. Bendetsen was impressed, and praised

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4 Stephen Webbe, "Station US ABM's in orbit...", op. cit., p. 12; Daniel Graham, "bold strokes...", op. cit., p. 59; Bruce Ingerson, "'Star Wars' not just fantasy", Chicago Sun-Times, June 21, 1981, p. 55 sec. 2. These space cruisers were the ones being advocated by Bud Redding. SRI had developed a conceptual design for the space cruisers under a contract initiated by one of the intelligence agencies, but later transferred to DARPA and the Defense Department's Strategic and Space Systems Office. (Clarence Robinson, "Beam Weapons Technology Expanding", op. cit., p. 40.)
6 Daniel Graham, "bold strokes...", op. cit., p. 59.
Graham after the speech, telling him that it was a marvellous idea that really had to be pushed. Graham told Bendetsen that he needed to raise money, so that he could bring in specialists to develop his concept further, and Bendetsen agreed to help. However, even with Bendetsen's help Graham seemed to be having trouble getting his study group off the ground. He approached Edwin Meese to give him a hand to collect money, and also tried to set the project up under the auspices of the American Security Council. In the latter case, Graham ran into trouble and was eventually taken off the ASC pay-roll by John Fisher who "wasn't very keen on this idea". Finally, the Heritage Foundation came to the rescue: Ed Feulner, the Heritage Foundation's President, agreed to let Graham have the cheques for the study made out to the Heritage Foundation so that donors could receive a tax deduction, and also provided office space. On September 1, 1981 the study which would eventually be published as High Frontier in March 1982, got underway.

By the summer of 1981 Graham began to contact technical people to become involved in his study. The team that Graham was able to assemble with the help of Karl Bendetsen included some hangovers from his previous study group: Brigadier General Robert Richardson, formerly of the Air Force Systems Command, who advised on the problems of acquisition; Dr. Arnold Kramish, who was chief scientist for the study; Bud Redding of SRI, who was advocating the orbiting space trucks and space cruiser; and, Dr. Peter Glaser of Arthur D. Little, who was the architect of the solar powered satellite system and was High Frontier's expert on civil space systems. Other members of the technical study group included Dr. Edward Teller, (and possibly Dr. Lowell Wood), from Lawrence Livermore National Laboratory; Major General Stewart Meyer, formerly commander of the Army's Ballistic Missile Defense Command in Huntsville, Alabama, and High Frontier's expert on point defence; Cresson Kearney, a civil defence consultant who was High Frontier's expert on civil defence; Dr. Mose Harvey, editor of *The Soviet World Outlook*, who was High Frontier's analyst on the Soviet reaction; and, Dr. Jim Daugherty of the University of Virginia who predicted the probable European reaction to the High Frontier proposal.

1 Transcript of Graham interview, July 7, 1987, op. cit., p. 7. Karl Bendetsen's own company Champion International contributed US$15,000 to the cause, but the largest donation came from Gus Bunder, a St. Louis Lawyer who donated US$100,000.
2 Ibid., pp. 7-8.
3 Ibid., p. 7.
4 "Selling the High Frontier Defense Strategy", op. cit., p. 170. Other names that are mentioned in conjunction with technical aspects of the High Frontier study are Orlando Johnson, Dr. Ralph Nansen and Frank Olsen, engineers from Boeing Aerospace in Seattle. Johnson was, apparently, so enthusiastic about the idea that he took two months leave from Boeing to work for Graham. (Transcript of Graham interview, July 7, 1987, op. cit., p. 17); Robert Squire of Lawrence Livermore National Laboratory, and Professor Paul Zinner of the Dept. of
As well as gathering together technical experts for his study, a "panel of people with political clout" was gathered together, Karl Bendetsen volunteering to do this job. This panel was set up to take a look at what Graham's experts were coming up with a piece at a time. It included, as well as Bendetsen and Graham: Joseph Coors the beer brewing executive, William Wilson a rancher and oilman, Jacqueline Hume an industrialist and a former Under-Secretary of the Army¹, Ed Fuelner of the Heritage Foundation, Frank Barnett from the National Security Information Center², and possibly also Justin Dart, a wealthy businessman.³

No sooner had the study started, than it began to run into trouble. At the centre of this was a difference between Daniel Graham and Edward Teller over the form that a space-based BMD should take on, a difference that would remain a running sore, eventually causing the group to split into two. Graham had been wary of Teller right from the start, and would rather have not had him on the study team, as he thought that Teller's interest was not so much in strategic defence, as in promoting his x-ray laser. Graham's objections notwithstanding, Teller stayed on the study team, attending the meetings held about every three weeks or so during the six months that the study was in progress. He became a growing source of tension.⁴

¹ Political Science, University of California, Davis, also worked on the possible European reaction to the High Frontier proposal. (Letter to Arnold Kramish from Robert Squire, 23 Feb., 1982.); Others mentioned as contributing to the report are: Dr. Jeffery Barlow, John Bosma, Phillip Clarke, John Coakley, Dr. Miles Costick, Dr. Jacquelin Davis, Col. Sam Dickens USAF(Ret), William Gill, Lawrence Hafstad, Frank Hoeber, Brig. Gen. Albion Knight USA(Ret), Cleaveland Lane, Ed Milauckas, Dr. Robert Pfaltzgraff Jr., Dr Jerry Pommelle, John Rather, Dr. Peter Vajk, and James Wilson. (Daniel Graham, The Non-Nuclear Defense of Cities, op. cit., p. vi.) Gregg Fossedal is also listed on a July 29, 1982 letter from High Frontier as being part of the project staff for Public Information.


⁴ According to Graham: "If Bendetsen had asked me, I would have asked him if he really thought it was a good idea because I had already bounced the basic idea of a defensive system off Teller and had gotten what essentially was a negative response. I know how powerful a personality Ed is, and wondered if it was a good idea to put him on our panel". (Transcript of Graham interview, 7 July, 1987, op. cit., p. 8.) Karl Bendetsen was an old friend of Edward Teller, and it had been Bendetsen who recruited Teller for the High Frontier project. Both also worked for the "ferociously Cold War" Hoover Institute on War, Revolution and Peace, Bendetsen being the Director, and Teller a
Early in the study it was Teller's idea that a strategic defence system should be based on an x-ray laser weapon aboard a satellite. This, according to Graham: "we sort of laughingly called ... the space borne sea urchin because of all the rods that would be moving around to get a bead on the warheads". Graham argued that even if the x-ray laser was technically feasible, it did not make military sense because it was a defensive satellite "that would have to destroy itself to protect itself if it were attacked". If just one interceptor missile were fired at the satellite it would need to decide whether to self-destruct, or hang on just in case the missile missed.\(^1\) Responding to Graham's criticisms, at the next meeting Edward Teller and Lowell Wood suggested that instead of the x-ray lasers being based on an orbiting satellite that they be based on the ground, and popped-up into space in the event of an attack. Graham found fault with this proposal too: "they had to admit that the aiming problem, which was severe enough for an orbiting system, was even more severe in the case of a pop-up system, since you now had two accelerating bodies -- the pop-up system and the approaching warhead -- instead of one. This system would probably be able to make only one intercept for each pop-up device".\(^2\)

Graham had, as well, a number of political objections to the x-ray laser proposal. Firstly, because this proposal was based on relatively immature technologies and would have to be extensively researched before being deployed, he was worried that the High Frontier study would become "just another bunch of words and just placed on the shelf to gather dust with a bunch of other dry strategic studies". The way to get around this, he felt, was to base the proposal on off-the-shelf technologies that could be deployed now; that is, based on the more conventional kinetic energy technology. According to Graham: "This is where Ed Teller and I split company because every time we put non-nuclear in a draft, he would scratch it out".\(^3\) Graham's main objection was the political problems that would be posed by placing nuclear weapons in space: "Obviously a non-nuclear defensive system would have much more appeal to the public". Graham thought that you would have to be "politically naive not to understand that non-nuclear systems in space would have a lot more support than nuclear systems in space".\(^4\) Graham's disagreements with Teller eventually led to a falling-out with both Teller and Bendetsen, and the splitting up of the High-Frontier study into two groups, one led by Graham, and the other led by Karl

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1 Transcript of Graham interview, 7 July 1987, op. cit., p. 8.
2 Ibid., pp. 9-10.
3 Ibid., p. 10. Graham argued that his proposal could be deployed almost immediately, and that it needed only engineers, not theoretical physicists "to start bending tin". (Gregg Herken, "The earthly origins ..., op. cit., p. 21).
Bendetsen and Edward Teller, and including William Wilson and Joseph Coors. This group dismissed the idea of killer battle stations in space as being impractical, even "nonsense", that could be easily countered.\(^1\)

Although the technical differences were a source of tension, the final split seems to have been precipitated by a meeting that Karl Bendetsen arranged for his group with the President, but excluding Daniel Graham, and not informing him about it until some time later. Bendetsen, Edward Teller, William Wilson, and Joseph Coors met with President Reagan in the Roosevelt Room after a cabinet meeting on January 8, 1982. At this meeting, they recommended that Reagan instigate a new Manhattan Project to develop high technology weapons able to neutralize Soviet ballistic missiles.\(^2\) When he learned about this meeting, Graham was most upset:\(^3\)

> The main reason I was upset was that I found out later that they had about an hour with the President, but they spent about twenty-five minutes just describing how awful the threat was and another twenty-five minutes about how to reorganize government and only about ten minutes on what the solution to the threat was. The actual results of our study were covered only very briefly.

Graham was also upset because Karl Bendetsen had told him that the White House did not want the study group to go public with their ideas about strategic defence. Graham disagreed: "I told him that I had already gone public", he said, "the document was going to be on the streets".\(^4\) Graham, based on his years of experience in the military and civilian bureaucracies, thought that if he did not go public the idea would be killed off by the bureaucracy. It was, argued Graham, "an idea involving too many distressing changes for a bureaucracy to accept since it would require a fundamental shift of strategy. Unless there is outside pressure, no such change can be accomplished". The project would cause mistrust among project managers all over the Pentagon, argued Graham, "from R&D all the way up through the missile builders or 'hole diggers'. I knew that it ran smack in the face of MX Dense Pack and MX Race Track. These ideas would be on a collision course with any strategic defense system. There was no way that this concept, turned over to the bureaucracy would survive. So, I insisted on going public".\(^5\)

And so public Graham finally went, releasing his High Frontier study on March 4, 1982, and claiming that it led away from the "bankrupt and basically immoral" strategy of

\(^1\) Gregg Herken, "The earthly origins ...", op. cit., pp. 21-22.
\(^2\) Ibid., p. 21.
\(^3\) Graham claimed that Bendetsen didn't include him because "he said it was going to be just the President, a couple of people, and ex-"kitchen cabinet" folk ... In fact, this small group turned out to be thirty or forty people in a room ... all sorts of aides etc". Transcript of Graham interview, July 7, 1987, op. cit., pp. 10, 14.
\(^4\) According to Graham: "He did insist that I not go public, but I said no, no, I am going public", (Ibid., pp. 10-11.)
\(^5\) Ibid., pp. 10-12.
Mutual Assured Destruction.¹ In military terms, the High Frontier proposal contained five main elements, most of which could be met with off-the-shelf technology it was claimed: (1) a point defence for US ICBM silos which would be deployed within two or three years; (2) a first generation space-based BMD system, deployed within 5 or 6 years and comprising orbiting satellites which fired conventional missiles at ICBMs in their boost-phase; (3) a second generation space-based BMD, which would be deployed within 10 to 12 years, and which would be capable of attacking ICBMs in their boost and mid-course phases using laser weapons; (4) a manned military space control vehicle, which would be deployed within 6 to 8 years at a cost of less than US$500 million, and would be capable of inspection, in-orbit maintenance and space tug missions; and, (5) a civil defence program.² In addition to these military programmes, the High Frontier proposal contained a civilian element, making it, in Graham's eyes, a true "national strategy". The centre-piece of this civilian effort was the deployment in space of high power solar energy collectors, which could be used to power industrial activities in space and to beam back electrical energy to any spot on earth.³ The total cost of the system would be around US$24 billion over the next 5 or 6 years, stretching to about US$40 billion through to 1990.⁴

The point defence system that was preferred by High Frontier was known as "swarmjet". It consisted of three elements: (1) a set of two radars located at 10,000 feet and 20,000 feet in front of a missile silo to detect, track and calculate the intercept point for the incoming warhead; (2) a blast-hardened launcher system which could aim and launch a "swarm" of small rockets at the intercept point; and, (3) a swarm of about 10,000 ballistic

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² The civil defence programme was based on programme "D" developed during the Carter Administration to implement the policies of Presidential Decision 41. The civil defence section of the High Frontier report seems to have been written largely by Cresson Kearney. (Cresson Kearney, letter to Daniel Graham, October 2, 1981; Cresson Kearney, "Creating A Strategically Significant American Civil Defense System, A Fuller Exposition, Citing References").
³ Daniel Graham, The Non-Nuclear Defense of Cities, op. cit., p. 7. This proposal was due to Dr. Peter Glaser, Vice-President of Arthur D. Little Inc, who seemed to have been obsessed with the potential of space. Glaser believed that "space, by enabling [the US] to tap not only the present information resources ... [i.e. satellites] ... but in addition, ... will be able to find new ways to process materials. We also certainly believe it is feasible to consider, once and for all, taking care of energy problems which, although they are presently somewhat subdued will come back to haunt us in a few years". Glaser argued that "energy from space for use on earth is one of our major options to supply the world with energy for as long as civilization exists". (David S. Coker, "'High Frontier': Bold New Strategy ...", op. cit., p. 15.)
⁴ Ibid., p. 9.
rockets which would fly to the intercept point at around 5,000 feet per second and kill the incoming warhead by impact. A partially tested system was supposed to already exist.¹

The first generation space-borne defence was known as the Global Ballistic Missile Defense (GBMD) system, and was exactly the proposal put forward by Bud Redding of SRI.² The system comprised a network of 432 satellites in orbits inclined at 65 degrees with the equator at an altitude of 300 nautical miles. These "space trucks" would contain 40-50 self-propelled carrier vehicles which could travel at a velocity of 3,000 feet per second with respect to the satellite and propel a miniature vehicle into the missile for a kinetic kill. The interceptors were to be similar to those planned for the Air Force's antisatellite miniature homing vehicle, and the Army's homing intercept programmes. It could be built, argued the High Frontier report, with off-the-shelf-technology, and could be fully deployed within five or six years at a cost of some US$10-15 billion.³

The second generation space based defence (GBMD II) was to be a product improvement upon GBMD I. With the addition of advanced infrared sensors the first generation system would be able to attack warheads in their midcourse as well as boost-phase. It might even be possible, argued the report, to use laser weapons on the orbiting space trucks, or pop them up from installations on the ground. The GBMD II system could be ready for deployment in 1990 at a cost of around US$5 billion on top of the GBMD I's cost, and advanced laser defenses would require the expenditure of about US$100 million per year for research and development.⁴

Underlying the High Frontier study was an ideology that was very much similar to that espoused by the members of the 'laser lobby'. Graham and his colleagues who prepared the study were opposed to both detente and the SALT arms treaties, arguing that the Soviets played the game of Mutual Assured Destruction differently than the United States and had a different regard for human life. "The Communist elite couldn't care less about losing 50 million people in war", argued Gregory Possédal, a member of the High

¹ Ibid., pp. 7-8; Daniel Graham & Gregory Possédal, A Defense That Defends, op. cit., pp. 48-51.
Frontier staff, valuing only their factories and military installations, and their own lives.\(^1\) The Americans were supposed to play fairly under MAD, laying their own homeland vulnerable to an attack by the Soviets, and seeking to negotiate limits on offensive weapons. However, the Soviets viewed arms negotiations as a way of limiting the United States' offensive weapons while they engaged in a massive build-up, and did not consider that vulnerability should be mutual, pouring "more resources into strategic defenses, active and civil" than the United States had invested in its offensive weapons.\(^2\)

Under the SALT treaties, the Soviets were held to have built a massive offensive force of their own, between the signing of SALT I and 1978 having tripled their own counterforce and throw weight capacity, while the United States had stood still, or even unilaterally disarmed, canceling or slowing down many weapons programmes, hoping that through SALT, detente, and diplomacy the Soviets could be persuaded to halt their developments at the "parity" level as required by MAD.\(^3\) The Soviets had now surpassed the strategic capability of the US by a substantial margin and there was no evidence that they were about to stop. Because the Soviet military had most of their strategic nuclear weapons based on land, and the US military held only about one third of its strategic nuclear arsenal as land-based ICBMs, Graham argued that the Soviet military were deploying a first strike arsenal, while the US military only had a second-strike one. Thus, the Soviets had a "dangerous advantage" in pre-emptive first strike capability, and the United States faced a "window of vulnerability". Graham argued that so long as the Soviet leaders thought that they could take advantage of this situation, without too much risk for themselves, then there was a strong possibility that they would do so.\(^4\)

To get around this problem of the "window of vulnerability", Graham saw that there were two fundamentally different approaches, one the "incremental approach" and the other, the one he advocated, the "bold approach", both aimed at reasserting the superiority of the United States. Under the "incremental approach" MAD would remain the cornerstone of US nuclear strategy and force structure, but an attempt would be made to increase and modify the offensive nuclear forces to attain strategic superiority; strategic and civil defences would not be pursued; arms control would still be on the agenda, but the US would get tougher with the Soviets at the bargaining table; and finally, the concept of "parity" would be retained, the US spending billions of dollars to close the gaps between the United States and Soviet nuclear arsenals. Graham's "bold strategy" on the other hand

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3 Ibid., p. 92; Daniel Graham & Gregory Fossedal, A Defense that Defends, op. cit., pp. 34-35.
would replace MAD with mutually assured survival through the deployment of space-based BMD and the setting up of a civil defence programme. The problem with the incremental approach was that by entering an arms race with the Soviets in current technology, the US was doomed to lose because the "Soviets [were] already producing these items at a very high rate, far surpassing current production rates of the US and its allies". Further, such a programme could not rely on public support indefinitely. It might, create "the grave danger of a severe backlash against current proponents of increased defense expenditures if four years hence there is no perceptible favorable change in the U.S.-Soviet military balance".¹

Time was of the essence in the commitment to Graham's High Frontier project. If the United States could not reverse the adverse trends in the military balance quickly, it might be too late. High Frontier, argued Graham, held out the promise of closing the 'window of vulnerability' in two or three years and of negating the "brooding menace" of Mutual Assured Destruction in five or six years.²

That Graham did not opt for the exotic beam weapon technologies advocated by the 'laser lobby' or the x-ray laser advocated by Teller had much to do with this perceived need for rapid deployment. Graham argued that while these two technologies had demonstrated significant capabilities in the laboratory and may have become a reality in the future, "their deployment in global defensive systems is too far in the future to meet the urgencies of the High Frontier study". The 'window of vulnerability' couldn't be left open for this long.³ According to Graham and Fossedal, it was hard to over-stress this point. A viable strategic defence system need not wait for these exotic technologies, they argued, and indeed it would not be prudent to base the security of the United States on the prospect that such weapons would become available in the near future.⁴ There were as well technical objections to these beam weapons. They all required massive amounts of energy to power them and such energy sources had not yet been obtained on the ground. Particle beams in particular would require huge energy sources. Laser beams were vulnerable to both inclement weather and dust.⁵ With respect to x-ray lasers, Graham's main objection

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¹ Ibid., pp. 17-19.
² Ibid., pp. 11-12.
³ Ibid., p. 113.
⁵ Ibid., p. 58; Daniel Graham, Non-Nuclear Defense of Cities, op. cit., pp. 113,119. Angelo Codevilla, of 'laser lobby' fame, thought that these criticisms of space-based lasers were misleading, but agreed with Graham's time frame for deployment. Codevilla thought that the GBMD idea was sound, but that the missiles would be required to attain higher velocities, and that the cost estimates were "severely flawed". (Angelo Codevilla, review of "High Frontier: A New National Strategy", Strategic Review, Summer, 1982, p. 60.)
was that such a laser would have to destroy itself to defend against a single missile. Even if it was possible to design an x-ray laser that could generate multiple beams, Graham argued that this would require years of engineering development, and would not be ready for near term deployment.¹

Graham's High Frontier proposal met a mixed reaction when released. There were some supporters for the proposal, from companies such as Boeing, Rockwell, Tracor, LTV, Vought, Northrop, and McDonnell Douglas, companies who stood to benefit from contracts if such a proposal went ahead; also there was some congressional support, Graham citing Senators William Armstrong, Jesse Helms, Steven Symms and William Roth, and a group known as the Congressional Space Caucus.² The proposal ran into stiff opposition from the Pentagon, and the arms-controllers, but Graham expected this.

Graham was fully aware of the problems that he would run into trying to sell his proposal to the Pentagon. For a start, because his proposal put the future of strategic defence in space, High Frontier "was causing a real problem for the United States Army ... which has since the end of the war been charged with ballistic missile defense. Because the Army would not have the responsibility for running a space-based [BMD] they don't want to give up that mission." What made it even worse was that the Air Force, the service that would be charged with the responsibility for the space-based defence mission, had "never been very much interested in strategic defense", and looked at High Frontier as a competitor to the offensive systems that they would prefer, quite rightly as far as Graham was concerned.³ To get around this, Graham realized that to override the objections of these turf-protecting defence bureaucrats it would be necessary to have the presidential sanction. "If the President said 'do it', and make sure the technology works, it would succeed", contended Graham.⁴

To get around the arms controllers, Graham thought, might not actually be all that difficult, as the High Frontier proposal, with a little clever foot work, could be sold as being the ultimate arms control measure. One of the underlying aims of the High Frontier proposal seems to have been as a clever way to circumvent the freeze movement, and herein lay some if its appeal for the hawks, and Graham hoped, the Reagan Administration. As Gregory Fossedal, one of the consultants to High Frontier, put it, it

³ "'High Frontier': Defense Strategy to Save the US", op. cit., p. 10.
would provide "an opportunity ... to fast-thaw the nuclear freeze movement".¹ No attempt is made to hide this same theme in the High Frontier report itself:²

The High Frontier concept would even convert or confuse some of the conventional opponents of defense efforts. ... It is harder to oppose non-nuclear defensive systems than nuclear offensive systems. It is impossible to argue effectively for a perpetual balance of terror if it can be negated by new policies. It is hard to make environmentalist cases against space systems.

Even those "naysayers" who wanted disarmament, would be hard pressed to make a case against High Frontier. As well as countering the peace movement at home, it could be used to provide a strong counter-effect to the "highly disruptive", "anti-nuclear", or "peace" movements in Europe, and to boost the morale of pro-US elements.³

The potential for High Frontier to undercut the freeze movement was used as one of its strongest selling points to the Reagan Administration, as is evidenced by an endless stream of letters that Daniel Graham sent to Defense Secretary Casper Weinberger⁴, and was welcomed by right-wingers for this reason. For example, David Coker, writing in Human Events, argued that the non-nuclear defence was important in political terms because it "undercut the argument of leftist nuclear freeze proponents who claim it is impossible for the United States ... to protect itself in the event of a nuclear war".⁵

A discussion paper written in April 1984 by John Bosma for High Frontier, considering ways in which ballistic missile defence could be sold politically, addressed this problem

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¹ Gregory Fossedal, quoted in Rip Bulkeley & Graham Spinardi, op. cit., p. 72.
³ Ibid., p. 11. See also Daniel Graham & Gregory Fossedal, A Defense That Defends, op. cit., p. 11. In response to a question as to whether High Frontier was the answer to the Catholic Bishops and the freeze proponents, Graham replied: "I certainly think so, because instead of arguing about getting rid of nuclear weapons and so forth, and about the morality of the punitive nature of our deterrent, they can support a purely defensive option." It provided an option between the "false dilemma" of freeze and burn, which had been created by the freeze movement, which was "essentially led by unilateral spokesmen". ("High Frontier: Defense Strategy to Save the U.S.", op. cit., p. 10.)
⁴ Daniel Graham to Casper Weinberger, March 17, 1982: "The fact that our military systems require no nuclear weapons makes it at least conceivable that the anti-nuclear crowd would seize on High Frontier as a vehicle for their purposes"; Graham to Weinberger, March 31, 1982: "In light of the current country-wide press for "nuclear freeze", I wish to bring to your attention the value of the High Frontier concept as an effective counter. High Frontier would also dampen the urge to add nuclear weapons, but unlike the "nuclear freeze" notion would not require highly improbable Soviet cooperation and good faith".; Graham to Weinberger, April 13, 1982: "These concepts constitute the best available riposte to the new surge toward "nuclear freeze" and related proposals".
explicitly. The primary objective, was to make it politically risky for proponents of arms control to argue against BMD. Bosma argued that:

In fact, the project should unambiguously seek to recapture the term "arms control" and all the idealistic images and language attached to it. This can be done by showing that BMD is very supportive of classical and contemporary arms control objectives (e.g. limits on war, protection of civilians, "just war" conduct, ... etc), and that early BMD deployment on a major scale are critical to the realization of such highly lauded initiatives as a nuclear freeze, a nuclear build down, and permanent disarmament. To the extent that it is possible, BMD proponents should stress nuclear disarmament as their new goal..."

Bosma argued that proponents of BMD systems such as High Frontier, should seek to argue that SALT and other arms control regimes that fit within the doctrine of MAD "are built around war-crimes strategies", and thus "war crimes behaviours and intentions" could be imputed to the signatories of treaties such as the 1972 ABM treaty. BMD on the other hand could be sold as a way of getting away from these war-crimes strategies.

Because Graham realized that he would run into problems trying to sell the High Frontier concept to the armed services, his efforts were aimed at trying to sell it to President Reagan, or at least those close to the President. As we have seen Graham met with Reagan twice - in February 1980 and February 1981 - before losing his direct access to the President. In addition to these meetings with Reagan, Graham also met with senior officials in the Administration - Caspar Weinberger, Edwin Meese, Richard Allen (the President's National Security Adviser), George Keyworth (the President's Science Adviser), and Martin Anderson. Graham and his offside Robert Richardson also sent letters to General Edward Meyer, the Army Chief of Staff, and General Charles Gabriel, the Air Force Chief of Staff. Graham claims to have personally delivered a copy of the High Frontier report to General John Vessey shortly before he became Chairman of the Joint Chiefs of Staff, and said that Vessey was "pretty positive" about the proposal.

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1 John Bosma, "A Proposed Plan for Project on BMD and Arms Control(Final)", NSR #46 High Frontier, Heritage Foundation, Section 1.1; Parts of this also reprinted in "The Selling of Star Wars", Harpers, Vol. 270, No. 1621, June 1985, pp. 22-24.
2 Ibid., Section 1.2.1; In another part of the Report Bosma summarizes his strategy thus: "a radical approach that seeks to disarm BMD opponents either by stealing their language and cause(arms control), or by putting them into a tough political corner through their explicit or de facto advocacy of classical anti-population war crimes", (Ibid., Section 2.0); Bosma later parted company with Graham and High Frontier, as he "became quite concerned about his[ Graham's] orientation with the crazy right". Bosma charged that Graham had received early funding for the High Frontier project from Rev. Sun Myung Moon's Unification Church, an allegation that Graham denies. (John J. Fiolka, "Combative General Is A Political Godfather of 'Star Wars' Plan", Wall Street Journal, December 11, 1985.)
2.4 EDWARD TELLER AND THE X-RAY LASER

Edward Teller, the father of the hydrogen bomb, had been a long time space-hawk. He had testified before Congress in favour of building a military base on the moon; had been an energetic opponent of every arms control agreement between the United States and the Soviet Union, including the 1963 Test Ban Treaty and the 1967 Outer Space Treaty, which banned nuclear weapons in earth orbit; and, had with General Bernard Schriever (USAF), served on the 1960 panel on the Air Force's future in space, that recommended the development of "the Dyna-Soar as an aerospace bomber, anti-satellite weapons, a manned military space station, a reusable shuttle, and a space-based ABM system".¹

As well as favouring the militarization of space, Teller had also been a long-time advocate of strategic defence: "It would be wonderful", he wrote in his 1962 book The Legacy of Hiroshima, "if we could shoot down approaching missiles before they could destroy a target in the United States". Teller argued that although US technology was not up to the task at this time, that the United States should work on such technologies to stay ahead of the Russians, because if they gained the lead, they would use it to achieve world domination: "If the Communists should become certain that their defenses are reliable and at the same time know that ours are insufficient", he wrote, "Soviet conquest of the world would be inevitable".²

Two decades later, encouraged by the development of an x-ray laser at Lawrence Livermore National Laboratory, Teller began publicly promoting the same theme. In a 1980 article, Teller argued that:³

It is strongly recommended that the United States place emphasis on this type of active defense [ABM systems] ... programs along these lines would be crucial. The strength of our electronics industry raises the hope that ABM's could become truly effective. A vigorous research program on ABM's would not be too costly, since research is generally cheap compared to deployment.

The reason that Teller was again pushing ballistic missile defence was that the Soviets were now ahead of the United States "quantitatively", and had, according to Teller, "won

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the arms race". If they were now to develop a "good and practical ballistic missile defense", it was, in Teller's opinion, "a foregone conclusion that they would use it". He urged that the United States pursue the "military secret technology" that was being developed at Lawrence Livermore National Laboratory and the application of electronics to defence, as this was the one industrial field in which the US had "not yet lost leadership to the Russians".¹

By 1982, Teller was arguing that the "Balance of terror is not a nice idea", but that it had become the "keystone of our defense policy for two decades", and, he suspected, was "one of the strong but not obvious reasons behind the nuclear-freeze movement". To get out of this 'MAD-trap', one which had allowed the Soviets to attain nuclear superiority whilst the US in effect disarmed, Teller argued that an ABM system based on nuclear weapons was needed: "The answer is true defense in the most literal sense of the word. We need weapons - not against people, not against industries, not even against missiles in their silos to be fired, but against explosives that have been fired and that, within minutes would reach their targets and kill. The sword has been invented; now we must work on the shield". Teller, at this time, could only give very general details about this shield. The possibility of a very effective defence came, he said, from the prospect of using small nuclear explosions to disable missiles, so small that they would not effect civilians on the ground. But, he warned, "The 'salvation' offered by the freeze advocates will prevent the development and deployment of such protective defense systems".²

² Edward Teller, "Teller: Defensive Weapons a Must", Pittsburgh Press, 13 October, 1982, p. B4. Teller expounded a similar theme in a number of other forums at about this time. For example, at the 30th birthday of the Livermore Labs in September 1982, Teller spoke against the Freeze Movement, and in favour of the construction of a third generation of nuclear weapons, which he described as "the kind of bomb that uses the nuclear explosion only as a starting point to accomplish something else". He went on: "what this laboratory can accomplish now is more important than what we ever have accomplished before. The third-generation efforts give us every expectation of an effective nuclear defense. ... And if defense by nuclear weapons is possible, we must have it." (Teller, quoted in Robert Scheer, "Flaws Peril Pivotal 'Star Wars' Laser", Los Angeles Times, September 23, 1985.) In a 1982 article in Reader's Digest, Teller argued: "Furthermore, extremely important research is being conducted on systems to defend against incoming nuclear missiles. For example, exploding a very small nuclear bomb near an attack missile as it enters the upper-to-middle atmosphere over our nation would have no effects on the ground and negligible effects on the atmosphere, but could totally disarm the incoming missile without detonating it. Such a system, used to protect vulnerable missile silos, could be an important first step in improving both our current retaliatory position and directing our policy towards defense". (Edward Teller, "Dangerous Myths About Nuclear Arms", Reader's Digest, November, 1982, p. 140.)
What Teller was alluding to in his speeches was the x-ray laser which was being developed at Lawrence National Livermore Laboratory. The x-ray laser project, dubbed "Excalibur" was conceived at Livermore in the 1960's. The search had picked up in the 1970's, when two young researchers Lowell Wood and George Chapline teamed up to pursue it. Chapline, in particular, had a vision of building an x-ray laser which could be pumped with a very powerful energy source - a nuclear bomb - and in 1977 he devised a novel way to build such a nuclear-pumped x-ray laser. Chapline's idea so impressed officials at the laboratory, that an experiment to test his concept was "piggybacked" onto an underground test at the Nevada Test Site being run by the Defense Nuclear Agency to study the effects of nuclear radiation on the MX missile warhead. The test, code-named 'Diablo Hawk', took place on September 13, 1978, but due to a failure of the sensors to measure the output of the x-ray laser, it was impossible to tell whether the test had been a success.

Soon after the Diablo Hawk test, Chapline obtained funding for a dedicated test of his concept, the test being scheduled for 1980. In the lead up to the test a series of meetings were held at the lab at which those interested in the nuclear-pumped x-ray laser would gather to discuss the coming test. At a meeting held in the summer of 1979, one of the young physicists present, Peter Hagelstein, suggested a new way that an x-ray laser could be made. Lowell Wood, who had also been present at the meeting, pushed Hagelstein's idea, and in the end it was decided that the test of Chapline's nuclear x-ray laser should be modified to include Hagelstein's idea as well, one bomb being used to pump the two competing sets of hardware, to see which one worked best. The underground test in question, code-named 'Dauphin', occurred at the Nevada test site on November 14, 1980. The test was a success for both x-ray lasers, and it was the one proposed by Hagelstein for which the test results were superior. News of the test was leaked in Aviation Week and Space Technology in February 1981. The article claimed that the supposedly secret tests at Nevada had led to a breakthrough that "has the potential to blunt a Soviet nuclear weapons attack". A projected application was a nuclear warhead surrounded by a ring of fifty or so laser rods, each of which could be pointed at a target missile and the bomb detonated. Such a device, it was claimed, could easily be carried aloft by the space shuttle. It was claimed that 20 or 30 x-ray laser battle station in space

1 Work had also been undertaken at Livermore on rare-gas halide lasers pumped by nuclear explosions. It was reported in 1980 that Roderick Hyde had designed a "nuclear explosive-driven orbital laser ballistic defense system" based on these lasers. In this design 50 such lasers would be driven by the one source. ("Technology Eyed to Defend ICBMs, Spacecraft", op. cit., p. 34; "High-Intensity Electron Beams Pushed", AWST, August 4, 1980, pp. 67-68.)
3 Ibid., pp. 101, 103, 106.
could handle a ballistic missile attack on the United States.\footnote{Ibid., p. 111; Clarence Robinson, "Advance Made on High-Energy Laser", \textit{AWST}, February 23, 1981, pp. 25-26.} Hagelstein's x-ray laser became known as "Excaliber", and a separate bureaucracy known as R Program was set up around it at the Livermore labs. Depending on whether or not a test was about to be conducted, the size of the R Program staff could swell into the hundreds.\footnote{William Broad, \textit{Star Warriors}, op. cit., pp. 106, 108-109; Clarence Robinson, "Advance Made on High-Energy Laser", \textit{op. cit.}}

The allure of the x-ray laser, and indeed all of the so-called third generation nuclear weapons for the researchers at Livermore, seems to have been that these weapons represented the scientific and technical challenge of the future. The second generation nuclear weapons no longer represented a challenge for these scientists.\footnote{Kosta Tsipis, "Third Generation Nuclear Weapons", \textit{SIPRI Yearbook 1985}, Taylor and Francis, London, 1985.} As Lowell Wood told William Broad, "Frankly, the offensive game, in addition to its somewhat dubious intent, is awfully easy. There just isn't much challenge there. Success consists of shrinking off an inch here and a pound there or moving the center of gravity half an inch forward. It's distinctly an engineering problem". On the other hand, the "intriguing thing about defensive weapons is that they have a real, semifundamental challenge to them - to making them work, work effectively, robustly, and to work at very high cost efficiency, a high cost-exchange ratio against the offence".\footnote{William J. Broad, \textit{Star Warriors}, op. cit., p. 78.}

Underlying Teller's belief in the need for strategic defences was a world view which saw the Soviets as being hell-bent on world domination. According to Teller, the US was now the inferior partner of the two superpowers, the Soviets having gained superiority in the "throw weight" with which they could rain down nuclear destruction upon the United States. Between 1966 and 1981, argued Teller, "the total megatonnage of the American nuclear arsenal was \textit{reduced} to less than one-half of its former size". The Soviet arsenal, on the other hand, "has rapidly increased in yield, accuracy and diversity during the same period and currently includes a total nuclear explosive power in excess of what the United States \textit{ever} had". Teller argued that the throw weight of the Soviet military was five times that of the US, and warned that "the ration could increase to tenfold without our noticing it".\footnote{Edward Teller, "Technology: The Imbalance of Power", \textit{op. cit.}, p. 507; Edward Teller, "Dangerous Myths ...", \textit{op. cit.}, p. 139.}

To make matters worse, not only was it the case that the strength of the Soviet nuclear forces were being underestimated, but the Soviets were playing a completely different nuclear ball-game, pursuing a strategy that would allow them to initiate and win a nuclear
war, whilst the US clung doggedly to the doctrine of MAD, naively laying its population bare to nuclear annihilation by the Soviets. According to Teller, official Soviet policy claimed that they would win a nuclear exchange with the US, the Soviets never having agreed to the ideas upon which MAD is based. This was evidenced by the fact that the Soviets placed great emphasis on civil defence - the evacuation of cities and the building of fallout shelters and food storage - instead of laying their population bare to destruction, as was required by the MAD doctrine. As well as their civil defence program, Teller argued that the Soviets had forged ahead on strategic defences against ballistic missiles. Although the United States had begun to deploy such a system in the early 1970's, under the SALT I treaty the US had been limited to two, subsequently one ABM site, which it had abandoned, as well as research on more effective, and less expensive technologies for ballistic missile defence. The Soviet Union on the other hand had maintained the ABM system that it was allowed under SALT I, and pressed ahead with research on more effective technologies.

Because of these civil and ABM defences, Teller argued that the Soviets might be able to simply blackmail the US into submission. "Our country may find itself in the situation", Teller claimed, "where it has to give in to Russian demands or face the end of the United States". Teller argued that the Soviets "could land an attack feeling secure against ravages from retaliatory bombings". The United States on the other hand had done virtually nothing towards protecting its population. This civil defence program may well allow them to lose fewer people in a nuclear war than the 20 million or so casualties that the Soviet Union suffered during World War II.

The advent of the freeze movement, totally misguided in Teller's eyes, meant that the Soviets might get away with their evil ploy: "Do the advocates of the freeze know that in the last 16 years the explosive power of nuclear bombs in the US arsenal has decreased to half its earlier value? Do they know that today the Soviet arsenal is more than three times ours in destructive power?" Teller asked. According to Teller the freeze movement

3 Ibid., p. 512.
5 Teller pointed to tests undertaken at the Oak Ridge National Laboratory, which he claimed showed that, under optimum conditions, the Soviet civil defence programme would allow them to protect all but 5 to 10 percent of their population in the event of a full retaliatory strike. (Edward Teller, "Dangerous Myths ..", op. cit., pp. 140, 143.)
granted acceptability to the Soviets' "extraordinarily destructive" weapons, when they should actually be opposing them. Also it would end further work in the United States on what could well be the best defence systems, Teller's third-generation nuclear weapons. "The Soviets have already deployed an anti-ballistic missile system around Moscow". Teller claimed. "We have the right to deploy a similar system but have not done so".¹ According to Teller, the "balance of terror" no longer worked, MAD was bankrupt and detente was self delusion.² But the freeze was not the answer. The answer was to build a nuclear defence system based on the x-ray laser.

Apart from his public stance on the need for a ballistic missile defence based on nuclear weapons, Edward Teller was actively lobbying the Reagan administration and Congress. As early as February 1981, days after Reagan was installed as president, Teller and his colleague at Livermore, Lowell Wood, are reported to have begun briefing leaders of the House and the Senate on the promise of, and need for, third generation nuclear weapons for ballistic missile defence.³ In October 1981 Teller sent a classified letter to Congress that reportedly recommended the stepping up of x-ray laser research.⁴ Teller had known Reagan for quite some time, their first meeting taking place in 1967, shortly after Reagan had been elected Governor of California. Reagan was the first Governor to visit the Lawrence Livermore National Laboratory, in Livermore, California, with Teller acting as his guide. Here Reagan learned first-hand some of the new ideas for defence against a missile attack from Teller.⁵ Teller recounted this visit in an interview with Michael Charlton: "He listened carefully; not to a highly technical presentation, but to one that must have contained a host of completely novel ideas. He asked maybe ten or twelve questions which clearly showed that he followed - that he comprehended".⁶

Teller also became involved in the High Frontier study through his long time friend Karl Bendetsen, but soon broke away from Daniel Graham's group to join up with Bendetsen and a group of his colleagues, including Joseph Coors, William Wilson, and Jacqueline Hume. All were influential supporters of Reagan - often being referred to as Reagan's 'kitchen cabinet' - and also of Stanford University's Hoover Institution on War.

¹ Edward Teller, "Dangerous Myths ...", op. cit., p. 140.
³ Gregg Herken, "The earthly origins...", op. cit., p. p. 22.
⁴ Jeff Hecht, Beam Weapons, op. cit., pp. 132, 236.
⁶ Michael Charlton, op. cit.
Revolution and Peace, one of America's premier conservative think tanks. Teller was also one of the Hoover Institution's senior scholars. In 1981 Teller is reported to have approached George Keyworth, the President's Science Adviser, who also seems to have been involved in Bendetsen's group, and said that he "wanted to offer his technical expertise to the President's well-meaning friends".

Guided by Teller, Bendetsen and the other members of President Reagan's so-called 'kitchen cabinet' eventually split from Daniel Graham and the High Frontier. It was, reportedly, Teller's vision of the new generation of "speed-of-light" nuclear weapons that captured the attention of Bendetsen's group. Briefed by Teller, they became convinced that the third-generation nuclear weapons could revolutionize "the art of defense as much as the atomic bomb had revolutionized the art of war". They dismissed the idea of General Graham's killer battle stations in space, and the 'laser lobby's' idea of chemical-laser battle stations as impractical and unrealistic. "Edward was of the opinion that that type of approach could be too easily countered", said one of his colleagues.

Bendetsen and Teller's group had some five or so meetings with President Reagan to discuss the subject of strategic defence - according to William Broad, three meetings before and two meetings after the so-call 'Star Wars' speech - the first occurring on January 8, 1982. In addition to this Teller met with Reagan once alone. At the January 8

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1 Frank Greve, 'Reagan's plan caught many administration insiders by surprise', San Jose Mercury News, Nov. 17, 1985. The Hoover Institution of War, Revolution, and Peace was founded in 1919 by President Herbert Hoover. The Charter of the Institution reads as follows: "...to demonstrate the evils of the doctrines of Karl Marx - whether communism, socialism, economic materialism, or atheism - thus to protect the American way of life from such ideologies, their conspiracies, and to reaffirm the validity of the American system". According to Australian journalist Robert Milliken, although things had changed since 1919, "the overriding mood of the Hoover Institution research is still one of profound pessimism about America's chances of survival in a show-down with the Communist World". It had, moreover, come to assert "an increasingly dominant influence over Reagan and the Right Wing of the Republican Party". After his failed presidential bid in 1976, Reagan began attending seminars at the Hoover Institution, and was such a hit that they made him an honorary fellow of the Institution. According to Milliken, Reagan's close affiliation with the Hoover Institution is reflected in his speeches. (Robert Milliken, "Reagan's Brain Trust", Norfolk Virginian-Pilot and Ledger-Star, 3 Aug., 1980, p. C2.)

2 Frank Greve, 'Reagan's plan caught many administration insiders by surprise', op. cit. It is not entirely clear whether Teller was a committed member of Bendetsen's group, or was just trying to use this as a vehicle to promote the x-ray laser. Although Bendetsen's group definitely seems to have been influenced by Teller, it also seems to have considered laser weapons and particle beams weapons.

3 Gregg Herken, 'The earthly origins ...', op. cit., p.21.

4 Ibid., p. 22.

meeting, Teller, Bendetsen, Coors and Wilson discussed with Reagan the technological advances which made a defence against ballistic missiles a real possibility.\textsuperscript{1} The meeting, scheduled to last only 15 minutes, went for an hour. According to sources present at the meeting, there was much talk of lasers, which might be used to destroy aircraft as well as missiles. However, they pointed out that such lasers "might have only a limited capacity because their wavelength was too long". The shorter the wavelength of the laser, the more destructive its beam would be. The shortest wavelength could be obtained using an x-ray laser. Rather than trying to create a ballistic missile defence using "off-the-shelf" technologies, Bendetsen's group argued for a stepped up program of research on advanced technologies.\textsuperscript{2}

Reagan is reported to have shown "great interest" in the idea\textsuperscript{3}, though he wondered whether such a system should be designed to protect missile silos only, or the whole population. Karl Bendetsen argued that the system his group was proposing could, eventually, do both, however that to protect the whole population would be much more expensive and take longer. Whatever the case, argued Bendetsen, he thought that they should start now. He wanted Reagan to announce the start of a national quest, similar in scope to the 1942 Manhattan Project, to develop an ABM system based on directed energy weapons. Reagan is reported to have agreed.\textsuperscript{4} The question of how to deal with the ABM Treaty and other treaties that were relevant to outer space was also raised by the President. Bendetsen is reported to have told him to let others worry about this. The message was get on with it.\textsuperscript{5} Not only was ballistic missile defence a real possibility but in the opinion of Bendetsen's group, one that the public would definitely welcome.\textsuperscript{6}

Another meeting with the President occurred on September 14, 1982, this time Edward Teller being alone. Teller had repeatedly appealed for a private meeting with the President to discuss his ideas, but had been repeatedly rebuffed by Reagan's aides. It was not until Teller appeared on national television - the "Firing Line" programme hosted by William Buckley (seen by Reagan at his Santa Barbara ranch) - and complained that he had been denied Presidential access, that he was given a meeting. "May I tell you a little secret which is not classified?", Teller asked on the programme. "From the time that President Reagan has been nominated I had not a single occasion to talk to him". Teller had some new and promising ideas about defence which he wished to discuss with the President.

\textsuperscript{1} Gregg Herken, "The earthly origins ...", op. cit., p. 22.
\textsuperscript{2} William J. Broad, "Reagan's 'Star Wars' bid...", op. cit., p. A3.
\textsuperscript{3} Ibid.
\textsuperscript{4} Frank Greve, "Reagan's plan caught many administration insiders by surprise", op. cit..
\textsuperscript{5} Ibid.
\textsuperscript{6} Gregg Herken, "The earthly origins ...", op. cit., p. 22.
An invitation was duly issued to Teller for a meeting at the Oval Office on September 14, 1982, the meeting scheduled to last for half an hour. At this meeting, Teller is reported to have warned the President that the Soviet Union was developing an x-ray laser weapon similar to "Excaliber" which was being developed at Livermore, and that the Soviets would soon be in a position to blackmail the United States. He appealed to Reagan to dramatically increase funding for his "Excaliber" project. Before he could progress too far with his wild claims however, the meeting was cut short by Reagan's aides, and ended in disappointment for Teller.1

Leading up to Reagan's 'Star Wars' speech, Edward Teller, and Bendetsen's group continued to press their case. Starting in October 1982 and continuing through to the following January, Teller met repeatedly with members of the Joint Chiefs of Staff and senior civilian officials in the Defense Department to brief them on Livermore's progress toward the development of x-ray lasers.2 Bendetsen's group, including Teller met with the President again in the early months of 1983.3

2.5 THE HUDSON INSTITUTE AND STAR WARS

At the level of strategy, one of the strongest advocates of ballistic missile defence, particularly in conjunction with the MX missile has been a group of strategists at the Hudson Institute. This group includes Herman Kahn, Research Director at the Hudson Institute until his death in the early 1980's, Donnald Brennan who was active in the 'ABM Debate' at the end of the 1960's and Director of national security studies at the Institute in the late 1970's, and most recently Colin Gray and Keith Payne both members of the professional staff of the Institute concerned with national security studies.4 As far back as the early 1960's, Kahn had emphasized the relationship between the capability to minimize damage to the United States in a nuclear war and the capability to extend deterrent coverage to distant allies. According to Kahn, in his 1961 book On Thermonuclear War, the Soviets did not take the American deterrent seriously, because

2 Gregg Herken, "The earthly origins ...", op. cit., p. 22.
4 The Hudson Institute is situated at Croton-on-Hudson, New York. Gray and Payne are also, respectively, President, and Executive Vice President and Director of National Security Studies at the National Institute of Public Policy in Fairfax, Virginia.
the US "had made negligible preparations to ward off, survive, and recover from even a "small" Soviet retaliatory strike".\(^1\) A 1972 Hudson Institute study in which both Kahn and Brennan were involved, argued that the effective deterrence of the Soviet Union by the United States required that the US secure an advantage in 'relative war outcomes' by adopting a damage-limitation strategy which could be provided by either offensive counterforce weapons, or by antiballistic missile defences. Brennan in the late 1970's had argued that even a fairly ineffective ABM system could be useful, as it would create a measure of uncertainty, while more effective systems were being developed.\(^2\)

Gray and Payne speak with fairly much the one voice, often collaborating on papers as joint authors, or if writing papers under their own names drawing heavily on the other's advice. In their writings on ballistic missile defence they seem to have been the intellectual heirs of Herman Kahn and Donnald Brennan. Gray and Payne were strong critics of the Strategic Arms Limitation Talks that had taken place during the late 1960's and the 1970's, and of the SALT I and SALT II treaties and the ABM Treaty which resulted from these talks. Colin Gray, in particular had been a long term critic of both the SALT I and II treaties:\(^3\)

It is important to recognize that SALT I and prospectively SALT II were (and are) poor agreements that reflect both a near-parody of "how a nation should negotiate" and the absence of a credible bargaining chip on the U.S. side. The problems of clearly predictable impending inferiority and instabilities cannot be solved through SALT diplomacy - one point, at least, on which all shades of opinion would seem to be agreed.

Gray charged, in 1976, that what had then been six years of arms negotiations with the Soviets had, on the one hand, led to the termination of work on active missile defences (one of the more promising approaches to maintaining the invulnerability of ICBM silos), while on the other hand allowing the Soviets to indulge in a massive nuclear arms build-up, leaving the threat to the ICBM silos unconstrained. Thus, the double-headed monster of SALT was progressively increasing the vulnerability of United State's strategic nuclear weapons.\(^4\)

SALT I had been signed by the US, Gray claimed, for two main reasons: on the political level it was largely to secure the reelection of Richard Nixon by acting as a symbol for superpower detente; and secondly, on the strategic level it was supposed to be an arrangement whereby the US surrendered a "greatly superior" ABM system for the

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4 Ibid., p. 16.
defence of ICBM silos, for the "severe arresting of the Soviet threat" to these ICBM silos. Unfortunately, this was illusion. The Soviets had only agreed to the ABM treaty to "maintain unimpeded targeting access to U.S. ICBMs and NCA facilities and to counter the U.S. BMD technological advantage". Furthermore, although the agreement might have frozen the construction of ICBM launchers, it did nothing to constrain qualitative improvements. And, if this wasn't bad enough, the Soviets cheated, Gray citing fifteen or so possible cases of violation.

So much so did the Soviets cheat, argued Gray, that it called into question "the very notion that the superpowers retain enough common interest in arms control to warrant continuing negotiations". Of particular concern was that the Soviets were cheating on the ABM Treaty and were in the process of constructing a nationwide ballistic missile defence system, giving them a "superior breakout potential" from this treaty. Gray claimed that the Soviets had tested air defence radars in the ABM mode, had modified their air defence system so that late model SA-10 and SA-X-12 interceptor missiles would have some ABM capability, and were constructing radar infrastructure, including phased-array radars capable of predicting impact points and handling targets for ABM battle management which, "when linked will represent a firm foundation for a nationwide ballistic missile defense". Although this still might not provide the Soviets with a comprehensive defence, it would complicate US retaliatory planning.

The prospects for the future looked even more bleak, SALT II only adding insult to injury, representing yet another sell-out on the part of the United States. As a consequence of the SALT I and II and the ABM treaties, Gray argued that a 'window of vulnerability' would open on the United States in the early to mid 1980's. In 1976, Gray argued that the window was just beginning to open: "the U.S. in the 1980's will be on the unhealthy end of a hard target counterforce gap that could well endure for four or five years". In 1978 he argued that: "By the early to mid 1980's, the United States will be unable to [retain] confidence in the ability of all save a small fraction of its silo-housed...

2 Colin S. Gray, "Moscow is Cheating", Foreign Policy, No. 56, Fall, 1984, p. 141.
3 Gray cites the construction of new Pushkino and Pechora-class BMD radars, production of the Flat Twin tracking and Pawn Shop missile guidance radars for the SH-04 and SH-08 interceptor missiles which were also in production, and the development of a network of C3 systems, air defence and BMD radars and battle management radars. (Ibid., pp. 143, 149-150, 216-217); See also Keith B. Payne, "Strategic Defense and Stability", Orbis, Summer, 1984, p. 216.
4 Colin S. Gray, "SALT: Time to Quit", op. cit., p. 16.
missile force to ride out a Soviet first nuclear strike. ... An entire leg [land based ICBMs] of this triad is approaching mass obsolescence - as currently deployed in fixed hardened sites".¹ By 1981 it had become a reality: "Everyone, so it seems, accepts the proposition that a 'window' of Western military vulnerability has opened, and that it will likely endure until perhaps 1987-88".² The Soviets were now ahead on megatons, "equivalent megatonnage", missile throw weight and the numbers of strategic launch vehicles, and were catching up rapidly on missile accuracy and numbers of nuclear warheads, Gray claimed. This meant that they could forcibly disarm the land-based leg of the US strategic triad and, while doing so, hold their own casualties down to less than that suffered during the second world war, "even if the United States should proceed all the way up the escalation ladder".³

That the 'window of vulnerability' was now open did not mean that a Russian first strike attack was imminent argued Gray. What it did mean was that the USSR would be likely to seek to coerce the United States while the 'window' remained open. While in fact the United States was likely to emerge unscathed from the window of military vulnerability, Gray argued that it would not be prudent to rely on such hope, that US defence planners should plan for the worse. "As with Germany in the 1929 case", Gray warned, "the Soviet Union in the 1980's may well not recognize a firm Western line when it appears. Each side will expect the other to back down, but neither will do so. The result will be war by miscalculation".⁴

Underlying their analysis of the 'window of vulnerability' and the Soviet threat, was a particular strategic viewpoint, which entailed a critique of the doctrine of MAD, a theory about how the Soviets viewed the doctrine of MAD, and a belief in the idea of a strategic posture which Gray and Payne called 'denial of victory', 'extended deterrence', or 'credible deterrence'. From this perspective nuclear weapons were not so much about fighting nuclear wars, as they were an element of day-to-day foreign policy, the strategic nuclear balance playing a central role in maintaining US dominance in the world, especially its freedom to act outside its borders. According to Gray: "American's perceptions of their country's relative standing, perceptions by others, and the American

¹ Colin S. Gray, "The Strategic Forces Triad...", op. cit., p. 771.
⁴ Colin S. Gray, "Thinking About the Unthinkable War", op. cit.; See also Keith B. Payne, "Deterrence, Defense, and the Freeze", op. cit., p. 18.
sense of what risks are involved in particular possible enterprises - all rest, in part, though in ways that are incalculable upon assessments of the state of the strategic balance".\(^1\) With the declining strategic balance, the United States might well conciliate in the event of a crisis, rather than engage in competitive escalation with a stronger and more determined foe.\(^2\) The Soviets, who now held the upper hand in the strategic nuclear balance were however not constrained by domestic opinion, and they were expansionist, "not accepting the political status quo in regions vital to the West". They might therefore be willing to use military force to obtain a favourable outcome for themselves.\(^3\)

The United States must be perceived to be willing to engage in the escalation of a nuclear conflict, rather than suffer a defeat in one of its areas of interest, they argued. Such willingness would not exist however, if there was an expectation that the United States could not survive a central nuclear war if a conflict escalated to this level. Mutual deterrence, the policy of MAD, was unacceptable as the focus of US strategic doctrine, they argued. Only if the US was in a position to "wage and survive a central war" was it plausible that it would prefer a policy of strategic use to regional defeat.\(^4\) Such a "denial of victory" deterrent strategy, would signal to the Soviet leadership that they could not gain a military advantage by launching a first strike, or a political advantage by threatening such a strike, and would, in effect, be bringing about "Soviet disarmament without military benefit". This is because the United States would be likely to be more willing "to turn an impending theatre defeat into a central war than conciliate, and capable of denying the Soviet Union victory at whatever level of escalation that war attained".\(^5\) Whilst the doctrine of MAD might provide a logical basis for the deterrence of a very large scale attack on the American homeland, the threat of US retaliation in this instance being credible, it would not act as a hedge against Soviet expansionism (of political influence or territory), even in times of political calm.\(^6\) The doctrine of 'extended deterrence' would require that the Soviet leaders considered "that it was not incredible that the United States would take the strategic initiative on behalf of distant allies".\(^7\)

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1 Colin S. Gray, "The Strategic Forces Triad...", op. cit., p. 775; Colin S. Gray & Keith B. Payne, "Victory is Possible", Foreign Policy, Vol. 39, Summer 1980, p. 20.
3 Ibid., p. 751.
4 Ibid., p. 752.
5 Ibid., p. 759.
6 Ibid., p. 753.
7 Ibid., pp. 768-769; Colin S. Gray & Keith B. Payne, "Victory is Possible", op. cit., pp. 16-17. Similarly, Gray argued that area BMD was required because: (i) it would "usefully reduce American self-deterrence and so enhance the credibility of the extended deterrent"; (ii) it might discourage the Soviets from pressing ahead with the development of new offensive systems. Also, the Soviets did not adhere
This would require a serious commitment to strategic defence (civil defence, air defence
and ballistic missile defence (BMD)), and strategic force survivability, (perhaps BMD,
mobility, and/or concealment), and a policy of offensive counterforce targeting. Strategic
defence was particularly important, because even if the US was confident in the disarming
potential of its offensive strategic forces, strategic defence would be necessary because
the United States could never be certain that it would be the side to strike first, or that the
Soviet Union would not launch "on warning" in the event of a first strike attack by the
United States.1

Furthermore, the notion of parity between US and Soviet strategic arsenals was out,
especially in the area of strategic defence, as this would be "inconsistent with American
deterrence responsibilities".2 The strategic doctrine of the Soviet Union was at variance
with that of the United States, Gray claimed, in that the Soviets held that a good defence,
because it could limit damage in the event of war, was a good deterrent. Rather than
seeking to deter war, Soviet doctrine was about achieving war-fighting prowess.3 Not
only did the Soviets have a different strategic posture, but their leaders had a different
"hierarchy of values" to American leaders, who valued most the American people and
urban-industrial assets. The Soviet leaders valued most their "instruments of military and
political control and power"; they believed that Soviet society had value not in itself, but
rather as a vehicle for state purposes.4 Gray, for example argued that:5

Whereas a U.S. president would view the loss of 5 to 20 million Americans as a
national tragedy of unprecedented proportions, a Soviet leader would probably view
such a loss as a regrettable necessity to avoid defeat and ensure the possibility of
victory.

2 Ibid., p. 759.
3 Colin S. Gray, "SALT: Time to Quit", op. cit., p. 17; Colin S. Gray,
"A New Debate on Ballistic Missile Defence", Survival, March/April
1981, p. 64.
4 Keith B. Payne, "Strategic Defense and Stability", op. cit., p. 221;
Colin S. Gray, "Making Sense of the Nuclear-Freeze Debate", op. cit.,
p. 148.
5 Colin S. Gray, "Making Sense of the Nuclear-Freeze Debate", op. cit.,
p. 148. (Gray's arguments were based on the analysis of Soviet
intentions conducted by Richard Pipes)
These Soviet assets were more easily defended than those which the US leaders valued most, so consequently, "an equivalent level of imperfect defense capability could provide protection of the highest Soviet values, but not the highest American values". Therefore, parity in offensive and defensive weapons could be extremely disadvantageous for the United States because of these supposed differences in values between the two nations' leaders. Thus, the United States must at least achieve a "functionally equivalent capability" to protect its own highest values and to threaten the highest values of the Soviet leadership - "recognizing that such a functional equality may well require superior capabilities given the differences in the target sets to be threatened".  

The centre-piece of the 'extended deterrence' strategy was seen to be the MX missile programme. It was the programme "which could right a strategic balance which would otherwise tilt in favour of the Soviet Union to a politically and militarily significant degree". Gray argued that the MX "should be thought of as a weapon program that is essential for the support of forward-placed allies, in that supportive limited first-strike options could be threatened credibly, secure in the knowledge that the United States had a residual ICBM force that could deter attack upon itself". He went so far as to argue that the MX should be welcomed by supporters of arms control, because it could be used to provide leverage in the SALT negotiations, by showing the Soviets that a "hard-target counterforce race cannot be won". It would however need to be deployed, and would have to be survivable before the Soviets would be persuaded that the US was serious.

To get around the problem of MX silo vulnerability, a number of different possibilities were envisioned: the US could adopt a launch on warning policy; it could choose to phase out the land-based ICBM leg of its strategic triad which had become vulnerable, and rely instead on a dyad of SLBMs and manned bombers/cruise missiles; could seek to preserve the strategic triad by means of mobile deployment; or, it could defend its silos. In 1978 Gray thought that BMD would not be the best solution to the MX silo vulnerability problem, partly because it had few advocates at that time. There were, moreover, many technical problems to be solved, and the ABM Treaty of 1972 would have to be abrogated. (Gray argued that if this was so, then the Soviets would be in a much better position to deploy a BMD system.) Gray argued that if the United States were to put the same resources into developing BMD as it was putting into the development of the MX,

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1 Keith B. Payne, "Strategic Defense and Stability", op. cit., p. 221.
3 Colin S. Gray, "The Strategic Forces Triad...", op. cit., p. 786.
then a limited system may be possible by the late 1980's and 1990's. Towards the end of the century, even space-based lasers might be a possibility.¹

By 1981, Gray thought that because of certain technical advances the use of BMD to make MX silos survivable was a definite option. The arguments dating from 1970 to the effect that BMD did not work no longer applied to these new technologies, he argued.² The US now had a "low-risk BMD technology", in the form of the US Army's Low Altitude Defense System (LoADs), which was designed to protect missile silos by intercepting nuclear warheads within the atmosphere. Although Gray felt that at the moment the deceptive basing mode for the Minuteman/MX was the most cost-effective solution to the problem of ICBM survivability, he thought that BMD would provide a useful complement to this at some stage. The LoADS system had, after all, actually been designed to defend a deceptively based ICBM system.³ The LoADS technology would not suffer from the same shortcomings as the Safeguard system.⁴ It was, at that time, scheduled for initial operational readiness by 1988. As LoADS comprised 'state-of-the-art' technology, Gray felt that there was no good reason why it could not be deployed with the MX missile around 1985.⁵

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² Colin S. Gray, "A New Debate on Ballistic Missile Defense", Survival, March/April 1981, p. 60. In 1969-70 it was argued that the Safeguard BMD system would not work because" (i) The radar systems could be "blacked out" by the nuclear explosion of an incoming missile or from defensive missile; (ii) the computer systems were not sophisticated enough to handle the volume of information, assessments and battle management that was required. In addition it was argued that the Spartan ABM system would not work because the radars could not identify and discriminate real targets from decoys and chaff precisely enough to have confidence in the exoatmospheric intercept ability of the system. It was also argued that the system could be easily overcome if the Soviets chose to saturate the system, or to use such offensive ploys as 'salvage-fusing'. Also, the system was criticized because it would not be 100% effective. (Ibid., p. 61-62.)
³ The MX basing mode being envisaged at the time involved 200 MX missiles deployed one to each "linear track" with 23 horizontal shelters on each track. The missiles would be shuffled around between the shelters so that the Soviets would never quite know where they were. The LoADS system would complicate things even more. If just one LoADS deployment were used per track, the Soviets would have to send twice the number of missiles to be certain of success, as it may have been protecting any one of the 23 shelters. (Ibid., pp. 63-64; Keith B. Payne, "Detente, Arms Control and US Strategic Doctrine", op. cit., p. 761.)
⁴ With the LoADS system the interceptor missile and radar would also be deceptively based, and was far smaller than the radar for the Safeguard system. Also, because it was a 'minimum altitude' intercept system it would be difficult to use spoofing tactics. (Colin S. Gray, "A New Debate on Ballistic Missile Defense", op. cit., p. 64)
⁵ Ibid., p. 64-65.
An even more advanced system was being developed by the US Army, an exoatmospheric 'overlay' BMD system, designed to intercept nuclear warheads above the atmosphere. Although based on a less mature technology than the LoADS system, Gray argued that when fully developed, it would represent a qualitative advance over the Spartan system through a revolution in optical discrimination. It would involve the launching of 'probe' missiles into the "threat corridor" of an incoming threat cloud to identify target warheads, from the decoys and chaff. This threat data would then be 'handed over' to the "warhead 'buses' of long-range interceptors, which would then in turn 'handover' threat data to non-nuclear homing vehicles which could neutralize the targets through impact or fragmentation". If this homing overlay system received adequate funding, then, according to Gray, it could be operational by about 1990. Combined with LoADS to form a two-tiered BMD system, a truly effective BMD system would be obtained.

Furthermore, Gray and Payne argued, future developments may allow the addition of a third layer to the BMD system based on exotic technologies which would be used to intercept ballistic missiles in their boost-phase. "Space-based high-energy laser systems, designed to destroy ICBM and SLBM in their boost phases, could easily mark a historical change in the relationship between the offence and the defense in favour of the latter". However, major practical problems remained to be solved. According to Gray: "Crises and wars are deterred or waged with actual weapons, not with strategic promissory notes; it is always possible to design a better weapon tomorrow than today. Space-based laser weapons for BMD may or may not prove technically feasible and strategically attractive, but their promise could deprive the U.S. of effective BMD weaponry to accomplish modestly defined missions in the near term". Further, "extravagant-sounding strategic vision deploys on paper weapons whose construction far exceeds the current state-of-the-art and can damage the political prospects for more modest programs".

Not surprisingly, both Gray and Payne strongly opposed the freeze movement. They argued that the nuclear freeze supporters misunderstood strategy, and would in fact produce results that were counter-productive in terms of promoting the objectives of arms control. "To minimize the probability of war the U.S. needs to act now to reduce the high degree of strategic force vulnerability that has resulted from the formidable build-up of

1 Ibid., p. 65; Keith B. Payne, "Deterrence, Arms Control and US Strategic Doctrine", op. cit., p. 761.
3 Ibid.
Soviet counterforce potential", Payne argued.1 For the nuclear strategists the nuclear freeze was a nightmare which had them waking in an icy-cold sweat. It would only serve to freeze the 'window of vulnerability' in place and deny the US the opportunity of modernizing and building up its strategic weapons to regain the superiority which was required for 'extended deterrence'; it would also deny the US the option of deploying the MX ('Peacemaker'), and of modernizing the existing Minutemen ICBM force and deploying it in a more survivable mode. Further, it would deny the US the option of deploying BMD to protect its land-based ICBM force. "In short, the freeze would deny the United States the means of addressing the problem of ICBM vulnerability".2

Furthermore, they argued that the doctrine of MAD, and thus the nuclear freeze which attempted to preserve this, was immoral. "Instead of purposefully threatening Soviet cities, the United States directs its deterrent primarily against Soviet nuclear weapons, political-control facilities, and other military capabilities that threaten the United States and its allies. ... This type of deterrence policy and planning is morally more acceptable than the "countercity" notions of freeze advocates, and is also based on a more effective deterrent because it threatens that which the Soviet leadership values most highly".3 Even worse that this, the nuclear freeze advocates were not paying due respect to the nuclear strategists, and might even make them obsolete: "In a spirit of 'back to basics', a nuclear freeze would sidestep the realm of strategic analysis and constitute an apparently effective answer to what is allegedly a simple problem - to halt, or at least arrest the nuclear-arms race before that race triggers a war that would be to the advantage of neither side".4

Although Gray and Payne do not seem to have had direct access to the President they both worked as consultants for the Pentagon, and Colin Gray was on the General Advisory Committee on Arms Control and Disarmament, a body of the Arms Control and Disarmament Agency.5 Gray, in particular, seems to have done quite a deal of work on the MX missile for the Air Force, being granted a US$100,000 contract by the Air Force in January 1980 to head a two-year study on "Strategic Force Posture and Arms

2 Keith B. Payne, "Deterrence, Defence and the Freeze", op. cit., p. 18. Other undesirable effects of the freeze cited by Payne included: (i) it would force the US to maintain its aging B-52s with only a small number of ALCMs operationally deployed, (ii) deny the US the opportunity of deploying a more survivable bomber such as the B1-B or stealth bomber; (iii) allow the Soviets to improve their air defences; (iv) allow the Soviets to improve their anti-submarine capabilities but ban further US development of modernized nuclear missile carrying submarines. (Ibid., pp. 26-28.)
3 Ibid., pp. 28-29.
4 Colin S. Gray, "Making Sense of the Nuclear Freeze Debate", op. cit., p. 149.
5 Colin S. Gray, "Moscow is Cheating", op. cit., p. 145.
Control". Shortly after Reagan entered office Gray and Payne had completed a comprehensive study for James Wade, Acting Assistant Secretary of Defense, on the advantages of a new 'denial of victory' strategy. Strategic defences, as we have seen, would be essential for this strategy, to back up US commitment to initiate a nuclear war by limiting damage to the US home land. As Gray and Payne put it, "the U.S. ... could with relative confidence in its political integrity engage in a war that while perhaps militarily unpromising in the short term, would envisage the eventual attainment of the desired political objective".

Not surprisingly, both Colin Gray and Keith Payne welcomed the announcement by President Reagan of a programme to make nuclear weapons impotent and obsolete. However, they argued for a BMD system that was much more limited in scope, in the near term at least, and were sceptical of the claims that a "nuclear umbrella" could be achieved, and of the claims of the advocates of exotic space-based weapons. Under their theory of 'extended deterrence' such exotic weapons were not necessary. They recognized however that "the promise of a comprehensive defense of cities by exotic systems and the transcending of offensive-oriented deterrence is a goal that will capture the imagination and support of the American people". For them the more limited defence approach was not "inconsistent with a future exotic defense of cities" when this technology was at an adequate stage of development. Indeed, these limited defences would be required for a stable transition, they argued. Also, just because a defensive shield was being constructed, did not mean that offensive weapons need be done away with, as they too would be required to "safeguard stability during the initial phase of a defensive transition".

2.6 COMMON THREADS AND DIFFERENCES

All of the groups advocating the deployment of ballistic missile defences of some sort shared a common ideology and world view. All were ferociously anti-communist and held that the Soviets were bent on world domination, as they had always been. All were opponents of detente and the SALT I and II and ABM treaties that were a by-product of

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3 Colin S. Gray, "Reagan's defense plan should be welcomed", Washington Times, April 18, 1983, p. 1C.
this policy, and all argued that the Soviets played the game of Mutually Assured Destruction differently. Whereas the United States was content with a notion of "parity" and prepared to lay its homeland open to a Soviet nuclear attack (dismantling its only ABM system in the mid-1970's), the Soviets were held to reject the notion of "mutual vulnerability" as was evidenced by their large civil defence programme and their development work on ABM systems. Also, the Soviets were held to be engaged in a massive build-up of offensive nuclear weapons in an attempt to develop a war-winning capability. They all argued that the SALT treaties had constrained (if not unilaterally disarmed) the United States, but had allowed the Soviets to forge ahead unconstrained, so much so that they had attained strategic superiority, and the United States was facing a 'window of vulnerability' in the first half of the 1980's through which the Soviets would be tempted to launch a first-strike attack, or which they might use to coerce the US to surrender without even launching an attack.

All of the proponents of BMD were arguing that in some way their system would help to close this 'window of vulnerability', that is, to make US land-based missiles less vulnerable to a Soviet first-strike attack. They rejected the doctrine of Mutual Assured Destruction and argued that the deployment of ballistic missile defence would be a vehicle through which a new strategic doctrine - Mutual Assured Survival (MAS) - could be introduced. They argued that the doctrine of MAD was immoral as it meant laying the population of the United States open to nuclear annihilation. The doctrine of MAS was held to be morally superior, and it had the added advantage that it could be pursued in the absence of arms control agreements with the Soviets. All were strongly opposed to the freeze movement, arguing that it would freeze in place the 'window of vulnerability', and that as it operated within the framework of MAD, it was immoral.

It was this common ideology which led the members of the 'space-weapons lobby' to be attracted to ballistic missile defence. Given that the Soviet Union was supposed to have attained strategic superiority over the United States and that it was futile negotiating arms agreements with the Soviets, there were two main ways in which the United States military could regain superiority. They could increase the quantity and improve the quality of their offensive nuclear weapons, or they could deploy strategic defence systems - civil defence and ballistic missile defence. A combination of offensive and defensive weapons could also be employed. All of the members of the 'space-weapons lobby' favoured the defensive option. They did so for several reasons. Firstly, some thought that the Soviet Union had already won the arms race in offensive nuclear weapons but that through the United States' superiority in sophisticated technologies there was still a chance to win the arms race in defensive weapons. A slight variation on this theme was that defensive
weapons could be used to open up a new area of the arms race as a form of economic warfare against the Soviets. Because the United States held the advantage in this area of technology it was felt that if the Soviets tried to compete their economy would collapse, perhaps leading to the overthrow of the communist system. Finally, it was thought that defensive weapons would be much easier to sell to the public than offensive weapons. This last reason became increasingly important with the rise of the peace movement. It would be much easier to justify an increase in expenditure on defensive weapons which protected Americans but "did not kill Russians" than for offensive weapons of mass destruction. Further, groups such as the 'laser lobby' and High Frontier emphasized the importance of having a non-nuclear defence. Such a system had the potential to steal the thunder of the peace movement.

The need for a space-based ballistic missile defence system was also related to public appeal. Land-based ballistic missile defence systems had been discredited in the 'ABM Debate' in the late 1960's as they either didn't provide a perfect nuclear umbrella, or they were only there to protect missile silos and not people. Only a space-based ballistic missile defence could attack ICBMs in their boost phase, when they were most vulnerable and had not released their multiple warheads or decoys, and therefore held the potential to provide the perfect nuclear umbrella. There was a symbolic element to this also, as Graham fully realized. Not only were the space weapon technologies highly advanced and exotic, but space had the potential to capture people's imagination. This symbolic element was very important. For groups such as High Frontier and the 'laser lobby', the ballistic missile defence systems that they were proposing were a vehicle through which a new strategic doctrine - that of Mutual Assured Survival - could be implemented and publicly proclaimed.

Although the different lobby groups shared a common view of the Soviet threat which led them to advocate ballistic missile defence as the solution, they pushed essentially different technologies to implement this ballistic missile defence system. This can be explained in terms of different "interests" that these groups brought to bear on the problem. Thus, while the broad nature of the BMD system was shaped by the ideology of the groups, the components of the system was shaped by the interests. The final 'shape' of the ballistic missile defence system that the different groups advocated reflected an interplay between the ideology and the interests of the groups. In some groups it seems to have been the ideology which was dominant in the shaping process, and in others the interests.

The 'laser lobby' brought together representatives of the defence contractors who were working on the technologies for DARPA's space-laser triad, with a group of hawkish
Senators and their aides. DARPA's laser triad aimed to develop on the ground a 5-megawatt chemical laser for future use in space. Thus, the 'laser lobby' advocated space-based chemical lasers as the form of BMD to provide the nuclear umbrella. That they did not opt for the shorter-wavelength lasers (which were supposed to be more effective) was congruent with the interests which were represented in the 'laser lobby' but was justified in terms of ideology. The lobby claimed that the need to deploy the system in the near future to shut the 'window of vulnerability' necessitated the chemical lasers as these were at a more advanced stage of development than the shorter-wavelength lasers. Even though all of the senators who were members of the 'laser lobby' shared the a common ideology and saw space-based laser battle stations as the answer to the problem of the Soviet threat, they had slightly different reasons for actually supporting space-based BMD: some because it would be a neat technical solution to a nightmarish MX basing plan that was politically unpopular in their home states, and others because they thought it represented a cheaper solution to the problem of MX basing. This shows how the shaping of a particular weapons system can be linked to the development of another weapon system, in this instance the MX, and how wider political and social factors can come into play.

The High Frontier study brought together a collection of defence industry and military experts who were proposing an assortment of different BMD technologies, civil defence, and also some civilian space projects, the final proposal focusing on technologies which were supposedly 'off-the-shelf': the "swarmjet" system for the point defence of ICBM sites, and the GBMD system which had been proposed by Bud Redding of SRI International. In this case, although the interests which were represented in the High Frontier study can be seen to have shaped the eventual outcome of the BMD system that was proposed, these interests were, in the first place, enrolled into the project by Daniel Graham and Karl Bendetsen. In the High Frontier group it seems to have been the ideology which dominated over the interests, the High Frontier report emphasizing the technologies which were most compatible with the group's ideology. High Frontier's leader, Daniel Graham, was one of the most vocal supporters of the 'window of vulnerability' thesis, and his group's advocacy of off-the-shelf technologies over the more exotic beam weapon technologies had everything to do with his perception that it was important to close this 'window of vulnerability' as soon as possible.

Edward Teller's group brought together some conservative industrialists with good access to the President, with a group of scientists who were working on third generation nuclear weapons, including x-ray lasers. The advocacy of x-ray lasers by Teller's group seems to have been dictated by the allure of the third generation of nuclear weapons to the scientists at Livermore. Not only were the scientists at Livermore actively engaged in research
programmes on these weapons but to these scientists offensive nuclear weapons had become mere engineering, no longer representing a challenge. Teller's group was pushing for large increases in the funds being devoted to research on third generation nuclear weapons, which were held to be more exciting and represent more of a challenge than the second generation nuclear weapons. They were not so intent as the other groups on actually deploying the system. It is in Teller's group which the interests seem to have dominated the ideology, although the ideology still seems to have played an important part.

Colin Gray and Keith Payne were nuclear strategists who earned their keep devising ways to deploy and employ offensive nuclear weapons. They had worked on contracts for the Air Force on the MX missile, and had invested a significant amount of their intellectual capital in devising ways to base the MX to ensure its survivability and on strategies for its use. It was the centre-piece of their theory of 'credible deterrence'. To the problem of ballistic missile defence Gray and Payne brought both their professional interest as nuclear strategists, and the interests of the Air Force and Army. That the 'window of vulnerability' be closed as quickly as possible to negate the Soviet threat was important to them also. Thus, Gray and Payne were advocating the early deployment of the LoADS and Homing Overlay systems that had been specifically designed for the defence of the MX missile. They argued that the more exotic systems would not be able to be deployed early enough to solve the problem of MX vulnerability, and may well threaten the early deployment of the more conventional systems. They argued that the deployment of more accurate nuclear weapons and conventional ballistic missile defence was necessary to make a stable transition to the more exotic forms of ballistic missile defence some time in the distant future.

There is an interesting "clash of interests" between the different lobby groups, even though they were all advocating BMD systems to solve the problem of the 'window of vulnerability'. This debate focused on the technical merits of the different systems, and on their timeframe for deployment. The most pressing need for all groups, except Teller's group advocating the x-ray laser, was that of early deployment. Each group attempted to show that their system was the most effective system that could be deployed by the middle of the 1980's, just in time to close the 'window of vulnerability'. It was in this debate that the interests which lay behind the different groups shine through most strongly, each attempting to assert their dominance over the claims of the others. By linking the technical claims made by the different groups to the ideology of the groups and to the interests represented in the groups, more sense can be made of the debates. These debates do not go into any great technical detail. Rather, the proponents of a particular
BMD system focus on a particular feature of the system and use this to try and assert their claims. For example, shorter wavelength lasers were held to be more effective by advocates of x-ray and eximer lasers.

Notwithstanding these clashes of interest between the groups there were a number of common threads in the approaches they took in attempting to sell their systems and in the response they received. Firstly, all of those groups who were proposing exotic BMD systems were opposed by the Pentagon, especially the Army and the Air Force who had their own, more conventional programmes. (Gray and Payne can be seen to be the exception here, as their interests seem to have been aligned with those of the Air Force and Army.) Interestingly enough, even those members of the lobby groups who came from the defence contractors often ran into opposition within their own companies, as their activities were putting at risk contracts that these firms currently held with the Air Force and Army. Daniel Graham and Malcolm Wallop had a keen sense of the problems that they would run into from the Pentagon when pushing their schemes. This opposition would be expected from the model of the weapons development process outlined in section 1.2. The missions of the Army and the Air Force had become embodied in their more conventional programmes. The technologies being proposed by the 'laser lobby' were, in Kaldor's terms, 'revolutionary', and were destined to run into bureaucratic opposition. This aspect of the development of space-based BMD is dealt with more fully in Chapter 4.

Kaldor has argued that the type of 'revolutionary' technologies that the members of the 'space-weapons lobby' were advocating would have to be taken up by "maverick constituencies" within the armed forces. In the case of space-based BMD weapons such a maverick constituency does not seem to have existed, or at least was not powerful enough to have much influence. This left two options for the members of the 'space weapons lobby'. Firstly, they could try and work through Congress to pass legislation to impose space-weapons on the armed services. This was the approach taken by the 'laser lobby' but was fraught with problems. The armed services, particularly the Air Force, were a powerful lobbying force on Capitol Hill and seem to have intervened on several occasions to block the 'laser lobby'. The second option was to try and sell the programmes to the President directly, or indirectly by working on the President's advisers. Because of the opposition within the Pentagon, and within the defence contractors, the 'laser lobby', High Frontier, and Teller's group realized that they needed to follow this path. Only this way could they override the bureaucratic opposition and turf guarding that was sure to arise. Obtaining Presidential sanction meant that not only would it be easier to sell space-based ballistic missile defence to the public and to Congress, but also the President was
the only one who could impose a decision on the armed services. This meant that those groups with good access to the President had a greater chance of success. It should be remembered that this access was also controlled by the President's close advisers.

The case study of space-based ballistic missile defence has, so far, given some support to model of the weapons development process that has been developed, and also pointed to some modifications which may be required. A number of groups that were pushing different BMD systems have been identified, these groups providing the "impetus" for the weapons development process. The process of bureaucratic politics can be seen in operation, the proposals of the 'space-weapons lobby' running into opposition from the armed services, who had a vested interest in more conventional programmes, and were not yet ready for the exotic technologies being proposed. The importance of Congress, and congressional committees such as the House and Senate Armed Services Committees, is evident. Groups such as the 'laser lobby' operated out of the Senate and tried to pass legislation to influence the development of space-based BMD. The lobbying efforts of the armed services, the Department of Defense, and the Executive Branch were also important in Congress. The armed services seem to have had various allies on Capitol Hill, and also had influence through input to congressional hearings. The importance of the Executive Branch, and in particular the President is evident. All of the groups pushing exotic space-based weapons realized they would have to win over the President to get around the opposition from the armed services. The importance of the wider political context is evident. The fortunes of ballistic missile defence improved markedly when President Reagan entered the White House. Unlike the Carter Administration, the Reagan Administration was prepared to abrogate the ABM Treaty, and it was also looking for solutions to the 'window of vulnerability'. Further, the 'laser lobby' provides an example of how the issue of space-based BMD can come to be linked to wider political concerns. Finally, the role played by ideology is also evident. All of the groups advocating space-based BMD shared a common ideology, and it was this ideology which led them to be attracted to BMD systems, and shaped the broad outlines of the system.

Where modification to the model seems necessary is in the area of the forces that are driving the weapons development process. Kaldor has argued that the two main institutions which drive the weapons development process are the weapons laboratories and the defence contractors. This would seem to be too simplistic. Although two of the groups in the 'space-weapons lobby' had links with defence contractors and one of the groups had links with a weapons laboratory, the situation is more complex than this. For a start, it is too simplistic to treat defence contractors and weapons laboratories as single actors. There are different divisions and groups within the contractors working on
different development projects. While it may be the case that the defence contractors have a need for follow-on programmes to remain profitable, it will not always be in the contractor's interest to push all of its projects at any given time. As was the case with Lockheed, they will not push projects which might lose them important contracts. A similar situation could be seen to exist for the weapons laboratories and other research institutions. For example, there is some evidence to suggest that the 'laser wars' in 1982 was a result of a power play within DARPA between groups working on competing laser projects. Thus, the different levels of bureaucratic complexity which have been applied to the armed services must also be applied to the defence contractors and weapons laboratories. A particular weapons systems must be placed within the institutional context of the defence contractor or weapons laboratory in which it is being developed.

Secondly, it is too simplistic to attribute solely an economic interest to the defence contractors and a scientific/technical interest to the weapons laboratories. The ideology of the groups that are providing the impetus to the weapons development process is also an important factor shaping the weapons system. It may even be that a group is pushing a particular weapons system for almost entirely political reasons. A good example of this would be the High Frontier organization. It seems to have been largely the ideology of the groups which comprised the 'space-weapons lobby' which has shaped the broad nature of the form of BMD system that they were advocating, and largely the interests represented in the groups which shaped the components of the system. The actual weapons system that was being proposed resulted from an interplay between the ideology and the interests.
CH. 3: THE SPACE WEAPONS LOBBY AND THE C.P.D.

3.1 INTRODUCTION

That the members of the 'space-weapons lobby' shared a common ideology and view of the Soviet threat is not very surprising. This ideology was that of the Committee on the Present Danger (CPD), which formed in the middle of the 1970's and set as its mission the revival of concern about the Soviet threat, and the reassertion of American military superiority. In this chapter I trace the development of the Committee on the Present Danger, focusing on its major identities and the ideology that was espoused by this group. Finally, I explore the links between the CPD and the 'space-weapons lobby', in an attempt to explain the concurrence of their world views, and to provide a revealing perspective on the meaning and purpose of ballistic missile defence.

3.2 HISTORICAL BACKGROUND TO THE CPD

One of the antecedents of the Committee on the Present Danger was a group known as the Coalition For A Democratic Majority (CDM), a group of Democrats who had broken with George McGovern in 1972. Eugene Rostow, a member of this group, and Chair of the CDM's Foreign Policy Task Force, played a major role in the formation of the Committee on the Present Danger. All up, thirteen members of the Rostow's eighteen member Task Force became members of the CPD when it was formed. In the summer of 1974, the Task Force released a report, "The Quest for Detente", a scathing attack on the concept of detente, which, they argued, was a dangerous illusion which could lull the West into thinking that the Cold War had come to an end. It had not, the Soviets could not be trusted, and they were still bent on world domination. It was out of this Task Force experience that Rostow became convinced that there was a need to put together a broadly-based committee to trumpet aloud the Soviet threat and to push for a return to unquestioned American superiority.2

In June 1974, Paul Nitze, the 'white-haired hawk', who had held a national security post in every administration since Truman, resigned in disgust from the SALT delegation that

1 Rostow, former Undersecretary of State during the Johnson Administration is described by Jerry Sanders as being an "unreconstructed hawk on Vietnam". Other members of the Task Force were Richard Pipes, Midge Decter, Norman Podhoretz, Leon Keyserling, Jeane Kirkpatrick, Max Kampelman, Richard Schifter and John Roach. (Jerry Sanders, Peddlers of Crisis, p. 150; Richard J. Barnet, Real Security, p. 42.)

2 Jerry Sanders, op. cit., p. 151.
was negotiating the SALT II Treaty, and went before the Senate Armed Services Committee on June 20th telling them that Nixon and Kissinger were selling the "myth of detente". Nitze had come to pretty much the same conclusion as Rostow, and in the first year of the Ford Administration began to discuss with about half a dozen or so of his colleagues, including Rostow, the possibility of forming a high-powered group to continue his attack on detente and SALT, to awaken people to the Soviet threat, and to push for big increases in military spending. Others involved in these discussions were James Schlesinger, Nixon's hawkish Secretary of Defense, Charles Walker, former Deputy Secretary of the Treasury in the Nixon Administration, David Packard, and Henry Fowler.\(^1\) Finally, in late November 1975, after downing a few Bloody Marys before lunch, Rostow, according to his own recollection, decided that they had talked about it enough and sat down and fired off a memo to Walker and Nitze. "I said we'd had preliminary discussions long enough", Rostow recalled. "By God, why don't we just do it?".\(^2\)

In March 1976, over lunch at the Metropolitan Club in Washington, the Committee on the Present Danger was formed, Charles Tyroler II, who had been invited to attend by Nitze, becoming director. The name chosen for the committee was identical to that of a committee set up in 1950 by James Conant, president of Harvard, Will Clayton, Robert Lovett and other former national security officials with an identical purpose.\(^3\) Through the spring of 1976, the committee members worked on defining themselves as an organization, and devising strategies to communicate the Soviet threat, and it was not until early November 1976, that the group went public.\(^4\) Their founding statement *Common Sense and the Common Danger*, expounded Cold War themes that were familiar from the pages of NSC-68: "The principle threat to our nation, to World peace, and to the cause of human freedom is the Soviet drive for dominance based upon an unparalleled military build-up". Furthermore, "The Soviet Union has not altered its long-held goal of a world dominated from a single center - Moscow".\(^5\)

\(^{1}\) Ibid., pp. 151-152; Richard J. Barnett, op. cit., p. 51.
\(^{3}\) Jerry Sanders has made a comparison of these two committees with the identical name but separated in time by a quarter century. Some of those involved with the first, were also involved with the second CPD. Paul Nitze, who became a leading member of the 1976 CPD, worked informally with the earlier CPD as a member of the State Department. And Charles Tyroler, director of the 1976 CPD, as a young Pentagon official.
\(^{4}\) Ibid., op. cit., pp. 153, 183.
\(^{5}\) Ibid., p. 183. Paul Nitze was the author of NSC-68, otherwise known as "The Report by the Secretaries of State and Defense on 'United State's Objectives and Programs for National Security'", April 7, 1950. It reads: "... the Soviet Union, unlike previous aspirants to hegemony, is animated by a new fanatic faith, antithetical to our own,
Right from the start the CPD worked with other like-minded anti-Soviet groups. An example of these links, and an indication of the direction in which the group was heading is provided by correspondence between Frank Barnett, President of the National Strategy Information Center (NSIC), and Eugene Rostow of the newly formed CPD. Barnett wrote to Rostow on May 24, 1976, inviting him to join the Board of the NSIC, and advising him that the NSIC had "been granted [US]$1 million to "crank up" an all-out effort to meet the current and growing threat from the USSR - whether in military, ideological or economic warfare terms". He continued: "You are fully aware, of course, that in terms of the shifting military balance - and in our diplomatic credibility in much of the world - the U.S. today is about where Britain was in 1938, with the shadow of Hitler's Germany darkening all over Europe."¹ The NSIC, to counter this threat was going to open a "full-scale" Washington office to:²

a) interact with policy echelons in the White House and Pentagon (where we still have many friends);
b) "tutor" Congressional Staffs, and brief members;
c) work with Trade Associations - with an interest in "defense" - which have Washington offices;
d) generate more public information through friends in the Washington press corps who write about military and foreign affairs.

Rostow, not surprisingly, replied to Barnett informing him that he would be "honoured to accept the invitation" to join the Board of the NSIC and that he was delighted that the NSIC would be conducting a "campaign of direct and large scale persuasion to Congress, the Executive Branch, Trade Associations and the press corps". Rostow advised Barnett that the CPD would be planning a somewhat more limited operation, but that he thought it would be possible to coordinate the activities of the two organizations. Furthermore, he fully agreed with Barnett's world outlook: "... with your estimate that we are living in a pre-war and not a post-war world, and that our posture today is comparable to that of Britain, France, and the United States during the Thirties. Whether we are at the Rhineland or the Munich watershed remains to be seen."³

A two-tier strategy was developing, which according to Sanders was "designed to squeeze an incoming president between a reassertion of hardline doctrine within the

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² Ibid.
national security bureaucracy and from the outside by means of pressure from an interest-backed Cold War ideology led by hawkish Congressmen and groups associated with the military-industrial complex and the grass roots right wing.¹ Within four years of its inception, the CPD had brought this strategy to bear in three major battles with the pro-detente, pro-SALT forces, and helped to change dramatically the American perception of the Soviet threat. The first of these was the Team B report, the second, the opposition to Paul Warnke in his confirmation hearings, and the third, opposition to the ratifying of the SALT II Treaty.²

3.3 TEAM B AND THE CONSTRUCTION OF THE SOVIET THREAT

High-ranking officials of the Central Intelligence Agency said their annual so-called national estimate of Soviet Strategic objectives over the next ten years ... was more sombre than any in more than a decade. A top level military intelligence officer who has seen the estimate commented: "It was more than sombre - it was very grim. It flatly states the judgement that the Soviet Union is seeking superiority over United States forces. The flat judgement that that is the aim of the Soviet Union is a majority view in the estimate. The questions begin on when they will achieve it. [David Binder, "New C.I.A. Estimate Finds Soviet Seeks Superiority in Arms", New York Times, Dec. 26, 1976.]

This was something new. From the 1950's, up until 1976, the CIA believed that the Soviet Union was only seeking parity with the United States, not superiority. Nor was it believed that the Soviet leaders expected to survive and win a nuclear war with the United States.³ Not all of those in the intelligence community viewed the Soviets in the same way though. The CIA had, over a number of years, been coming under attack from the likes of Air Force Major General George Keegan, and Army General Daniel Graham, as well as a number of civilians outside of the intelligence community, such as Paul Nitze and Richard Pipes, all of whom felt that the CIA were being soft on the Russians.⁴ General Graham, who had had a number of years experience in the CIA's Office of National Estimates, and had actually argued against the "missile gap" in the early 1960's, now argued that there

¹ Jerry Sanders, op. cit., p. 197.
⁴ Ibid., p. 51.
⁵ Both Graham and Keegan had been influenced by the writings of Dr. Albert Wohlstetter, then of the University of Chicago, who in his "legends of the Arms Race", published in 1974, (see "Legends of the Strategic Arms Race, Part 1: The Driving Engine", Strategic Review, Fall 1974), had examined the record of military estimates of Soviet strategic weapons system and argued that the intelligence community had, without exception, consistently underestimated the development and deployment of Soviet Strategic forces. (Daniel Graham, "The Intelligence Mythology of Washington", Strategic Review, 1976, p. 60; "New Assessment Put on Soviet Threat", Aviation Week and Space Technology, March 28, 1977, p. 38.)
were "more liberals per square foot in the CIA than any other part of government", and concluded that they were "anti-military".¹

In 1974, George Keegan had dissented so strongly to the national intelligence estimates² relating to the significance of the Soviet civil-defence programme and a new guided missile, that he was called to make his case before the President's Foreign Intelligence Advisory Board. Keegan was able to convince the Board's chairman Leo Cherne and the Board of his case, and Cherne was able to persuade George Bush, then director of the CIA, of the need for a team of outsiders to reevaluate the raw intelligence data. In the lead up to the 1976 Presidential elections, Ronald Reagan had been making national security a major issue in the Republican primaries, and so finally President Ford granted permission to Bush to set up just this team, the so-called Team B, to appraise the CIA's estimates of Soviet capabilities and intentions.³ In a break with the agency's standards of secrecy, and without precedent, the Team B group was given access to the most sensitive intelligence data on the Soviet Union.⁴

In June 1976 Bush appointed a panel of seven outsiders to go over the same classified data that was available to the CIA and to develop their own judgement of Soviet

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¹ Jerry Sanders, op. cit., p. 198; In the early 1960's Daniel Graham, then a Major, had been assigned to the Estimates Office of the Assistant Chief of Staff for Intelligence, Department of the Army, where it was his job to represent the Army intelligence in the process of coordinating the national intelligence estimates on Soviet strategic forces. Ironically, while the Air Force was advocating a "missile gap" at this time, Graham was arguing that no such missile gap existed. He now argued that the CIA analysts had a mind-set that was "basically liberal, humanist, antinationalistic and antimilitary". (Daniel Graham, "The Intelligence Mythology of Washington", op. cit., pp. 60-61, 64.)

² The importance of the national intelligence estimates is that they provide the guidance for the size and shape of the military budget, and the strategic posture the US will assume. Keegan was convinced that the Soviet Union had developed a massive civil defence programme in preparation for fighting a nuclear war. In a recent interview he claimed that photointerpreters working for him in the early 1970's had discovered that every apartment built in the Soviet Union since 1955 had a large civil defence shelter underneath, with tunnels interconnecting the shelters. "And in these tunnels, we found water, electric power conduits, and a vast storage of medical supplies: hospital-type facilities". Further, his team had found a ring of 75 underground command posts around Moscow, and similar shelters around the other major cities. He claimed that these were 700 feet across, covered with 100 feet of reinforced concrete, and cost US$500 billion each to build! (William Burrows, Deep Black, Random House, New York, 1986, pp. 1-11.)

³ That the FIAB should suggest this is not very surprising. As Sanders points out, six of the 16-member Board later became members of the CPD; Robert Scheer, With Enough Shovels, op. cit, p. 59; Jerry Sanders, op. cit., p. 198.

capabilities and intentions. The group included Richard Pipes (as chairman), Paul Nitze, Fay Kohler, and William Van Cleave, all of whom were members of the CPD, and Daniel Graham who had just retired as Director of the DIA, Thomas Wolfe of the RAND Corporation, and John Vogt Jr., a retired Air Force General. As well, there were a number of analysts who held government positions at the time: Major General George Keegan, Air Force Brigadier General Joseph Welch, Paul Wolfowitz of the Arms Control and Disarmament Agency, and Seymour Weiss from the State Department. Right from the start the Team B exercise was far from impartial, the charge that the CIA was soft on the Russians being taken as given even before they inspected the data. Paul Nitze and William Van Cleave had been holding discussions for months with Eugene Rostow and others about the need to form the CPD. Fred Kaplan argues that the Ford Administration had "deliberately decided to bring in a collection of frankly right-wing Russo-phobes, headed by Harvard historian Richard Pipes, an expert on pre-revolutionary Russia, just to see if they could take CIA data and come to conclusions quite different from those reached by the in-house analysts". Pipes was unconcerned by this. As far as he was concerned there was "no point in another, what you might call, optimistic view". While the moderately optimistic view prevailed, the Soviet threat was being underestimated, and the US imposing limits upon itself in the hope that the Russians would slow down. "They haven't", argued Pipes.

Once the Team B members had started on their reassessment, insider reports told of "absolutely bloody" discussions during which the Team B members accused the CIA analysts of dealing in faulty assumptions, faulty analysis, and faulty use of intelligence. The CIA analysts came under strong pressure to align their views with those of Team B. Daniel Graham was reported to have told the CIA analysts at one point: "I don't want to tell you guys you're going to lose your jobs if you don't get on board, but that's the way it is". The two teams came together for a final meeting on December 2 and 3, 1976 before the President's Foreign Intelligence Advisory Board to present their estimates. The Team B members were pleased with the outcome, George Keegan reportedly saying that he believed that the CIA analysts had shifted 180 degrees as a result of the Team B's analysis.

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1 Jerry Sanders, op. cit., p. 199.
4 Jerry Sanders, op. cit., p. 199. In 1978, the Senate Select Committee on Intelligence reported that "The Composition of the B Team was so structured that the outcome of the exercise was predetermined. ... The intelligence agencies were cast inaccurately in the role of 'doves'. (Richard Barnett, op. cit., p. 57.)
5 Ibid., pp. 199-200.
6 Ibid., pp. 200-201.
The Team B analysis was leaked to the press at the end of December. Shortly after this, the now retired Major General George Keegan charged that the Soviet Union had already achieved military superiority over the United States and was preparing to fight and win a war with the United States. "I am unaware of a single important category in which the Soviets have not established a significant lead over the United States", said Keegan. He charged that this condition was brought about by "a failure over the last 15 years to adjust American strategic thinking to Soviet strategy, and out of a failure of the leadership of the American intelligence community to 'perceive the reality' of the Soviet military build-up".¹ This theme was reiterated by Graham and Van Cleave at a seminar for news reporters from the major US news agencies held in January 1977. Van Cleave, underscoring the Soviet superiority went on to claim that "I think it's getting to the point that if we can make a trade with the Soviet Union of defense establishments, I'd be heartily in favor of it". Graham backed Van Cleave up, deriding the lack of US strategy to meet the Soviet threat, and making it clear that he would settle for nothing less that American superiority.²

George Keegan took this theme yet even further, by claiming that the Soviets were about to deploy beam weapons in space. Keegan, was former head of Air Force intelligence, a position he had resigned because the Pentagon had not accepted the assessment of his Foreign Technology Division regarding Soviet beam weapon development.³ On March 28, 1977 Aviation Week and Space Technology reported a speech that Keegan had made to a group of Washington newsmen under the auspices of the American Security Council. Reiterating his claims that the intelligence community in the United States had consistently underestimated the Soviet threat, Keegan claimed that: "If there is a Watergate in this country, and there has been, but ignored, it has been monumental incompetent judgemental process in this government regarding the nature, character and growth of the Soviet threat as it has evolved from year to year".⁴ One particular area about which Keegan was concerned was the supposed development by the Soviets of technologies which would "soon neutralize ballistic missile weapons as a threat to the Soviet Union". According to Keegan, the Soviets, "on the basis of what I have examined, have every expectation that well before 1980, if they don't blow themselves up - and they may - will perceive that they have technically and scientifically solved the problem of the ballistic missile threat".⁵

¹ Ibid., p. 201.
⁵ Ibid., p. 48.
On May 2, again in *Aviation Week*, Keegan expanded upon this theme, outlining the weapons which the Soviets were supposed to be developing for BMD. They had, Keegan claimed, made a breakthrough in high-energy beam weapons which would soon give them the capability to neutralize the entire US ballistic missile force.\(^1\) Administration officials strongly disputed Keegan's claims. Carter's Defense Secretary Harold Brown said that in his view, and that of all technically qualified people he knew it was "without foundation, the evidence does not support the view that the Soviet's have made such a breakthrough or indeed that they are very far along in such a direction".\(^2\) In reply to a letter from Senator William Proxmire, Vice Admiral Bobby Inman, acting Director of the DIA, responded that there was "no basis in available evidence to ascribe to the Soviet Union success in development of such a weapon"; and that there was no evidence to support the claim that "a space borne hydrogen fluoride laser, to be used as a satellite killer, is under preparation for test".\(^3\) Unperturbed, Keegan continued to press his case, in public appearances, numerous newspaper and magazine articles, and on December 17, 1978 in an appearance on the CBS television programme *60 Minutes*.\(^4\)

The conclusions that Team B came up with were based on three assumptions: that the Soviet Union was engaged in a massive military build up; that the Soviets had a fundamentally different view of nuclear strategy to that of the United States; and, that the Soviet civil defence programme was evidence of their intention to wage and win a nuclear war.\(^5\) The assumption that the Soviets were engaged in a massive military build up was based upon "new evidence", the CIA's revised estimate of Soviet defence spending, which claimed to show that the Soviets had increased their military spending from 6-8 percent to 11-13 percent of GNP.\(^6\) The claims made by Team B regarding the Soviet civil defence programme were a critical part of their argument. Daniel Graham, referring to previous national intelligence efforts, claimed that "the largest factor that caused us to err was putting U.S. concepts into Soviet Russian heads", especially the notion that the Soviets rejected nuclear war as an option of policy. Team B argued that the Soviets

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rejected the notion of mutual vulnerability, and were aiming for clear nuclear superiority so that they could wage and win a nuclear war. According to Graham, the main reason for the change in perception of Soviet intentions was, "the discovery of a very important [Soviet] civil defense effort - very strong and unmistakable evidence that a big effort is on to protect people, industry and to store food".¹

The Team B interpretation of the data has not gone unchallenged. According to Arthur Macy Cox, an ex-CIA analyst, Team B's conclusion was based on a "misinterpretation of the facts". The notion that the Soviets had increased their defence spending was actually wrong, he argued. The CIA's own explanation for the change in the estimates of Soviet defence spending as a percentage of GNP was that: "The new estimate of the share of defence in the Soviet [gross national product] is almost twice as high as the 6 to 8 percent previously estimated. This does not mean that the impact of defense programs on the Soviet economy has increased - only that our appreciation of this impact has changed. It also implies that Soviet defense industries are far less efficient than formerly believed."² Thus, there had actually been no doubling of the Soviet level of defence spending in absolute terms, it was just that the Soviets were being credited with a higher level of industrial efficiency than they actually possessed. A CIA report published in January 1980 concluded that during the period 1970 to 1979, the Soviet defence spending, estimated in constant dollars, increased at an average annual rate of 3 percent, that is, at about the same rate as the United States.³

3.4 THE FIGHT AGAINST WARNKE AND SALT II

Following on from the Team B report, the next main battle in which the CPD was involved was a personal attack against Paul Warnke, who President Carter had nominated to be Director of the Arms Control and Disarmament Agency, and a SALT negotiator. Warnke was charged with advocating unilateral disarmament for the United States.⁴ The fight against Warnke's appointment was led by an ad hoc organization known as the Emergency Coalition Against Unilateral Disarmament (ECAUD), which was chaired by Daniel Graham. According to Sanders, this coalition "symbolized the growing alliance among Cold Warriors like Nitze and Henry Jackson, CDM idealogues like Rostow and Podhoretz, hardline dissenters in the intelligence community like Daniel Graham", and the

¹ Ibid., pp. 59-60.
³ Ibid.
New Right.1 With this "potent alliance" behind them, Henry Jackson and Paul Nitze teamed up in the Senate Armed Services Committee against Warnke, the objective of their campaign being, according to Jackson, to "weaken Warnke as an international negotiator to the point of uselessness by holding the vote in his favor to sixty or less", the number of votes required to ratify an arms treaty being sixty seven. The coalition's efforts were successful, Warnke being confirmed as a SALT negotiator by a vote of only fifty-eight to forty in the end.2

The third battle waged by the Committee on the Present Danger was the fight over the signing and ratification of the SALT II Treaty, the CPD joining forces with the Coalition for Peace Through Strength, an off-shoot of the American Security Council, to do so. (The American Security Council has been referred to by some as the "heart if not the soul of the military-industrial complex", being linked to some of the top defence contractors, such as Honeywell Corporation, General Electric, Lockheed, and McDonnell Douglas.) Together, they argued that the Soviets were already superior to the United States, that the effect of SALT II would be to further tie the hands of the United States, and that the SALT treaty represented a failure of nerve on the part of the ruling elite. In 1978, the Coalition for Peace Through Strength launched a US$2 million effort to defeat the SALT II Treaty.3

The Coalition for Peace Through Strength was, according to Sanders, an ad hoc lobby styled after the Emergency Coalition Against Unilateral Disarmament, which was not surprising, as both originated in the American Security Council and the major arms of both were headed by Daniel Graham. The Coalition for Peace Through Strength was comprised of three different branches, the "congressional" and "private sector" branches, and the "auxiliary arm" which carried out the day-to-day lobbying activities. The congressional core included such New Right figures as Senator Jake Garn of Utah, Senator Jesse Helms of North Carolina, and neoconservatives such as Representative Jack Kemp from New York. The "military-industrial" complex was represented by such congressional figures such as Richard Ichord (D-Missouri), Samuel Stratton (R-New York), and "the preponderance of Southern Rim congressmen who dominated the Coalition as representatives of the defense-laden Sun Belt".4 The "auxiliary arm", headed by Graham, with fellow Team B members George Keegan and William Van Cleave being

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1 Organizations represented in the coalition included the American Conservative Union, National Conservative Political Action Committee, Conservative Caucus, Committee For Survival of a Free Congress, Young Americans For Freedom, Young Republican National Federation and the American Security Council. (Jerry Sanders, op. cit., pp. 208-209.)
2 Ibid., pp. 208-209; Richard Barnett, op. cit., pp. 50-61.
3 Richard Barnett, op. cit., p. 60; Jerry Sanders, op. cit., p. 223.
4 Jerry Sanders, op. cit., pp. 223, 226.
Co-chairmen, also included fellow CPD members such as Karl Bendetsen, General L. Lemnitzer, Clare Booth Luce, Edward Teller and Charles Burton Marshall, and New Right figures such as Philip Crane, Phyllis Schlafly and Stefan Possony.¹

The Committee on the Present Danger weighed into the fight as well, Paul Nitze, alleging in November 1977 that the terms of the SALT II agreement, then still under negotiation, would enable the Soviets to gain a decisive edge, and lock the United States into a "position of inherent inferiority". In support of these claims Nitze released classified information concerning the negotiations. Because of the prestigious membership of the committee these arguments carried weight, getting wide media exposure and attracting congressional attention. From early 1978 right through until the SALT II Treaty was signed by Carter and Brezhnev in June 1979, the CPD kept up its campaign, churning out a barrage of policy papers and press releases and individual members making speeches. The message that they carried was that (i) the SALT negotiations and treaties had not stopped Soviet expansionism, or altered their goal of world domination; (ii) the SALT treaties had not stopped the Soviet drive for military superiority; (iii) as a consequence of these first two, by the early to mid-1980's the United States would be unable to deter the Soviet Union, as it would be vulnerable to a first strike attack.²

The resources that were poured into the campaign against the SALT II Treaty were massive. At the CPD's annual meeting in December 1979, Eugene Rostow outlined the group's activities in this campaign. This included appearances by CPD Executive and Board members on 17 occasions during the hearings on SALT II held before the Senate Foreign Relations and Armed Services Committees - more than all of the other critics put together; a series of comprehensive papers on SALT II written by Paul Nitze; the participation of Executive and Board members in some 479 TV and radio programmes, press conferences, public forums, briefing conferences of citizen leaders, and major speeches; and the distribution of over 200,000 copies of the CPD's publications. The committee is reported to have spent some US$750,000 on this campaign, even before the treaty was signed.³

¹ Ibid., p. 226.
² Ibid., pp. 254-257.
³ The Coalition for Peace Through Strength is reported to have spent about US$2.5 million in 1979, the American Security Council some US$3 million, the Conservative Caucus US$1 million and the American Conservative Union around US$1.8 million to defeat SALT II. The ASC is reported to have targeted 10 million people in its direct mail operation, the Conservative Caucus 5 million, and the American Conservative Union 500,000. The Coalition For Peace Through Strength, the American Security Council, and the American Conservative Union each produced anti-SALT films which received airplay on hundreds of TV stations. (Ibid., pp. 264-265.)
3.5 THE CPD WORLD VIEW

The world view espoused by most members of the CPD and the other organizations with which the CPD was associated is based on several main premisses, starting from the premiss that the Soviet Union is bent on world domination. It goes on: (ii) The Soviets - who can't be trusted and only sign arms agreements if they act in their favour, and then cheat on them anyway - were involved in a massive military build up under the SALT I and II treaties, and had forged ahead of the United States, so much so that they were now vastly superior, the United States being exposed to a "window of vulnerability". (iii) The Soviets, being students of Clausewitz, adhere to a different strategic doctrine than the United States, and do not espouse the theory of mutual vulnerability. This was evidenced by the fact that the United States exposed its homeland to nuclear devastation, while the Soviets had invested heavily in civil and ballistic missile defence. (iv) The United States, facing the Soviet threat found itself in very much the same position as Britain, facing the German threat at the end of the 1930's. Thus, to follow the course of the arms controllers would be tantamount to appeasement and would be taken advantage of by the Soviet menace. Instead, the US should move back to the policy of containment, by achieving military superiority, and thus needed to embark on a massive military build up.

The CPD members remained firm in the conviction that the East and West were locked in implacable conflict, the Cold War going on ad infinitum. Paul Nitze, when asked in an interview how the world of the 1970's differed to that from the early years of the Cold War replied that the "basic intentions of the Soviet Union - the drive for expansion and global hegemony - remained unchanged".1 Richard Pipes had an explanation for this. He claimed that it was because the Russian Revolution had removed from power the Russian bourgeoisie and installed in their place the Russian peasant, or muzhik. "And", Pipes claimed, "the muzhik had been taught by long historical experience that cunning and coercion alone insured survival: one employed cunning when weak, coupled with coercion when strong".2

Under the policy of detente, and the SALT treaties, it was claimed that the United States had pretty much unilaterally disarmed, freezing its ICBM force at 1054 launchers and abandoning civil defence, defence against enemy bombers, and ballistic missile defence, and watching benignly as the Soviets moved first to parity and then to nuclear superiority over the United States. In every category of military power the Soviet Union was claimed

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1 Ibid., p. 161.
2 Richard Pipes, "Why the Soviet Union Thinks it could Fight and Win and Nuclear War", Commentary, p. 26; Jerry Sanders, op. cit., p. 166.
to have moved relentlessly forward, increasing both the quantity and quality of their nuclear weapons each year. During the entire decade of the 1970's the Soviets were claimed to have spent some three times as much as the US on defence. The SALT I treaty had in no way constrained the Soviets, and the same could be said for SALT II. On the other hand, the SALT treaties had actually held the United States back. The readiness, even eagerness on the part of the United States to accept this decline in military power was due to the widespread acceptance of the doctrine of MAD, under which overly large offensive forces and defences against ICBMs were held to be destabilizing. Thus, a "window of vulnerability" had opened on the United States, through which the Soviets may well launch an attack.¹

It was claimed by the CPD that the Soviets had a different strategic posture to that of the United States. According to Nitze: "The Soviet leaders are careful students of Clausewitz and his successors and pay much attention to questions of doctrine, strategy and tactics". The Soviets were guided in their action by the "careful and continuously updated appraisal of what they call the correlation of forces. When the correlation of forces has evolved significantly in the Soviet's favor, their doctrine calls upon them to exploit that change to nail down permanent gains for their side". This approach was fundamentally different to that of the United States.² According to Pipes, the Soviet approach held that even though nuclear war would be extremely destructive for both parties, "its outcome would not be mutual suicide: the country better prepared for it and in possession of a superior strategy could win and emerge a viable society".³ The Soviets did not want deterrence but victory, not sufficiency in weapons but superiority, not retaliation but offensive action, Pipes claimed.⁴

According to Pipes, nothing better illustrated the fundamental difference between the two strategic doctrines than their attitudes to defence against nuclear attack. The US theory of mutual deterrence mitigated against civil defence programmes, against ballistic missile defences and against air defences. The Soviets, he claimed, had only agreed to limitations on ABM after they were "unable to solve the technical problems involved and feared the United States would forge ahead in this field". Basically it was to hold the United States back while the Soviets carried on developments. They had developed anti-aircraft defences, continued work on ABM systems, and were developing a serious program of civil defence, Pipes claimed. However, the Soviet civil defence program was not

² Paul Nitze, "Strategy in the Decade of the 1980's", Foreign Affairs, Fall 1980, pp. 82-83.
⁴ Ibid., p. 31.
exclusively for the protection of ordinary citizens, its chief function being to protect the political and military leaders, industrial managers and skilled workers - those who could reestablish the Soviet system after the successful prosecution of nuclear war.¹

The situation that the United States faced in the late 1970's was reminiscent of that faced by Britain in the 1930's, Rostow, and many of the other CPD members claimed. "The pressure of Soviet policy is increasing steadily, but the perception of the threat in the West has been diminishing. This strange psychological phenomenon is the heart of our foreign policy problem today", Rostow said.² According to Podhoretz an "unhealthy pacifism" had entered the US since the Vietnam War, similar to that which characterized England of the 1920's and 1930's, and there was a danger that the US might surrender to the Soviet Union without a war even. (To think of Hitler with nuclear weapons, Podhoretz claimed, one need only think of the Russians.) Podhoretz took this theme to the ridiculous by arguing that the root cause of this erosion of will was homosexuality.³ Pipes argued that when this kind of thinking becomes prevalent, "a nation loses the freedom to act in self-defense: psychologically, the white flag of surrender is up and sending unmistakable signals to the adversary". It would incite the Soviets to "keep on increasing their nuclear preponderance, given that the greater their theoretical capability too destroy the United States, the louder voices in the United States demanding that accommodation with the Soviet Union be made the 'paramount' objective of national policy", he claimed.⁴

Rather than surrender the members of the CPD counseled that the US should strive to reassert military superiority and to reimpose the doctrine of containment militarism. Daniel Graham, for one, reflected enthusiastically on the containment doctrine: "The containment strategy was the first and last strategy to be devised by the United States or Nato as a whole in the post-World War II period. It operated to the great advantage of the West until the late 1960's when it was replaced by a concept which came to be called detente".⁵ Graham didn't agree that "military superiority is not important ... if you want to make that case, that it doesn't do any good then one has to make the case that it didn't do us any good at the time of the Cuban missile crisis, and it certainly did us good. And I don't think there are many analysts who would believe that if the Cuban missile crisis should come off today that the end result would be the same, given today's strategic balance".⁶

¹ Ibid., pp. 33-34.
² Ibid., p. 161.
³ Ibid., p. 216; Norman Podhoretz, "The Future Danger", op. cit., p. 35.
⁵ Graham, quoted in Jerry Sanders, op. cit., p. 163.
The CPD called for military superiority at the conventional, tactical and strategic levels of warfare. They called for an increase of some US$260 billion in the first five years of the 1980's to pay for the MX, the Trident II submarine, the B-1 Bomber, as well as modernization and improvements in the Minuteman system. Nitze argued for: "curing the inadequate survivability of our land-based ballistic missiles and enhancing the power of those that can be expected to survive, proceeding with the modernization of the submarine-based component of our strategic deterrent, replacing our aging B-52's, rebasing our bombers at greater distances from the coasts, equipping them with high performance cruise and self-defense missiles, and assuring the survivability and endurance of our command, control, communication and intelligence".  

3.6 LINKS BETWEEN THE CPD AND THE SPACE WEAPONS LOBBY.

The ideology of the members of the 'space-weapons lobby' is just that of the Committee on the Present Danger. This is not very surprising, as some of the leading members of the 'space-weapons lobby' were also leading members of the CPD and other closely aligned organizations.

Several members of the 'laser lobby' at least were also members of the CPD or organizations which had the same outlook. Both Jake Garn and Jack Kemp were members of the Coalition For Peace Through Strength, and Henry Jackson of the Emergency Coalition Against Unilateral Disarmament, both of which were set up under the auspices of the American Security Council. A number of the members of the 'Madison Group' were also members of the CPD: Seymour Weiss, who had been a Team B member, Charles Kupperman, William Van Cleave and Richard Perle. Perhaps the clearest example of links to the CPD is provided by the High Frontier organization. Daniel Graham himself was almost 'Mr. CPD'. He was a member of Team B, was chairman of the Emergency Coalition Against Unilateral Disarmament, and Co-Chairman of the Coalition For Peace Through Strength, as well as being on the Board of Directors of the CPD. Karl Bendetsen was also on the Board of Directors of the CPD, as were Frank Barnett (President of the National Strategy Information Center), and Edward Teller. Bendetsen and Teller were also members of the Coalition For Peace Through Strength. From the Hudson Institute, both Donnald Brennan and Colin Gray were on the Board of Directors of the CPD.  

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Not only was it the case that leading members of the 'space-weapons lobby' were closely aligned with the Committee on the Present Danger, but the Reagan Administration was as well, Reagan himself joining, and being appointed to its executive committee in January 1979. All up, during the presidential campaign and the transition process, forty six members of the CPD served on Reagan's advisory task force. At the core of this task force with responsibility for foreign and military policy were CPD members Richard Allen, Jeane Kirkpatrick, William Van Cleave, Richard Pipes, Daniel Graham and Seymour Weiss. After Reagan had been elected, the CPD maintained its influence, with some 51 members of Reagan’s Administration having served on the Board of Directors of the CPD.¹

Thus, it can be seen that the ideology of ballistic missile defense in space is that of the Committee on the Present Danger, it is the ideology of American nuclear superiority, the ideology of nuclear war fighting, of 'peace through strength' rather than that of peace through nuclear disarmament and diplomacy. In 'peace through strength', 'strength' was much more important than peace. In many ways, the 'space-weapons lobby' was the result of a dispute within the Committee on the Present Danger over just how this military superiority could be most effectively gained. On the one side were those like Rostow and Nitze who argued that the United States needed to indulge in a massive build-up of offensive nuclear weapons with counterforce capabilities. On the other side were the members of the 'space-weapons lobby', who argued that the short cut to nuclear superiority was to build a defensive shield to effectively disarm the Soviet Union, and to harden American resolve to actually use the nuclear weapons that they had. They argued that a massive build-up of offensive weapons would be too expensive and would eventually lose public support.

¹ Jerry Sanders, op. cit., p. 282; Robert Scheer, With Enough Shovels, pp. 144-146.
4.1 INTRODUCTION

According to the model of the way in which military technology is shaped in the United States developed in section 1.2, it would be expected that, given that the proposals being put forward by the 'space weapons lobby' were, in a sense revolutionary, the armed services would tend to act as a conservative force and attempt to oppose the development and deployment of exotic space-based ballistic missile defence systems, or at least to integrate these systems within their own frameworks. Certainly both Daniel Graham of High Frontier and Malcolm Wallop of the 'laser lobby' realized that they were likely to run into stiff opposition from those in the armed services who were intent on protecting their own turf.

Also, with the development of new technologies, there is the potential that interservice rivalry will come into play, in this instance between the Army and the Air Force\(^1\) who had fought a number of bureaucratic battles in the 1950's over the air defence and ballistic missile defence missions. By the late 1970's the Army had a ballistic missile defence system for the point defence of missile silos based on "conventional" technologies in the advanced stage of development. Similarly, the Air Force was preparing to deploy an antisatellite system based on 'conventional' technologies. Both the Army and the Air Force were conducting research and development programmes on the more exotic beam technologies. The technologies used for these two missions were similar and the area of space-based defence against ballistic missiles was a potential area of conflict between the Army and the Air Force.

In this chapter I shall consider the development of the antiballistic missile defence mission by the Army and the antisatellite mission by the Air Force. Also, I will consider the more exotic beam weapon programmes that were being conducted by both the Air Force and the Army, to place the development of space-based weapons within their institutional and historical context. I shall also consider a major point of overlap between the interests of the Air Force and the Army - the basing of the MX intercontinental ballistic missile. As we have already seen, the MX was considered by most in the 'space weapons lobby' and most in the Committee on the Present Danger as being the key to American security. It turns out that the fortunes of ballistic missile defence were intimately connected with the

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\(^1\) The terms Army and Air Force are used here as a form of short hand. It is not meant to imply that they are single actors. The position that the Army say takes on a certain issue is the result of a bureaucratic struggle between units within the Army.
basing mode that would eventually be chosen for the MX. Finally, I shall consider the way in which the Army and the Air Force reacted to the proposals that were put forward by the 'laser lobby' and by High Frontier.

4.2 THE ARMY AND THE BMD MISSION

The mission of ballistic missile defence (BMD) has belonged to the US Army from the late-1950's, and was a carryover from its air defence mission. Not only has BMD come to be considered peculiar to the Army, but it has also served to differentiate the Army from the Air Force in the area of strategic nuclear weapons. By the late 1970's the Army had established an organization that was responsible for the development of ballistic missile defence systems, and had quite a long history of such development.

In 1945 the Army initiated Project Nike, awarding contracts to Bell Telephone Laboratories and Western Electric to develop a system to defend the United States against attack by enemy aircraft. This system involved a network of radars linked to computers which would track and identify the incoming aircraft and fire surface-to-air missiles which would detonate within a lethal radius of the aircraft. In the following decade, the Army deployed two such air defence systems, the Nike-Ajax and Nike-Hercules. The Army did not have the air defence mission all to itself at this stage though, as the other services had also developed air defence systems - the Air Force the Bormac, and the Navy the Talos systems. The Army did not take over all the air defence mission until November 1956, when it was given control of the Navy Talos system and other point defence systems with ranges out to 100 nautical miles.

In May 1946, a board of scientists recommended to the Army that it build an ABM system. However, it was not until about a decade later that the Army acted upon this advice. By 1953, the prospect of a Soviet missile force began to loom large and the Army asked Bell Telephone Labs to investigate the feasibility of a defence against ICBMs. By 1956, Bell had concluded that a modified Nike-Hercules system would be able to perform this task, and in 1957 the Army established the Nike-Zeus project. The Nike-Zeus BMD system consisted of a battery of nuclear-armed interceptor missiles linked to a set of huge radars which were used to track the incoming warheads and to guide the interceptors. "From that time on", Allison and Morris argue, "the Army consistently advocated

deployment of a large ABM system to defend the population against a major Soviet attack.\(^1\)

The Army's determination to push its ABM mission was derived from several factors. Firstly, the ABM mission, embodied within the Nike-Zeus project, was a follow-on from the Army's air defence mission which was embodied within Nike-Hercules.\(^2\) Secondly, during the 1950's the Army had surrendered much of its share of the budget to the Air Force and Navy, and had lost out in the competition for control of strategic nuclear weapons, the Air Force and the Navy capturing the strategic offensive missions. In 1958, the Air Force was given operational control of the Army Ballistic Missile Agency's Jupiter-C intermediate range ballistic missile (IRBM), the Army's hope for a piece of the strategic-nuclear action. The Army was limited to only tactical nuclear missiles but retained responsibility for ballistic missile defence, perhaps largely because the Air Force was not interested in this mission. For the Army ballistic missile defence seemed to be its last chance for a strategic nuclear role.\(^3\)

Right from its early days the Army's BMD programme was plagued with trouble. In 1958 the Pentagon's Reentry Body Identification Group (RBIG), a panel of scientists and engineers, concluded that Nike-Zeus simply would not work if confronted with a dedicated nuclear attack. If the Soviets were to build a missile fitted with several warheads then the ABM system would become "saturated" and would let a number of the warheads through. Also, they concluded that it could be defeated with decoys, and that the large radars were vulnerable to attack and could be blacked out by atmospheric nuclear blasts. Even worse, because the system itself relied on nuclear warheads, it would black itself out. These conclusions were reinforced in May 1959, when a panel appointed from Eisenhower's Presidential Science Advisory Committee (PSAC), prepared a secret report on the feasibility of ABM.\(^4\)

The RBIG and the PSAC reports provided a setback to the Army, which was keen to move the Nike-Zeus project into production. But it was limited to research and

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development only. When John Kennedy became President the Army made a "big push" for deployment of Nike-Zeus system consisting of seventy missile batteries (7,000 missiles), to defend twenty-seven areas in the U.S. and Canada. This system was initially endorsed by Kennedy's Defense Secretary Robert McNamara, albeit on a smaller scale - twelve batteries with 1,200 missiles defending six cities. It was thought that the system, even though not perfect, would deter the Soviets from launching an attack, and might protect the United States from an accidental nuclear attack by the Soviets, and from attacks by small nuclear powers such as China. Kennedy, who had been briefed by his Science adviser Jerome Wiesner, and by the Director of ARPA Jack Runia - respectively the chair of PSAC's 1959 ABM panel and a member of RBIG - had decided, by November 1961, against the deployment of Nike-Zeus.¹

At the same time, the Army was working on a new ABM system called Nike-X, which incorporated a "phased-array" radar, and a dual missile system - a long-range missile that came to be called Spartan, which could intercept incoming warheads in space, and a short-range missile called Sprint, which would intercept warheads once they entered the atmosphere, thus making it easier to get around the decoy problem. However, the scientists pointed out that the fundamental problems with the system still remained.²

Robert McNamara had come to change his mind about the wisdom of ABMs, but there was still strong pressure from the Army, from the entire Joint Chiefs of Staff and from their powerful allies on Capitol Hill, such as Senators Richard Russell, John Stennis and Henry Jackson. Although McNamara found it politically impossible to kill the Nike-X project outright, he tried to buy off its advocates by spending up to half a billion dollars a year on research and development. By 1966, the Army had been given enough to develop an ABM system geared for widespread deployment, and had kept the pressure up, placing the President, now Lyndon Johnson in a political bind. Johnson was "torn between the arguments of his Secretary of Defense and the judgement of the entire military establishment". In mid-1967 he finally ordered McNamara to fund production of the Nike-X system. McNamara announced the decision to deploy a limited ABM system - now called Sentinel - on September 18, 1967, claiming that it was largely to protect against the Chinese threat.³

McNamara's speech sparked a national debate over ABM, the first shot being fired by Hans Bethe and Richard Garwin in an article in the May 1968 edition of Scientific American. The article pointed to the problems which had been identified by the RBIG

¹ Ibid., p. 345.
² Ibid.
³ Ibid., pp. 346-347.
and PSAC committees, and argued that the offence could counter the defence at lower cost. By the summer of 1968, a group of Senators - including Edward Kennedy, William Fulbright, Albert Gore, George McGovern, Frank Church, Mark Hatfield and Stuart Symington had teamed up with scientists such as Hans Bethe, Richard Garwin, George Kistiakowsky, Jerome Wiesner, Sidney Drell, Wolfgang Panofsky, Jack Runia, and George Rathjens (many of whom were members of the 1959 PSAC panel or of RBIG), to oppose the Sentinel system, and the prospects for deployment began to look grim.¹

When Richard Nixon became President, in early 1969, he refocused the ABM debate by announcing that the Sentinel ABM system was scrapped, and that a new system called Safeguard would be deployed, not to protect cities, but to defend Minuteman silos, a less ambitious task. Safeguard was a two tiered layered defence system very much similar to the Sentinel system, which would use Sprint and Spartan missiles to intercept the incoming warheads.² By 1971, the Nixon Administration was justifying the Safeguard system to Congress mainly for its value as a 'bargaining chip' in the Strategic Arms Limitation Talks that were then in progress with the Soviets. On May 24, 1972, the US and the USSR concluded the SALT I Agreement and signed the ABM Treaty, limiting each side to two ABM sites of no more than 100 missiles. In 1974 this was further limited to one ABM site, and in 1975 the US dismantled its single site altogether.³

Even though the deployment of ballistic missile defences had been limited by the 1972 ABM Treaty, research and development continued throughout the 1970's, with an estimated US$250 million being spent per year to develop new systems.⁴ The two systems which had gained prominence by the end of the 1970's were known as the Low Altitude Defense System (LoADS) and the Homing Overlay system, both of which had grown out of the Safeguard system that had been abandoned in the mid 1970's.

The starting point for the development of LoADS is the Site Defense system which was designed primarily for the defence of Minuteman silos and was itself an improvement upon the Safeguard system. It differed from Safeguard in that it used small 'multiple netted' radars, high-capacity commercial computers, a low-cost version of the Sprint endoatmospheric nuclear-armed interceptor, preferential defence firing doctrine and a sophisticated discrimination capability. Site Defense was strictly a R&D programme, as it was carried out largely after the signing of the ABM Treaty, and was oriented toward

¹ Ibid., pp. 349-350.
² Ibid., p. 350.
³ Ibid., p. 354.
prototype demonstrations at the Kwajalein Missile Range until Congress terminated it in 1975.1 The Terminal Defense System (TDS), was, in turn, an outgrowth of the Site Defense programme. It seems to have been very much similar to the Site Defense system, employing a General Electric phased-array radar linked to a Control Data Corp. 7700 computer which ran complex software developed by TRW Systems. It was designed to intercept incoming warheads at an altitude of 200,000 feet and to have a detection to impact time of 15 seconds. Validation work on TDS was scheduled to be completed by the end of 1980.2 The LoADS system was an improvement upon the TDS system, designed to intercept warheads below 50,000 feet and to have a detection to impact time of less than 10 seconds. Its phased array radar is about one-fortieth the size of the TDS radar and it has a single stage interceptor half the size of the TDS interceptor.3

The LoADS system was designed to operate in conjunction with the Multiple Protective Shelter (MPS) basing mode for the MX missile. The system would employ a single-stage interceptor missile about 15 feet long armed with a nuclear warhead which, using an internal guidance system and a terminal homing sensor, would travel at hypersonic speeds to intercept nuclear warheads at altitudes below 50,000 feet. A small phased array radar in a capsule would be used in conjunction with the interceptor missile, and whenever the MX missiles were moved, the interceptor missiles and their accompanying radars would also be moved.4 Martin-Marietta, which had developed the Sprint interceptor for the Safeguard system was to design the smaller, single-stage interceptor for LoADS. McDonnell Douglas, which served as the Safeguard system integrator was to serve as the system integrator for LoADS as well.5 Beyond this system, the Army was also working on optics technology for terminal homing and non-nuclear warhead applications but, because of the speed of the interceptor within the atmosphere, the technology was, at the end of the 1970's, beyond the state of the art.6

In the early 1980's, the Army's Ballistic Missile Defense Systems Command had plans to demonstrate a pre-prototype LoADS system by the mid-1980's. The House Armed

3 Carol Feinman, "Army Planning New ...", op. cit., p. 11.
6 Ibid.
Services Committee, in a report released in early 1980, gave the LoADS plan a strong endorsement and urged the Army to expedite the programme. According to the House committee, the Department of Defense needed to structure a BMD programme that would "produce a demonstrated BMD capability that can be deployed in a time-frame responsive and reactive to the [Soviet] threat". In the committee's view, the length of time then needed to deploy an effective BMD system was excessive. The Army requested US$36 million in FY 1981 with which to start the development of the technology for LoADS and projected that it would need about US$92 million for the program in FY 1982.

In the 1960's the Army, under the Homing Interceptor Technology (HIT) project, funded the Vought Corporation to develop a non-nuclear interceptor missile which was initially conceived as an antisatellite weapon. The Army's programme in the 1970's to develop a new exoatmospheric interceptor was based partly on this HIT programme, and partly on the Spartan interceptor which formed part of Safeguard. Safeguard's exoatmospheric system used ground-based radars and so it was not possible to discriminate effectively between the incoming nuclear warheads and its accompanying booster fragments and decoys. This required the Spartan missile to have a nuclear warhead. The new approach sought to overcome these limitations by substituting electro-optical sensors in space for the radar. This, in turn, meant that non-nuclear interceptors could be used.

The Homing Overlay programme was conducted by the Army's Ballistic Missile Defense Systems Command under the Systems Technology Program (STP), with Lockheed Missiles and Space Company acting as the prime contractor. The interceptor was to consist of the first two stages of a modified USAF/Boeing Minuteman booster and a third reaction-controlled homing and kill stage. The interceptor was to carry an infrared sensor made by Honeywell, on-board data processing, and a non-nuclear kill device made by Lockheed, that resembled a folded umbrella. An alternative non-nuclear kill interceptor, designed to eject metal pellets to produce concentric circles was also being developed by Honeywell. Before the Homing Overlay interceptor was launched an electro-optical sensing device would be launched into space to acquire and track the incoming warheads. This "ballistic trajectory probe vehicle" would be linked to a ground control centre which

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1 Ibid.; "House Unit Backs Low-Altitude ABM Effort", AWST, June 16, 1980, p. 220.
4 Ibid.
would control the launch of the exoatmospheric interceptors. The technology for this probe was being developed by Boeing and Hughes Aircraft under the Designating Optical Tracker (DOT) programme.¹

The Homing Overlay system was considered to have a greater degree of technical risk than the LoADS system, as it employed newer, yet-to-be-proved technology. It was being developed to complement the LoADS system, and could be deployed with LoADS in a two-tiered layered defence system. While LoADS was considered to be suitable for the defence of MX missiles, layered defence was considered to be suited to the defence of "softer" military targets, such as SAC bases.² In addition to LoADS and Homing Overlay, the Army also had a programme known as "Quick Shot" which aimed to develop a small, relatively inexpensive hypervelocity missile for possible use in a "salvo-fired" very-low-altitude terminal defence system.³

The Army's Ballistic Missile Defense Agency (BMDA) seems to have played a major role in pushing for the development and deployment of its LoADS and Homing Overlay BMD systems. Starting in 1978, the BMDA began conducting a series of seminars in Washington. These seminars were attended by officials from the Pentagon and State Department, consultants from a variety of defence think tanks and aides to key Senators and members of Congress. Not surprisingly, the seminars were described as having "a definite pro-ABM slant" by one of the congressional aides who attended. One of the BMDA seminars, held in the Madison Hotel in Washington on September 18-19, 1979, was titled "The Future of U.S. Land-Based Strategic Forces". The 60 or so participants were treated to a series of conservative defence speakers on the US and Soviet forces concluding with a presentation on "BMD's role in national survival, a first assessment".⁴

The Army's Ballistic Missile Defense Command was also involved in a number of research and development projects on particle-beams and high-energy laser weapons. These programmes were funded at a much lower level than LoADS and Homing Overlay, and their technologies were at a much less advanced stage of development. In 1981, the responsibility for the particle-beam projects was shifted from the Ballistic Missile Defense Agency (BMDA) to the Defense Advanced Research Projects Agency (DARPA), but the

BMDA remained as the agent for DARPA in contracting and maintaining particle beam technology work, and as a technical adviser.\(^1\)

There were two particle-beam programmes which were transferred to DARPA. First, was an "autoresonant accelerator" designed to produce charged-particle beams of high-energy ions for use in the point defence of missile silos.\(^2\) Second, was the "White Horse" programme at the Los Alamos National Laboratory, which aimed to produce a neutral hydrogen beam by accelerating a beam of negative hydrogen ions using a "radio frequency quadropole linear accelerator", and passing this beam through a charge-exchange cell. Under the programme, a 5-MeV test stand accelerator was being constructed initially, followed by an advanced accelerator test stand operating between 50 and 100-MeV. In 1981, it was being predicted that, if successful, this programme would enable scaling to 500-MeV and packaging of the accelerator for space-basing providing a "neutral-beam weapon for ballistic missile defense in the 1990's".\(^3\) Funding cuts in 1980 delayed the construction of the "White Horse" test accelerator for about two years as DARPA had a commitment to the Triad chemical laser programme, and the Navy's "Chair Heritage" particle beam programme.\(^4\)

The Army was also involved with three laser weapon programmes. First was a tin-oxide chemical laser, being developed by Bell Aerospace. Approximately US$250,000 per year was being devoted to this project with a demonstration planned for 1983. Second was an electric-discharge eximer laser being developed by Westinghouse, which used xenon-fluoride gas as the lasing medium and an x-ray source to start the process. Some US$300,000 per year was being devoted to this project in the early 1980's. Third was a colspan vibrational electric transition laser device in which an electron beam was used to 'pump' a gaseous mixture of nitrous oxide and a cyanogen to produce the laser beam. This project was being funded at approximately US$250,000 per year.\(^5\)

**4.3 THE MX MISSILE BASING DEBATE AND BMD**

The MX missile evolved from the Strat-X study begun in 1967 and was conceived as a mobile ICBM to supplement the fixed silo-based missiles. Development of the MX began in 1972 but over $120 million was spent prior to that time looking at various schemes for basing the mobile missile. By 1974, a wide spectrum of possible basing modes existed,

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1 "Army Beam Programmes Moving to DARPA", AWST, August 4, 1980, p. 51.
2 Ibid.
4 "Neutral Particle Programs ...", op. cit., p. 55.
5 "Army Beam Programs ...", op. cit.
ranging from road and rail mobile basing, to basing in shelters and trenches, and extending to waterproof missile pods on the bottoms of ponds and reservoirs as well as missiles in blimps and dirigibles. The basing of MX missiles in large transport planes was also considered a viable option, a demonstration launch of a Minuteman missile taking place in 1974.\(^1\) Most of these concepts were rejected before being subjected to detailed cost-effectiveness analysis.\(^2\)

By the late 1970's four basing modes for the MX remained as strong contenders - a buried trench system, an air mobile system, a system of vertical multiple protective structures (MPS), and a system of horizontal MPS.\(^3\) The Air Force was directed to make a detailed study of the buried trench concept in October 1976. In this basing mode, 300 MX missiles would be deployed in concrete-enclosed trenches hardened to 200 psi and covered with five feet of earth - some 42 feet wide, 21 feet deep, and 10-12 miles long - along which the missile’s Transporter/Launcher would travel at random. The Pentagon planned to construct these trenches in the Southwest United States where there is an abundance of desert area and where they expected less resistance from environmental groups.\(^4\) A cheaper version of this scheme was the hybrid trench in which there would be one main trench of minimum hardness from which 20-25 hardened spurs would break off. The missile would be based in one of these spurs.\(^5\) This scheme was dropped by the Air Force in November 1977 because it was considered that it would be too easy for the Soviets to destroy, it would be too expensive, and because test results had not been encouraging.\(^6\)

The Pentagon began a new study, and in May of 1978 vertical shelters emerged as the favourite scheme, firstly known as Multiple Aim Point (MAP), but eventually known as Multiple Protective Structure (MPS). The Air Force Space and Missiles Systems Organization (SAMSO) and the MX Basing Ad Hoc Working Group of the Air Force Systems Command conducted studies in 1978 which concluded that 200 MX missiles could be deployed in some 4,500 vertical shelters each one hardened to 600 psi and spaced about 7,000 feet apart. The shelters would be sited in the Great Basin of Nevada and Utah, and the highlands of Arizona and New Mexico, at an estimated cost of US$30

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\(^2\) D. Ball, "The MX Basing Decision", op. cit., p. 58.

\(^3\) Ibid., p. 59.

\(^4\) Ibid., R.C. Aldridge, op. cit., p. 105.

\(^5\) R.C. Aldridge, op. cit., p. 105.

\(^6\) D. Ball, "The MX Basing Decision", op. cit., p. 59.
billion. The Air Force recommended to the Secretary of Defense in December 1978 that such a system be built and be operational by 1986.\footnote{Ibid., p. 59; R.C. Aldridge, op. cit., p. 107.}

In early 1979 the Defense Systems Acquisition Review Council (DSARC) directed the Air Force to review a number of air-mobile concepts, as well as further refining the vertical MPS concept. The review study which the Air Force presented to the Secretary of Defense on 31 March 1979 involved the acquisition of between 210 and 290 wide-body jets or short-take-off-and-landing transports. Each of these aircraft, containing an MX missile, would be stationed at one of five principal Air Force bases. During a missile alert, the aircraft would become airborne or be shuttled among some 4,500 small airports. This concept was pushed throughout the spring of 1979 by the President's Science Adviser and the Office of Science and Technology Policy, but was eventually rejected because it was more expensive than the ground mobile concepts and because of certain technical problems and operational risks.\footnote{R.C. Aldridge, op. cit., p. 111; D. Ball, "The MX Basing Decision", op. cit., p. 59.}

The fourth system, the horizontal MPS system, although never as comprehensively analysed as the alternatives, was the one eventually chosen on 5 September 1979, at a full meeting of the National Security Council presided over by President Carter. A decision was made to begin full engineering development of the system.\footnote{D. Ball, "The MX Basing Decision", op. cit., p. 58.} The so-called 'race track' system consisted of 200 closed-loop roads (one for each missile) with each having 23 spurs leading into horizontal shelters hardened to 600 psi and spaced approximately 7000 feet apart. The MX missile would be carried horizontally in its launch canister (some 120 feet long and 12 feet in diameter) on a transporter-erector-launch vehicle (TEL), a six-axle, 24 wheeled vehicle which would weigh 670,000 pounds. In addition the TEL would carry a 140,000 pound 'modesty shield', designed to prevent satellite observation of the missile canister and its placement in any particular shelter. The missile loops were to be located in southern Utah and Nevada.\footnote{Ibid., p. 60; R.C. Aldridge, op. cit., p. 109.}

The Air Force was not in favour of the horizontal MPS system arguing that it was less survivable than its preferred vertical MPS mode. The NSC opted in favour of the horizontal basing mode because, argues Ball, of two considerations. Firstly, the NSC staff wanted to ensure that there would be no infringement "of the principles regarding either ICBM mobility of national technical means of verification ... that had been negotiated in SALT". They were concerned that the Soviet reconnaissance satellites might...
not be able to properly verify that an empty silo did not contain a missile. Secondly, the horizontal MPS system had greater mobility than the vertical system and would be less vulnerable.\textsuperscript{1} Under the vertical shelter system, it would take one hour just to lower a missile into its silo, and about two days to relocate the entire MX force. Under the race track proposal, the missiles could be driven straight into their shelters, and the entire missile force could be relocated in 12 hours. In the event of a nuclear attack in which the shelter containing the MX missile was targeted, it would be possible with the race track system to 'dash' the MX missile to an untargeted shelter.\textsuperscript{2}

Another possibility for MX basing was the use of ballistic missile defence to protect the MX missiles in their shelters. This option was considered by the Carter Administration, but it was not preferred because such a system would have abrogated the 1972 ABM Treaty. In a statement in February 1979, Under Secretary of Defense for Research and Engineering, William Perry, indicated that: "Ballistic missile defense is limited by the ABM Treaty, which allows the use of only 100 interceptors. Abandonment of the ABM Treaty would introduce a number of new problems, even if it eased our concerns about ICBM vulnerability".\textsuperscript{3} Perry added that the US did maintain a "high technological level" in BMD capability which may, in future "provide an enhanced survivability posture for our ICBM force"\textsuperscript{4}, but pointed out at a later date that BMD would only be an option that would be considered "in a virtually incredible all-out arms race".\textsuperscript{5}

Right from the start, Carter's race track basing proposal ran into problems. As already mentioned, massive opposition to this basing mode arose in both Utah and Nevada. In March 1980, Governors Scott Matheson (Utah) and Robert List (Nevada) came out jointly against the deployment of MX in their states. They objected to the impact of the MX project on the "water supply, grazing and pasture land, and the area's fragile ecostructure, as well as the violation of the sacred lands of the Shoshone Indians and the inability of the area to absorb a large influx of people".\textsuperscript{6} The Defense Department considered resiting the race track system in the southern high plains area of West Texas and New Mexico. However, this area was far less desirable because the land was made up "almost entirely of small, privately owned lots, a factor that would engage the

\begin{itemize}
\item \textsuperscript{1} D. Ball, "The MX Basing Decision", op. cit., p. 60.
\item \textsuperscript{2} R.C. Aldridge, op. cit., p. 109.
\item \textsuperscript{3} Statement in Survival, Vol. XXI, No. 3, May/June 1979, p. 133.
\item \textsuperscript{4} Ibid.
\item \textsuperscript{5} "New MX Basing Design Being Evaluated", Aviation Week and Space Technology (AWST), March 31, 1980, p. 24.
\item \textsuperscript{6} R.C. Aldridge, op. cit., pp. 109-110.
\end{itemize}
department in lengthy, and potentially costly, negotiations. The great basin of Utah and Nevada consists of public lands".¹

On May 6, 1980, Carter's Defense Secretary Harold Brown, responding to the opposition to the MX basing plan, announced that the closed loop race track had been replaced by a linear race track system. There would still be the same number of missiles and shelters but the spurs to those shelters would now branch off of existing country roads. This would use less land and eliminate the need for additional road construction. A new shelter design was also adopted - the so-called "loading dock" concept. Rather than having a complete TEL drive into the shelter, only the erector-launcher system containing the missile would be off-loaded. The transporter would also provide the necessary shielding, eliminating the need for a shield vehicle and making the shelters smaller since they did not have to accommodate the transporter.²

During 1980, yet another MX basing plan was being hatched, this time at Los Alamos National Laboratory in New Mexico. Early in 1980 Senator Pete Domenici, Chair of the Budget Committee had asked the Los Alamos Lab to examine the prospects for BMD technology. The Los Alamos study, released in June 1980 is reported to have concluded that: "ballistic missile defenses could play a timely and vital role in national strategic policy". If the Army's LoADS system were combined with the homing overlay system, the study concluded, even a large-scale Soviet nuclear strike could be neutralized.³ Donald Kerr, Director of Los Alamos, and Robert Kupperman, echoing the Los Alamos study team proposed that "MX launchers be built and placed in existing Minuteman silos; that a fraction of these launchers have nuclear payloads as their front ends; and that the remainder be outfitted with ... anti-ballistic missile payloads. The ICBM force could be further defended by a localized missile defense, known as LoADS, intended to destroy Soviet warheads which had leaked through the initial defense".⁴ This concept apparently appealed to Republican Senators such as Paul Laxalt (Nevada), who was very close to Reagan, and to Domenici.⁵

⁵ Bruce Ingersall, "MX debate may fuel ...", op. cit., Sec 2, p. 1.
In early 1981, the need for an ABM system to protect the MX missile in the MPS basing mode was being discussed in the Senate. This discussion focussed on three questions: the vulnerability of the MX missile; if vulnerable, whether or not the LoADS system should be added to protect the MX; whether the LoADS system could be used "to lessen the impact on Nevada and Utah" of the race track basing mode, "by providing defense of MX missiles in existing" Minuteman silos; and, whether or not the Senate was willing to forgo the ABM Treaty.¹

When the Reagan Administration came to power it inherited the MX basing debacle. This administration was opposed to President Carter's basing plan but had a very strong commitment to the MX missile and was desperate to find a solution to the basing problem. The Reagan Administration did not have the same commitment to arms control that the Carter Administration had, so ballistic missile defence became a more serious contender as a complement to any MX basing mode. At first the Reagan Administration gave only a lukewarm response to the use of LoADS to protect the MX missile. When Senator Proxmire wrote to Caspar Weinberger during his confirmation hearings asking about his plans to use BMD to protect the MX, Weinberger responded that he believed that "we must look very carefully at ABM technology. An effective ABM system may be needed in the event the Soviets increase substantially the number of their hard target-kill capable warheads. If we were to achieve a significant breakthrough in the ABM area, we might - after extensive study - be able to deploy MX in fixed silos protected by ABM".² When Reagan sent his revised defense budget to Capitol Hill in early March 1981 it included a US$129 million increase in spending for ABM development.³

In the early days of the Administration the Pentagon began pushing Weinberger to reactivate the abandoned ABM system at Grand Forks, North Dakota. Seymour Zeiberg, Deputy Undersecretary of Defense for Space and Strategic Systems and a number of his fellow strategists, devised a plan to deploy 70 long range and 30 short range missiles to protect the Air Force warning radar at Concrete, North Dakota. They argued to Weinberger, and to some members of Congress in a secret briefing, that the radar at Concrete was so vital that it was worth protecting, and further that such a deployment would help to focus the Pentagon's currently diverse ABM research programme. This

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¹ "Senate Discussing ABM Need To Guard Multiple Shelter MX", AWST, 9 February 1981, p. 91.
² Ibid.
could be done without abrogating the 1972 ABM treaty. Weinberger said at the time that he was "not leaning any way" on the proposal, but "certainly considering it".1

On July 1, 1981, Defense Secretary Caspar Weinberger appointed a 15-member "blue ribbon" panel, Chaired by University of California physicist Charles Townes, to study alternative basing modes for the MX missile.2 This panel examined many ideas for basing the MX, including the Carter plan, but came to the conclusion "that virtually every idea was flawed, because the Soviets could build warheads of sufficient power and in sufficient quantity to destroy almost any land-based target".3 The panel was in unanimous agreement that basing MX missiles aboard airplanes and basing them deep underground were the two most promising alternatives, but argued that an interim basing mode was necessary. The interim mode suggested was a variation on the Carter plan and resembled the plan put forward by the Los Alamos team in 1980.4 Supporters of this plan were concerned that the Air Force, who preferred a mobile land-based plan, should not be upset. The main idea was not to let the missile itself disappear while the new basing alternatives were being examined.5

The Air Force pushed strongly to undermine the two alternative basing modes and thus improve the chances for its preferred basing mode, keeping the chances for the Army's BMD programme alive. The air basing idea consisted of placing the MX missiles aboard a huge aircraft - known as Big Bird - which was to be constructed largely of plastic reinforced with carbon fibres and powered by propeller engines. It was to get such good fuel economy that it could stay aloft for more than three days, even while carrying up to two missiles. The Townes panel sought independent confirmation of this proposal and asked for a study by the Department of Defense. Weinberger directed this study to DARPA, who had already rejected the idea once before. After less than a week the DARPA panel, basing its work on an analysis undertaken by the Air Force, concluded that Big Bird would weigh more than predicted, need a larger crew and would therefore

5 Ibid., p. 151.
obtain poorer mileage. The Townes panel would not accept this conclusion and awarded a US$240,000 contract to Boeing to review the proposal. Not surprisingly, the Boeing study team came to the conclusion that Big Bird was both technically and economically feasible.¹

The Air Force was far from pleased. Air Force commanders contacted senior Boeing officials and asked that the results of the Boeing study be checked. Boeing, which had an Air Force MX contract for US$1.5 billion, and stood to gain another US$8.5 billion in follow-up contracts, ordered that the conclusions of the study be "audited". The audit concluded that the performance of Big Bird was more uncertain than it seemed before. Also, the Air Force, in July 1981, directed the Air Force Science Advisory Board to review Big Bird. This panel found that Big Bird was not ready for engineering development.²

Two forms of underground basing were proposed. Firstly, missiles would be placed in buoyant canisters, which were lowered into narrow holes 3000-5000 feet deep, and then covered with sand. After a nuclear attack, the sand would be saturated with water from a storage tank buried alongside, and the missile would, supposedly, rise to the surface by pushing its way up through the wet sand. The second concept - the "mesa/tunnel" plan - was very much similar to the race track proposal except that everything would be hidden about 3000 feet underground in an enormous outcropping of rock somewhere in the West. In the event of a nuclear attack, the missile canisters would burrow their way to the surface, and release their missiles. The Air Force was strongly opposed to this plan as well. Deep underground systems in one form or another had been considered and rejected at least 9 times in 20 years, and there was little enthusiasm for another look.³

When the Townes Panel met with Weinberger they persuaded him that some short-term basing plan was necessary to keep the MX missile alive in Congress, otherwise it might

² Ibid., Smith suggests three reasons why the Air Force reacted so strongly to the Big Bird proposal: (i) it threatened to upset the race track plan, which the Air Force strongly supported. Many billions of dollars had been spent to develop this plan, and many officers in the Air Force had built their careers upon it. Further, the launch of missiles from a fixed point provided greater accuracy, a characteristic highly prized by the Air Force; (ii) it could threaten some existing Air Force missions such as ocean surveillance and command and control aircraft; (iii) the Air Force wanted things to go fast. The mere 150 knots of Big Bird would be antithetical to the culture that the Air Force officials had grown up in. (Ibid., p. 272-273.)
be canceled or deferred. Weinberger was reported to be intrigued by both the Big Bird and deep underground basing proposals. Even though many in the Reagan Administration were reported to favour the interim basing scheme proposed by the Townes panel, it did not find favour with Weinberger or Reagan, and Weinberger suggested instead that in the interim the MX be put aboard modified Air Force cargo planes. The Air Force and its allies on Capitol Hill lobbied against this proposal vigorously and it was soon dropped.\(^1\)

While the Reagan Administration was grappling with how best to base the MX missile the Army's BMDA continued to push its case, and support for BMD seemed to be growing. Some in the Reagan Administration began to look at how the ABM Treaty might be modified to allow for BMD systems. In the first half of 1981 both the Pentagon and the Arms Control and Disarmament Agency were reported to have studies under way on how they could modify the ABM Treaty. In March 1981, the BMDA awarded a US$224,000 contract to Science Applications Inc., a Virginia-based think tank to conduct a "qualitative and quantitative analysis" on the ABM Treaty and to recommend options.\(^2\)

In mid 1981, Weinberger seems to have started considering the BMD more seriously, directing one of three Defense Science Board (DSB) meetings in the summer of 1981 to conduct a study of "what kind of ABM we could have by the mid or late 1980's", looking specifically at the technologies developed by the Army's BMDA, and another approach being pushed in the Pentagon at the time to use a Navy Aegis early warning radar system with the Sprint ABM.\(^3\) When the DSB met with the Under Secretary of Defense for Research and Engineering, Richard DeLauer, on Friday 14th August, 1981 they recommended that the Reagan Administration go ahead with the land-based shelter scheme for deploying the MX missile, as strong opposition to the air-mobile idea had been expressed by the Air Force, and by key members of the Senate and House committees. Also, the DSB members were reported to have urged the development and ultimate deployment of a BMD system to protect the land-based MX missile. However, Weinberger and Reagan remained firm in their opposition to the race track scheme, in the face of the mounting resistance in Utah and Nevada against it, which had recently been joined by the Mormon Church.\(^4\) Although Reagan and Weinberger did not yet seem to be convinced of the need for BMD to protect the MX missile, Richard DeLauer was. He hinted in August 1981 that should Reagan decide to build a scaled-down MX missile in

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\(^3\) Ibid.
\(^4\) "Key defense advisory panel said to back land basing of MX", Baltimore Sun, 16 August 1981, p. 3.
Nevada it was highly likely that the Pentagon would step up the development of ABM interceptors.¹

On October 2, 1981 President Reagan announced a new basing plan.² As explained by Weinberger, Reagan's new basing scheme was twofold: The first 36 missiles would be placed in the silos vacated by Titan II missiles, and hardened to 5000 psi. Then by 1984 decide among three options for deployment of the remaining 64 missiles in 1988-89. The primary options were: air-basing, deep-underground deployment, and an ABM defence of silo based missiles. Weinberger at this stage was still plugging for air-basing.³ The interim basing decision was one of expediency. As Richard DeLauer put it: "We had to put it somewhere or put it in a warehouse. There was no survivable basing scheme we could count on right now and so what we said was we'll put 'em in existing holes".⁴ It soon became obvious however that this decision was "a product of substantial technical and political miscalculation". It was discovered that the geology near the Titan silos was unsuitable for superhardening to 5000 psi, and that the silo modifications would conflict with the unratified SALT II Treaty.⁵ The Department of Defense announced on 31 December 1981 its decision to deploy the MX in Minuteman silos instead. This decision "gave approval to a USAF recommendation for the interim basing mode".⁶

The Department of Defense established an executive committee to oversee a coordinated USAF MX basing/ Army BMD programme. The new basing scheme required a slight change of plan: the LoADS endoatmospheric system was now being called underlay, and was redesigned to defend the MX in Minuteman silos. It drew heavily on the technology developed for LoADS but the interceptor missiles for the underlay plan were required to be larger to achieve an extended range and velocity.⁷ Even though it was now being considered publicly as an option for MX basing, the Reagan Administration was reported

² R.C. Aldridge, op. cit., p. 113.
⁵ Ibid.
⁶ Four reasons were given for this new basing plan: (i) the funds for superhardening were slashed by Congress; (ii) the location of the Minuteman silos enabled more Soviet strategic sites to be targeted; (iii) command, control and communication was easier with the Minuteman silos, and; (iv) it was easier to defend Minuteman silos located 3-5 miles apart than Titan silos 10-12 miles apart, and BMD was considered to be a long term possibility. "A bmd system could be used to defend a flight of 18 Titan silos, but the US and USSR are limited to only one BMD. It would be possible to defend all 40 missiles in Minuteman silos. (Clarence A. Robinson, "Pentagon Drops Superhardened Silo Basing", AWST, 11 January 1982, p. 21.)
⁷ Ibid.
to be unwilling to commit itself to BMD because of uncertainties over cost and effectiveness.¹

Under pressure from Senator Tower and others in Congress who had publicly backed the Carter plan, the Pentagon, two months after Reagan's decision, said that MPS would be explored "as an option within the BMD program". The managers of the BMD programme were reported to be "busily hatching schemes" to shuffle the MX among a series of shelters. These schemes were supposed to be different from the Carter plan in that BMD was to be incorporated from the start rather than added on later and less land and fewer shelters would be used.² In fact, even though the Administration was not publicly promoting BMD, that it was emerging as the frontrunner among the three choices was evident from the level of funding that it was attracting. Early in 1982 the Pentagon proposed doubling the annual budget for BMD research to just short of one billion dollars. The competing basing options such as Big Bird were to only receive one-tenth of this amount, even though they were at a much less mature stage of development. The BMD proposal had quite strong support. Firstly, there was Senator Tower. Secondly, General David Jones, the Chair of the Joint Chiefs of Staff, who had said after Reagan's announcement that he still thought the Carter plan "was both affordable and would be survivable". And thirdly, General Lewis Allen, the Air Force Chief of Staff, who said "that Reagan and Defense Secretary Weinberger failed to grasp the merits of the Carter plan despite his ... concerted efforts to sell it to them".³

Reagan's new basing scheme ran into trouble in March 1982, when Senator John Tower, Chair of the SASC, announced that his committee would eliminate funds for the production of the MX missile for FY 1983 to save the Administration from an ineffective basing scheme, and thus to save the MX missile program from possible oblivion. A SASC subcommittee voted 9-0 to delete US$1.5 billion for production of nine MX's in FY 1983 and another US$200 million for work on temporarily basing MX in Minuteman silos. They voted to require the Pentagon to select by December 1, 1982 a permanent "survivable" basing plan that could be rushed to completion earlier than 1989.⁴ The Pentagon publicly expressed disappointment at the decision of Tower's committee and complained that it would not be able to come up with a new basing mode in time.

³ Ibid.
Privately Pentagon officials were reported to hold fears that the President's plan was in danger of defeat.¹

With the collapse of the latest basing scheme, the Air Force began to study a new land-based scheme known as the MX Deceptive Dense Pack Basing Concept - Dense Pack for short - and BMD became even more likely to become an option. Under Dense Pack, the 100 MX missiles would be based in Wyoming and deployed in silos - superhardened to 15,000 psi - and spaced 1,800 feet apart in alternating rows of two and threes that would stretch in nearly 14 mile north-south columns. The missiles would be rotated among the silos and would be protected at the periphery by BMD interceptors. The aim of Dense Pack was to aggravate Soviet accuracy and timing by forcing such close targeting that incoming warheads would be destroyed or deflected by radiation blast waves and debris from prior exploding warheads, a phenomenon known as "fratricide". It was thought that Dense Pack would be easier to sell because the missile fields would take up a relatively small area and so could be sited in existing military bases.²

There was a possibility that this basing mode would be susceptible to a Soviet "pin down attack", whereby the Soviets would detonate nuclear warheads outside the earth's atmosphere to produce nuclear radiation and electromagnetic pulses that would prevent the launch of the MX missiles. It was argued that such an attack could be prevented using a BMD system which could intercept the warheads in space before they exploded. The Pentagon was reported to be considering the Homing Overlay system for this.³

Ballistic missile defence was starting to gain favour both in and outside the Administration. In August 1982, Senator Tower announced that he thought that "ballistic missile defense is going to be essential regardless of the basing system" for the MX, a view he said that was shared by most of the members of the SASC. He added that it would not bother him if the US had to scrap or modify the existing ABM treaty.⁴ Weinberger too seemed to be starting to favour BMD. He said, in October 1982, an ABM system "would enhance any system's survivability", and that if it came "down to a question of whether or not the most effective method of deploying MX requires some

¹ Ibid.
kind of revision in the treaties or something of that sort, I would suppose that we would look at the way in which the treaties might be revised rather than give up the most effective way of deploying it".  

President Reagan announced his new MX basing scheme - Dense Pack, which involved 100 MX missiles, spaced 1,800 feet apart over 20 square miles of Warren Air Force Base in Wyoming - in early December 1982. Before the end of the month this scheme too had been rejected. Reagan's treasured MX missile was in real trouble. Not only was the freeze movement gaining support in Congress, but also many members of Congress had come to believe that defence spending needed to be cut sharply to reduce the federal deficit - the MX, costing billions of dollars, would be a prime place to start. In January, Reagan set up yet another "blue ribbon" committee to try and find a solution to the MX basing problem, this one called the Strategic Weapons Commission and headed by Brent Scowcroft, a retired Air Force general and former head of the NSC. In April 1983, this commission recommended basing 100 MX missiles in existing Minuteman silos in Wyoming.

The issue of the basing mode for the MX missile serves to illustrate the complexity of the weapons development process. Space-based or land-based BMD systems cannot be viewed as a weapons system in isolation. The future of ballistic missile defence was linked to the basing mode chosen for the MX missile. Thus, the factors that were shaping the basing mode for the MX were, indirectly, also shaping ballistic missile defence. One important factor here was the Air Force, which preferred a mobile land-basing mode for the MX. The Air Force seems to have formed an alliance with the Army over this, and together they actively worked through Congress to push MPS with LoADS and Homing Overlay as the preferred basing mode and to undermine the alternatives. They were helped in this endeavour with allies on Capitol Hill, such as Senator John Tower. Another important factor shaping the MX basing mode were environmental, Indian and farming groups, and the Mormon Church in Utah and Nevada, who rose up in opposition to the race track basing mode in their state. These groups, linked to national environmental and groups, were able to apply so much pressure to the government that it was forced to modify the basing plan. Also important was the wider political context, particularly in the form of the Administration that was in power. The Carter Administration was in favour of

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1 "ABM Could Guard MX, Weinberger Says", Los Angeles Times, 24 October 1982, p. 3B.
detente and arms control, and so did not consider BMD as a serious option for MX basing. The Reagan Administration had much less of a commitment to arms control and was prepared to abrogate the ABM Treaty if necessary. This meant that the chances for ballistic missile defence were much greater.

4.4 THE AIR FORCE AND BMD

The Air Force programme to develop a direct ascent non-nuclear antisatellite (ASAT) missile had its origins in Project SPIKE which began in the early 1970's, and was itself based on research on non-nuclear kill mechanisms carried out in the 1960's. In April 1971 the USAF's Air Defense Command proposed the development of an air-launched missile for use as an antisatellite weapon. The initial proposal was to use a modified AGM-78 anti-radar missile which would be launched from an F-106 fighter. The Air Force Space and Missile Systems Organization (SAMSO) conducted an assessment of this proposal, and, although favourable, the project only received low levels of funding.¹

In 1975 the Air Force was reported to be beginning a three-year project to develop a small ground- or air-launched ASAT weapon that would employ a Miniature Homing Vehicle (MHV) to home in on a target satellite using a long-wavelength infrared (LWIR) sensor and destroy it by direct impact. At this stage, three companies - Rockwell International, Vought, and General Dynamics - were competing in the development project organized by SAMSO. Rockwell seems to have been eliminated, leaving the competition to General Dynamics and a team of contractors led by Vought and including Boeing and Hughes.² The designs by General Dynamics and Vought were reviewed by the Office of Defense Research and Engineering, and the Air Force Space Division, and Vought was finally awarded the prime contract, worth initially US$58.7 million, in September 1977. The design put forward by Vought drew heavily on earlier Army-sponsored work undertaken by them under Project 922 on a direct-ascent infrared guided homing vehicle for ballistic missile defence.³

The Air Force did not settle on the development of an air-launched missile for the Miniature Homing Vehicle (MHV) until the end of 1978, the launching of MHVs from ground-based ICBMs, and launching from orbiting satellites also being considered as alternatives. These alternatives were considered to be less flexible than the air-launched

² Ibid., p. 205.
system, ground-based systems in particular suffering from weather and geographical constraints.¹ As well as the MHV approach, work towards a space-based laser ASAT system was being undertaken at the USAF Weapons Laboratory at Kirtland Air Force Base, however it was not envisaged that such a system would be operational until well into the 1990's. At this stage it was considered that such a system would require technical advancements well beyond the state-of-the-art, especially in the areas of surveillance, and command and control systems.²

By mid-1980, the Air Force's ASAT missile programme was being described as "essentially complete", and likely to be ready for operational deployment in the latter half of the 1980's. The system was developed by Vought, Boeing and McDonnell Douglas as associate prime contractors with Hughes and Honeywell as sub-contractors. It consisted of a three-stage ASAT missile that would be launched from a modified McDonnell Douglas F-15 aircraft. The missile consisted of three main stages: a modified Boeing short-range attack missile (SRAM); a modified Vought Altair III rocket booster; and the Miniature Homing Vehicle (MHV) developed by Vought, a small cylindrical object 12 inches by 13 inches which consisted of a cluster of small rockets surrounding eight cryogenically cooled infrared telescopes, connected to a processor which enabled the vehicle to home in on its target. Overall, the ASAT missile was approximately 17 feet long, 18 inches in diameter, and weighed 2,600 pound.³ It was planned that the squadrons of F-15's for the ASAT mission would be based at Langley Air Force Base, Virginia, and McChord Air Force Base, Washington, these squadrons being capable of attacking Soviet satellites in low-earth orbit, such as their ocean surveillance satellite capable of targeting naval vessels and the Soviets killer satellite.⁴

In 1981, contracts totaling US$418.8 million were awarded to Vought (US$268 million) and Boeing Aerospace (US$150.8 million) by the USAF's Space Division for further research and development of the air-launched ASAT. In fiscal 1983, the Air Force requested US$212 million for the ASAT programme, about one third of the service's budget for strategic systems research, and announced plans to demonstrate the system in

the not too distant future, so that it would be operational by the mid- to late-1980's. The Space Defense Operations Center at the North American Aerospace Command's (NORAD) underground headquarters at Cheyenne Mountain, which was planned to be the focal point for command and control of the ASAT interceptors was reported in 1982 to be conducting computer simulations and other studies in readiness for operational deployment. The Air Force was obviously making a strong commitment to this form of ASAT weapon.1

The Air Force's ASAT miniature homing weapon ran into trouble in early 1983 when the General Accounting Office (GAO) conducted a review of the antisatellite programme. According to an unclassified version of this report:2

> [W]hen the Air Force selected the miniature vehicle technology as the primary solution to the antisatellite mission, it was envisioned as a relatively cheap, quick way to get an antisatellite system that would meet the mission requirements. This is no longer the case. It will be a more complex and expensive task than originally envisioned, potentially costing tens of billions of dollars.

The report went on to list four alternative technologies which deserved more careful attention, these being: ground-based missiles, ground-based lasers, airborne lasers, and space-based lasers.3

Some work on laser weapons for the ASAT mission had been conducted by the Air Force since the 1970's, under the Advanced Systems component of the Space Defense Program, this area receiving increased funding since about fiscal 1977. The funding received for this programme through the late 1970's and early 1980's was: FY 1977 - US$2.6 million; FY 1978 - US$9.8 million; FY 1979 - US$14.5 million; FY 1980 - US$0.5 million and FY 1981 - US$2.1 million. This level of funding was not comparable with that being spent on the MHV technology for the ASAT mission, this programme receiving US$20.9 million, US$44.8 million, US$63.0 million, and US $82.5 million in the years FY 1978 to FY 1981 inclusive.4

The USAF's Space Command seems to have responded to the gauntlet thrown down by the GAO, by drafting, in early 1983 a formal "statement of need" for developing antisatellite weapons using lasers. According to General James Hartinger, commander of

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3 Ibid., p. 250.
the Space Command, the laser weapons were "a technology that looks like it could possibly fulfill our requirements better than the air-craft-launched Asat we are developing now".1

One question that can be asked is to what extent the Air Force, through its antisatellite weapons programme acted as a driving force for the development of space-based laser weapons. Ashton Carter argues that although, in some ways, the technologies used for the ASAT and BMD missions are similar, that in actual fact the two missions are quite different and thus the technological requirements are quite different. He points out that an ASAT system cannot be easily upgraded to a BMD system, but that a BMD system could quite easily, with some modifications, be applied to the ASAT mission, especially a space-based laser BMD.2 To get more of an idea of whether those in the Air Force who were working on laser technologies envisaged using these technologies for space-based BMD, I shall look more closely at the nature of this research programme, and the applications and time frames that were being proposed.

Out of all the military services, and DARPA, in the late 1970's and early 1980's it was the Air Force who invested most heavily in research and development on laser weapons, the main programme for the Air Force being the Airborne Laser Laboratory (ALL), a programme to mount a high energy laser weapon on a KC-135 aircraft. This programme was being undertaken at the Air Force Weapons Laboratory at Kirtland Air Force Base in Albuquerque, New Mexico.3

The Weapons Laboratory at Kirtland used a high-energy gas dynamic laser and an Air Force developed field test telescope to shoot down a drone target at the Sandia Optical Range at Kirtland in 1973. Since this successful test the Air Force has been working on the technology to place a laser weapon on board the KC-135 aircraft, (a military version of the Boeing 707), and shooting down an airborne target from the aircraft in flight.4 Specifically, the programme aimed to put a 400,000 watt gas dynamic carbon dioxide laser aboard the KC-135. The ALL was designed to test the feasibility of tactical Air

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3 Jeff Hecht, op. cit., p. 256.
Force lasers, and even if this mission could be accomplished, the ALL did "not have the beam-steering equipment" required for even antisatellite tests.¹

It was envisioned by the Air Force that other missions might be possible using such lasers at some time in the future. According to Ulsamer, in late 1977 the applications of air based laser weapons included: "bomber self-defense, air superiority, satellite destruction, and antisubmarine launched ballistic missile" missions. It was thought that the first of these applications might be feasible within the next decade.² Others were more boosterish about the prospects for laser weapons. After a test conducted in January 1981 as part of the ALL programme, in which the KC-135 remained grounded and stationary, and no beam was actually propagated, the outgoing Air Force Secretary Hans Mark claimed that the programme had passed a "significant milestone". "We can now think about shooting down other fellows' missiles without using nuclear warheads", Mark claimed, it being possible to eventually mount these laser weapons on satellites to destroy the enemy missiles from outer space. Mark thought that such weapons would become an important part of the United State's strategic arsenal in the next decade of so.³

Mark's optimistic predictions seem to have been somewhat premature. After the successful test in January 1981, Air Force officials announced plans to use the Airborne Laser Laboratory to shoot down sidewinder air-to-air missiles from the airborne KC-135. Two such tests were conducted at the Naval Weapons Center in China Lake, California in mid-1981, but the missiles were not destroyed. It was not until mid-1983 that the ALL actually did shoot down some sidewinder missiles.⁴

There were forces in the Senate which were pushing the Air Force towards the development of a space-based laser weapon capability, and perhaps some of the groups in the Air Force who were working on such weapons were lobbying also. In early 1981, Senators Malcolm Wallop and Harrison Schmitt put forward an amendment to the FY 1982 Defense Authorization Bill which would have added US$152 million to the budget of DARPA, and US$97.5 million to the Air Force budget to expedite the building of a space-laser weapon. The outcome was that the Air Force was given and extra US$30 million, and DARPA an extra $20 million, and the Secretary of the Air Force instructed to set up a special Program Management Office for space-based laser weapons, and to

¹ Jeff Hecht, op. cit., p. 256.
² Edgar Ulsamer, "Exotic Weapons ...", op. cit., p. 129.
³ Matt Mygatt, "'Star Wars' may become earth wars ...", op. cit., p. 3.
⁴ Jeff Hecht, op. cit., p. 30.
conduct a "detailed system definition of the space-based laser weapons program, which shall include costs, schedule, and identification of risks".\(^1\)

In August 1982, the Air Force was reported to be preparing a major study to determine by 1987 if it was feasible to launch laser battle stations into space. Air Force officials said that a series of 18 requests for proposal from industry had been prepared to study issues ranging from surveillance, to laser battle stations, servicing of the battle stations in orbit, laser tracking, launch vehicles, battle management for laser weapons and so on. These studies were to be under the management of the Air Force Space Systems Division in Los Angeles and the Weapons Laboratory at Kirtland Air Force Base.\(^2\) Yet another Air Force study which investigated the use of space-based laser weapons came to light in early 1983. The secret report, entitled "Air Force 2000: Air Power Entering the 21st Century" was prepared at the direction of the then former Air Force Chief of Staff General Lew Allen, and completed in June 1982. This study urged the development of space-based antiballistic missile systems and argued that these weapons might enable the United States to win a nuclear war in the event of a "massive exchange" with the Soviets.\(^3\)

In late 1982, the Air Force was rearranged slightly, creating a new command which centralized the Air Force's space activities. It might be expected that such a command would tend to push for a wider space role for the Air Force in terms of space-based ballistic missile defence. Robinson has pointed out that serious consideration was being given to this proposal in early 1981, the reason being, he claims, that "the Air Force and Navy are seeking to avoid space weaponry for defense and that any effort in this area takes away from total obligational authority for other planned strategic weapon systems". He further claims that there was "some concern over roles and missions between the Army and Air Force as to where the Army's ballistic missile defense mission stops and USAF's traditional space defense mission begins".\(^4\)

The Air Force Space Command was formed on September 1, 1982, with its headquarters at Colorado Springs, Colorado. The new command, led by General James Hartinger, took over the operations of the Aerospace Defense Center at NORAD, and it was planned

that it would operate military versions of the space shuttle, the "great variety of spy and other satellites" operated by the United State's and the antisatellite weapons which were now in the advanced stage of development. In addition, General Lew Allen, then Air Force Chief of Staff, said that the new command would be responsible for "planning and operating any future manned military space vehicles that may be developed by the Air Force ... and any orbiting laser weapons, if the U.S. decides to develop them". General Allen said that within a year the Space Command would become a "unified command", controlling the Navy and Army space activities as well, making the Space Command the equal of the most important US military headquarters (such as the European and Pacific commands), and putting space on an equal footing with the tactical and strategic air operations. In a separate, but related move, the Air Force also created a Space Technology Center at Kirtland Air Force Base, within the Air Force Systems Command.

The formation of the Space Command was said to be in line with the thinking of the Reagan Administration, especially the Secretary of the Air Force Verne Orr's views that space was emerging as a fourth medium for military operations. The Defense Guidance Plan approved by the Reagan Administration in 1982 stated that the "United States forces should exploit opportunities through the use of space for increasing deterrence at all levels of conflict" and instructed the armed forces to proceed with prototypes of space-based laser weapons. Representative Ken Kramer (R-Colorado), who had pushed for just this change predicted that the creation of Space Command would, in the long run, be regarded as the move "that turned national nuclear strategy away from mutual destruction to one that will give us the capability to defend ourselves against nuclear attack from space", using space-based laser weapons.

4.5. PENTAGON'S RESPONSE TO THE SPACE WEAPONS LOBBY

Although we have seen that there were some groups within the Air Force who supported the development of space-based lasers, either for antisatellite or BMD missions, in general the proposals being put forward by Malcolm Wallop's 'laser lobby' were opposed by

3 Ibid.
both the Army and the Air Force. The main objection to the proposals was that they were premature, the Army and Air Force being more interested, in the short term, in bringing their more conventional technologies to an operational capability, and content to consign the exotic technologies to slowly paced research and development programmes.

When Maxwell Hunter's 'gang-of-four' produced the senate briefing for Malcolm Wallop in 1979 it was, reportedly, "widely denounced as being premature and unrealistic". Army and Department of Defense officials argued that countermeasures were available to outwit the system and that "state-of-the-art technology in sensors and the complex battle management necessary was not available to handle the high volume of ballistic missile targets in the short engagement times required". The main objection was the estimated time frame for the deployment of the system. The 'gang-of-four' had argued that a system of 18 laser battle stations could be placed in orbit by the mid- to late-1980's and this was felt to be unrealistic. Defense Department officials involved in the development of laser technology were reported to be so upset about the briefing, that they put pressure on "those companies funded under laser contracts to keep the members out of Washington".¹

Another study conducted by the Department of Defense on high-energy laser weapons was reported in *Aviation Week and Space Technology* in February 1981. According to this study, the earliest estimated times for the deployment of space-based laser systems of various capabilities were as follows:²

*Test of a 5-megawatt/4-meter diameter weapon - 9 years.
*Development of a 10-megawatt/10-meter diameter weapon in a constellation of 10 satellites for full antisatellite and air defense missions, and light ballistic missile defense - 15 years.
*Development of a 25-megawatt/15-meter diameter weapon in a constellation of 100 satellites to provide full or robust BMD capability and for all other missions - 20 - 25 years.

Even these times, much longer than those proposed by the 'laser lobby', were supposed to have assumed a "fast-moving, aggressively managed and committed program", but not a "panic or crash effort".³

¹ "Defense Dept. Experts Confirm the Efficacy of Space-Based Lasers", *AWST*, July 28, 1980, p. 65. The assessment by the Department of Defense was not entirely negative; they did support the principle that at some stage in the future a system of laser battle stations could provide a "margin for success". According to the Defense Department about 25 laser battle stations would be required instead of the 18 proposed by Hunter's group. (Ibid.)
³ Ibid.
It is reported that in 1981 the Defense Department actively sought to sabotage the efforts of the 'laser lobby' in the Senate Armed Services Committee. This was occasioned by Malcolm Wallop's amendment, already mentioned, to the FY 1982 Defense Authorization Bill to add US$250 million to the budget to be spent on laser weapon research. A briefing on space-based lasers had been prepared by DARPA programme managers for the National Security Council in time for the White House to add its approval to the amendment before the floor vote on military authorizations. When DARPA's briefing was submitted to the Defense Department for approval it was reported to have been held up by a Pentagon official from the Carter Administration, still in the Defense Department, who was opposed to laser weapons. Because of this, the NSC briefing could not take place and the White House could not add its approval in time.\(^1\)

Further, a laser study panel convened by the Defense Science Board (DSB), headed by John Foster, failed to submit a congressionally directed report in time for "the mark up", providing only selected briefings in the Senate a day or so before the Wallop amendment was put. Foster's panel was reported to have only undertaken the laser weapons study after there was opposition within the Department of Defense to the study that was submitted by DARPA.\(^2\) The report of the DSB was made to the Senate Armed Services Committee in the hearings that preceded the passage of an amendment to add US$30 million to the Air Force and US$20 million to the DARPA budget in the FY 1982 authorization bill for space-based lasers, a watered down version of Wallop's proposal. The DSB report, presented by Senator John Warner concluded that: "in the twenty first century directed energy weapons such as space-based lasers are almost inevitable, but achievement of an effective space-based ballistic missile defense system is far more expensive and difficult than the most extreme enthusiasts admit".\(^3\)

The DSB found many problems with space-based lasers. Firstly, they questioned the merits of assigning ASAT and air defence missions to space-based laser weapons as these could be performed more cheaply by technologies such as miniature homing vehicles and ground-based lasers. Secondly, the commitment to "Manhattan-type" projects necessitated a commitment to chemical lasers. Shorter wavelength lasers, such as eximer lasers were held to be more cost effective. Thirdly, even when the technical problems for space-based BMD lasers had been resolved there were tremendous systems and operational problems to overcome. Although pointing to these problems, and arguing that "it was too soon to attempt to accelerate space-based laser development toward ... ballistic missile defense",

\(^1\) Clarence A. Robinson, "Beam Weapons Technology Expanding", op. cit., p. 42.
\(^2\) Ibid.
\(^3\) Edgar Ulsamer, "The Long Leap Towards ...", op. cit., pp. 61-62.
the DSB recommended that US$50 million be added to the defence budget to help with this work.¹

Ulsamer, presumably reflecting the views of the Air Force, argued that the proposals for the rapid deployment of space-based lasers such as that put forward by the 'laser lobby' was a result of the "convergence of several political and 'public-relations' considerations - rather than the realities of science and engineering". Such proposals had obvious media appeal.² He claimed that in the view of many in the Air Force, and other Pentagon officials the "transient, mainly propagandistic advantages", of such proposals, would not compensate for the disadvantages. He estimated that it would take about US$10 billion just to build and "fly" a single prototype. "Premature investment of this magnitude in a technology that most experts consider not yet ready for full-scale exploitation might sound the death knell for the development of such weapons systems at a later time when their underlying technologies have reached maturity", Ulsamer argued. Further, the diversion of R&D funds for this purpose would slow down work on unrelated weapon programmes that were ready for full-scale development.³

Officials in the Defense Department seem to have been in agreement with the DSB report. High-level officials from the Pentagon were reported to have sought to persuade members of the Senate that the technology for space-based lasers, "especially battle management and pointing and tracking subsystems technology" was not available, and that "laser battle stations would not become a reality until the next century".⁴ Dr. Richard Airey, described as the Pentagon's chief specialist on space laser weapons, expressed confidence in the long-term prospects of space-based lasers but claimed that it was the "consensus of everybody in the community who is knowledgeable on the subject ... that no matter how much money we throw at the problem, we can't have an anti-missile space-based laser in this decade".⁵ Even in late 1982 senior officials in the Defense Department who were in charge of research and development were maintaining this line. Richard DeLauer, Undersecretary for Research and Engineering told a meeting of the Air Force Association that the military was "not doing all we could in space laser developments, but we are doing all we should".⁶

¹ Ibid., p. 62.
² Ibid., p. 64.
³ Ibid.
⁴ C A. Robinson, "Beam Weapons Technology ...", op. cit., p. 43.
It would appear that even those who were charged with the development and future operation of space-based laser systems were far from enthusiastic about their near-term prospects. According to Lt. General Richard Henry, commander of the USAF Space Division:¹

Perhaps someday we will have the technology for an antiballistic missile system. ... That could be done from space using beam weapons, in theory. The problem is we don't know how to build the beam weaponry.

We probably could short-circuit the national treasury two or three times trying to do that, and so the concept is probably in the future.

A report, described as a "unique stem-to-stern" analysis of the Air Force's changing role in space was prepared by Lt. General Kelly Burke (USAF), the Deputy Chief of Staff for Research, Development and Acquisition and his assistant Major General Jasper Welch, some time in 1982. Welch, who was described as being "intimately involved" with the USAF's laser program, argued that the United State's "should proceed with prudent and measured speed down the general path we are on, meaning a balanced program consisting of near-term efforts directed at more conventional ASAT vehicle to be launched from a high-speed fighter and longer term efforts on a range of other promising possibilities", pointing out that the Air Force was firmly committed to develop, test and deploy an air-launched ASAT capability. The analysis by the two members of the Air Staff concluded that "we are making progress and our current funding levels are about right. We simply must not allow ourselves to be hurried as we enter the technology confirmation period confronting us".²

Most of the criticisms of the High Frontier proposal concentrated on the Global Ballistic Missile Defense (GBMD) proposal that had been put forward by Bud Redding of SRI International, and which formed the centre-piece of the High Frontier study. As General Graham had predicted, the High Frontier study would stir up a hornets nest amongst those in the Defense Department who were trying to protect their own turf. What eventuated was perhaps even more vehement than Graham might have predicted. In a memo prepared for General Stilwell of the Office of the Undersecretary of Defense (Policy), Herbert Reynolds, the author of the memo, launches a character assassination against Redding:³

He seems to be very sincere in his attempts to uncover unique solutions to major defense problems. Unfortunately, his sincerity and enthusiasm are seldom tempered by practical engineering considerations. In fact he appears to be a master of self deception and is not adverse to stretching the truth well beyond the breaking point. As a result, his credibility within the defense community is very low.

Reynolds goes on to describe Redding's GBMD concept as being shallow, "no more than one 'vu-graph' deep", and claims that Redding "continually modifies his concept as major problem areas are identified during the course of his briefings". Three main objections to the concept are identified. Firstly, Redding's "thoughts on defense strategy and international implications related to the deployment of such a system are shallow and naive". Secondly, the "cost and schedule estimates are so totally unrealistic as to be unworthy of comment". And thirdly, there are certain technical objections such as the technologies are not off-the-shelf, and that Redding has not considered the command, control and communications problems of a very complex system. Reynolds, in short, is unimpressed. He recommends that "we do nothing which might indicate to Redding that we intend to pursue the subject further. I further suggest that you indicate to General Graham, who is pursuing this concept at the highest levels of government, that perhaps he should seek some expert assistance to evaluate Mr. Redding's concept".¹

Reynolds's hard hitting memorandum seems to have been based on a less colourful technical critique of the GBMD concept prepared by a certain Captain Melanson for the Office of the Under Secretary of Defense (Policy). This report identifies four major problems with Redding's proposal. Firstly, Redding had underestimated the number of spares required for the 432 proposed orbiting space trucks. Based on a figure of 2 spares to 1 operational satellite, Melanson estimated that the actual operational requirement would be 1350 space trucks and 67,500 CVs. Secondly, partly because of these underestimates, and partly because Redding had not used the "Air Force MV/dispenser unit cost planning factor", the SRI cost estimate of US$5.3 billion increased to over US$100 billion, and if the spares were included to over US$300 billion. Even these cost figures did not include constructing infrastructure or the operational costs of the system throughout its lifetime. Thirdly, the GBMD proposal had not taken into consideration command, control and communications, such as coordinating space truck station keeping, self defence, and battle management. Finally, major technical problems were associated with cryogen storage for the long wavelength infrared sensors, on-board data processing for target discrimination and battle management, the guidance of the miniature vehicles against accelerating targets, and system weight.²

¹ Ibid.
Further, it was argued that the GBMD would be an unwelcome complicating factor in the MX missile basing debate. As GBMD was an alternative to the MPS basing mode for MX combined with terminal defence, it had the potential of introducing "additional uncertainty" into the MX decision process, Menlason felt. "It could also cause further delays in this program while we wait to assess GBMD feasibility and affordability. However, current GBMD conceptual immaturity argues against it being seriously considered in the context for the present. A more prudent view of GBMD is to consider it as a possible future complement to M-X and terminal ABM defense as part of a layered system".¹

The Air Force Systems Command's (AFSC) Space Division hosted a joint Army/Air Force evaluation of the SRI GBMD proposal on 23-24 February 1982 with representatives from the Space Division, the Army's Ballistic Missile Defense Office (BMDO), the Air Force Contract Management Division, SRI and Boeing Aerospace, amongst others, being in attendance. Several memos and summaries emerged from this meeting prepared by the Army and the Air Force which pointed to about six major objections to the GBMD proposal. (i) The proposed interceptor vehicle had insufficient divert velocity capability required to accomplish its mission. It required a divert velocity some 4 to 5 times larger. (ii) The technologies required were not off-the-shelf, and major modifications or new developments were needed in the areas of the miniature homing vehicle, surveillance technologies and in cryogenic cooling. (iii) The concept did not make reference to prior studies of similar concepts - BAMBI, SAI study, Aerospace review of BAMBI - and the problems identified by these studies. (iv) The proposal "grossly underestimated" the number of interceptor vehicles required. The requirement for a higher divert velocity coupled with the underestimation of the number of interceptor vehicles meant that the "life-cycle costs" had been significantly underestimated - approximately US$180 billion compared to US$5.3 Billion. (v) The MX did not have sufficient lift capability to lift the weight of the space truck and its payload of interceptors into orbit, and there were many logistical problems raising hundreds of space trucks into orbit using the space shuttle. (vi) There was inadequate consideration of mission utility or system effectiveness in the following areas: (1) survivability features; (2) susceptibility to countermeasures; (3) negative payoff margins; (4) coverage area deficiencies.²

¹ Ibid.
Even when "several extrapolations of the operational parameters associated with the proposed system were examined to determine if the proposal could be salvaged by modification", the analysis concluded that the system still would not work. All of the reports recommended that the proposal should be shelved: "This evaluation concluded that the proposal has no technical merit and should be rejected".1 "Based on the above considerations, it is our recommendation that the SRI unsolicited proposal not be funded as proposed, nor modified and funded".2

The overall High Frontier study fared no better than the GBMD proposal. According to an Air Force assessment of the study it had three main problems: "1) the technologies are not "off-the-shelf" ... 2) schedules are extremely optimistic in light of experience, and 3) the cost estimates are very low".3 Regarding the silo point defence system proposed by High Frontier, the Air Force contacted the Army's BMDO at Huntsville. The Army pointed out that they had been studying this technology since the 1960's and had always found such proposals to have three serious limitations: (i) if a warhead was actually destroyed by the system, it would detonate "destroying any capability to respond to a second" warhead; (ii) systems used trilaterated low frequency radars "which are ineffective against jammers and must be proliferated to avoid being targeted", and (iii) the systems had little range, which meant that supply systems would be liable to damage.4

Regarding the space-based laser system, the Air Force thought that it would be "premature to commit to full scale development", and that the current level of research and development was adequate. The Space Laser Program was investigating seven major areas: vulnerability and hardening, utility, survivability, system definition, laser Triad, weapon feasibility technology, and growth technology. The Air Force assessment argued that when these "tasks" had been successfully completed the Department of Defense would be in a position to make an "informed decision whether to recommend proceeding with development and deployment of a space laser weapon system".5 The High Frontier space-based laser had problems very similar to the GBMD: space transportation systems

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3 Assessment of High Frontier Study: A Summary, Air Force, undated.
4 Ibid.
5 Ibid.
were not adequate, a service vehicle would be required to replace cryogens, mirrors and so forth, and the system could not be "developed and deployed in the period cited in the report nor is the funding which is proposed adequate".¹

The Air Force concluded that the High Frontier study was "replete with proposed systems which use technology far beyond that which can be called 'off-the-shelf'. This alone would preclude the schedule suggested, even allowing the implementation of streamlined management. The cost estimates are also highly dubious". Further, even though General Graham conceded that his strategy was more important than the actual technology he was proposing, the Air Force report argued that "it is difficult to divorce an evaluation of a proposed strategy from the realities of its implementation".²

4.6 WHY THE PENTAGON OPPOSED THE SPACE WEAPONS LOBBY

Both the Army and the Air Force had made strong commitments to technology development programmes based on 'conventional' technologies, which tended to overshadow any research and development they were undertaking on the more exotic technologies. The Army, through its Ballistic Missile Defense Agency, had been working on the development of ballistic missile defence systems since the late 1950's, and from this time had actively lobbied for the deployment of a land-based BMD system using both endoatmospheric and exoatmospheric interceptors. The Army had been continually frustrated in these efforts. Even when in the late 1960's it was able to force the Johnson Administration to go ahead with the deployment of its Sentinel system, the ABM Treaty was signed in 1972 limiting the deployment of ABM systems, and in 1975 the Army's BMD system, now called Safeguard, was dismantled. In its LoADS and Homing Overlay systems which the Army was developing in the late 1970's, and which were designed basically to protect the MX missile, the Army saw another chance to finally deploy an ABM system. The Air Force had been working on a direct-ascent antisatellite weapon since the early 1970's. The Air Force had made a strong commitment to its direct ascent antisatellite missile which would be launched from an F-15 fighter, and which was to become operational in the late 1980's.

Both the Army and the Air Force were working on the more exotic technologies which had the potential for space-based (or land-based) BMD and ASAT missions, but these programmes were playing second fiddle to the more conventional programmes. They were at a less advanced stage of development, and less funds were being devoted to this

¹ Ibid.
² Ibid.
area of research. Further, it was planned to use these exotic technologies mainly for tactical missions in the first instance. While it might have been the case that some in the Army, and more particularly some in the Air Force who were working on the exotic technologies, were lobbying for space-based ballistic missile defence, they were running against the tide in their particular branches of the armed services. There is some evidence that the newly created Space Command was manoeuvring to acquire the control of all space missions for itself, including ballistic missile defence, but Space Command arrived too late on the scene to have much influence on this early development of space-based BMD, and was itself committed to the operational deployment of the direct-ascent ASAT system.

The area of space-based ballistic missile defence was a possible area of conflict between the Army and the Air Force, the Army having responsibility for ballistic missile defence, and the Air Force having responsibility for all space operations. At these early stages in the development of space-based BMD there does not seem to have been a great deal of rivalry between the two services over this mission. It remains a possibility as further development of such weapons proceeds towards deployment. The most likely outcome of such a competition would be that the Army retained responsibility for terminal defence, and the Air Force gained the responsibility for space based defence. (A further possibility might be that a new branch of the armed services is created to take control of operations in space.) A reason for the lack of interservice rivalry at this stage may have been that the Army and the Air Force had formed an alliance to push mobile land-basing of the MX in conjunction with LoADS and Homing Overlay.

It is evident that the proposals put forward by the 'laser lobby' and High Frontier were strongly opposed by both the Army and the Air Force. There were several reasons for this. Firstly, both services were committed to the deployment of more conventional systems. Further, both the Army and the Air Force were keen to promote terminal defence of MX missiles using LoADS and Homing Overlay as a neat solution to the vulnerability of the MX missile. The space-based BMD systems represented a complicating factor in the MX basing debate, which might hold up the deployment of the MX. Secondly, any crash programmes aimed at developing exotic beam weapon technologies would take funds away from the more conventional defensive programmes such as LoADS and perhaps also away from offensive weapons programmes. Thirdly, crash programmes to develop more exotic technologies, when these were still immature, might spoil the chances for these programmes in future. Finally, while both the Army and Air Force had their own research and development programmes on the more exotic technologies, they
were opposed to the timeframe for deployment that was being proposed by the 'space weapons lobby'.

The reactions of the Army and the Air Force to the proposals put forward by the 'space-weapons lobby' were to be expected from the model of the way in which military technology is shaped developed in section 1.2. A sub-unit of the Army, the Ballistic Missile Defense Agency had been given responsibility for the BMD mission, and had, over several decades developed a terminal BMD system in which this mission had become embodied. Similarly with the Air Force, which had developed a direct-ascent ASAT interceptor based on 'conventional' technologies. Both services were expecting to deploy their systems in the late 1980's. The exotic technologies proposed by the 'space-weapons lobby' were seen as a threat to these 'conventional' programmes, and so were resisted by preparing technical reports unfavorable to the near-term prospects of space-based weapons, and by actively lobbying Congress and the Executive Branch.
5.1 INTRODUCTION

When President Reagan made his so-called 'Star Wars' speech on 23 March 1983, it was widely reported the next day that he had two main reasons for giving it. Firstly, his defence policy was coming under increasing pressure from the nuclear freeze movement: the House of Representatives looked certain to pass a freeze resolution after Easter in 1983. By posing a nuclear umbrella Reagan might be able to seize the moral high ground from the freeze movement. Secondly, there was growing opposition in Congress to increased military spending because of the mounting deficit. Reagan's speech was carefully timed to coincide with the Congressional debate on the defence budget. Two other themes were evident in the early press reports, which gave some clue as to the origins of the Star Wars speech. Firstly, it was suggested that Reagan's long-standing interest in ballistic missile defence had been aroused six weeks earlier in a meeting with the Joint Chiefs of Staff. Secondly, it was suggested that in making the speech, Reagan had gone against the advice of several White House and Pentagon aides.

In this chapter I will consider the background of, and lead-up to, President Reagan's March 23 speech. Starting with Reagan's "long-standing interest in ballistic missile defence", I will consider the influence on Reagan of the 'space-weapons lobby' and the way in which members of this group were placed to influence the policy of the Reagan Administration. Next I will consider an early attempt by the Reagan Administration to protect the population from the effects of nuclear war, through a civil defence programme. This attempt failed miserably and only served to generate more opposition to the Administration's strategic modernization plan. The growing peace movement, particularly in the form of the "freeze movement", was, by the end of 1982, presenting a strong challenge to the Reagan Administration and can be seen to have strongly influenced the decision to make the speech. Finally, I shall consider the decision to make the 'Star Wars' speech. Starting with a meeting of the Joint Chiefs of Staff, who were preoccupied with the MX basing problem, Reagan and senior members of the National Security Council

became convinced of the need for strategic defence and began to hatch the speech in the utmost secrecy.

5.2 REAGAN - A LONG STANDING INTEREST IN BMD?

It would seem that well before he made his so-called 'Star Wars' speech on 23 March 1983, which eventually led to the establishment of the Strategic Defense Initiative (SDI), Ronald Reagan had an interest in implementing a new strategy which would not hold Americans as nuclear hostages. General Graham, who had advised Reagan on military matters during the 1976 Republican primaries, claimed that, even then, Reagan had questioned the strategy of deterrence, based as it was on purely an offensive capability. "He said it didn't make any sense to him", said Graham. "It was like two men with cocked pistols pointed at each other's head; if either man flinched, then you blew the other's brains out. It just doesn't make any sense".1

In the summer of 1979 Reagan paid a visit to the North American Air Defense Command (NORAD) at Cheyenne Mountain, Colorado. During the visit Reagan observed NORAD radars tracking thousands of objects in space, and asked the commanding officer General James Hill, what NORAD could do to stop an incoming Soviet missile. "The answer was, 'Nothing'", Martin Anderson - Reagan's adviser on domestic policy and an economist from the Hoover Institution - later recalled.2 Reagan recalled this incident in an interview with journalist Robert Scheer during the 1980 Republican primary election campaign:3

NORAD is an amazing place. ... They actually are tracking several thousand objects in space, meaning satellites of our and everyone else's, even down to the point that they are tracking a glove lost by an astronaut that is still circling the earth up there. I think the thing that struck me was the irony that here, with this great technology of ours, we can do all of this yet we cannot stop any of the weapons that are coming at us. I don't think there's been a time in history when there wasn't a defense against some kind of thrust, even back in the old-fashioned days when we had coast artillery that would stop invading ships if they came.

In August 1979, shortly after the visit to NORAD, Martin Anderson, who had accompanied Reagan, drafted a campaign memo urging Reagan to propose the construction of a "protective missile shield against Soviet intercontinental ballistic missiles, perhaps exploiting laser beam technologies"4, in conjunction with a build-up of

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2 Frank Greve, "Reagan's plan caught many administration insiders by surprise", San Jose Mercury News, November 17, 1985, p. 20A.
4 Frank Greve, "Reagan's plan ...", op. cit., p. 20A.
conventional forces and accelerating the development of strategic offensive weapons such as the cruise missile and the MX. Anderson further pointed out that such a strategic defence would be more "appealing" to Americans than the prospect of nuclear annihilation under the doctrine of MAD.\(^1\) Reagan's senior campaign adviser, Michael Deaver, advised against making this proposal. Deaver is reported to have liked the idea but not the timing, fearing Reagan might appear to be too much the radical hawk "if he proposed sharp changes in traditional nuclear doctrine".\(^2\)

A toned down version of Anderson's memo was, reportedly, incorporated into the 1980 Republican platform which called for "vigorous research and development of an effective antiballistic-missile system, such as is already at hand in the Soviet Union, as well as more modern ABM technologies". It also called for new offensive missiles and an "overall military and technological superiority over the Soviet Union".\(^3\)

Not only did Reagan show an early inclination towards ballistic missile defense but in the lead-up to his election he received further encouragement from members of the 'space-weapons lobby'. In the summer of 1979 Wallop and Codevilla sent Reagan a copy of their article "Opportunities and Imperatives of Ballistic Missile Defense", which was about to appear in *Strategic Review*. Reagan is reported to have returned the paper later with comments and annotations.\(^4\) In February 1980, General Graham, who was one of Reagan's military advisers for his 1980 Presidential campaign briefed Reagan on his ideas about strategic defence. Reagan was reported to be very interested and writing down notes.\(^5\) On 12 December 1980, Reagan, then president-elect, was visited by Senator Harrison Schmitt, the incoming chair of the Senate subcommittee on science, technology and space. At this meeting Reagan signaled to Schmitt his interest in developing an effective antiballistic missile system based on laser weapons because he wanted to alter strategic policy toward one of protection rather than mutually assured destruction.\(^6\)

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2 Frank Greve, "Reagan's plan ...", *op. cit.*, p. 20A.
4 Gregg Herken, "The earthly origins ...", *op. cit.*, pp. 1-2.
5 Transcript of interview with Graham, 7 July 1987, *op. cit.*, pp. 2-3, 4-5.
5.3 THE REAGAN ADMINISTRATION AND THE 'SPACE-WEAPONS LOBBY'

When Reagan did come to power, a number of people on his transition teams had links with the 'space-weapons lobby', or were themselves space-hawks who advocated space-based ballistic missile defence. His important defence and foreign affairs transition teams were staffed by people who were counted amongst the members of the 'Madison Group' or were members of the Committee on the Present Danger. Saffire has claimed that 'Madison Group' members John Carbaugh, Sven Kraemer (Senator Tower), Tidal McCoy (Senator Garn), Richard Perle (ex-Senator Jackson), and Mark Schneider (Senator Garn) were on Reagan's Defence transition team. Saffire also claims that 'Madison Group' members Michel Pillsbury and David Sullivan were on Reagan's Arms Control transition team; John Carbaugh and Richard Perle the State Department transition team; and, Mark Schneider and Angelo Codevilla (Senator Wallop) the CIA transition team.¹

Manno has pointed out that Edward Teller and retired Air Force General Bernard Schriever, both long-time space-hawks, were on Reagan's Science Policy transition team. Teller, we have already seen, was pushing for the development of the x-ray laser for ballistic missile defence. Schriever, who wrote the transition report on space had, even before the time of Sputnik, been publicly proclaiming that space would be the battleground of the future.² In a speech Schriever made to Air Force Academy cadets in April 1981, he said that there was "no question that space weapons will someday play a part in national defense".³ In an interview in January 1983, Schriever advocated a "radar surveillance system which allows you to spot everything that's moving, either on the surface or above the surface of the earth. And if we had ... a high-energy laser, or particle-beam weapon, or something else along with the pointing and tracking ability to knock down airplanes and missiles, then you wouldn't even need to knock out cities; you could knock out forces: You could pin your enemy down on earth. What would they do?

If I control the high ground and you can't move, what are you going to do? You're going to negotiate a surrender. That's what it's all about.¹

All up, during the presidential campaign and the transition process, 46 members of the Committee on the Present Danger served on Reagan's advisory task force. After Reagan had been elected the CPD maintained its influence, with some 51 members of Reagan's Administration having served on the Board of Directors of the CPD.² It did not necessarily follow that the CPD members who were serving in the Reagan Administration would automatically advocate ballistic missile defence, especially space-based ballistic missile defence. As we have seen some CPD members gave priority to the build-up of offensive nuclear weapons (perhaps in conjunction with terminal defence to protect missile silos), and others to the deployment of space-based ballistic missile defence to provide population defence, as a way of achieving superiority over the Soviet Union. Two prominent members of President Reagan's defence transition team, William Van Cleave and Scott Thompson, were known to be "firmly on the former side". Those, such as Daniel Graham, who favoured the defensive option found themselves outside of Reagan's circle of influence in the early years of the Administration.³

Patrick Tyler has labeled groups such as the CPD and the 'Madison Group' as the "survivalists", a group who believed that the United States needed to prepare to fight and win a nuclear war. The "survivalists" claimed that the United State's ICBMs were vulnerable to Soviet missiles, and pointed to Soviet civil defence programmes and research into lasers and particle beams for antiballistic missiles defence as evidence of Soviet intentions to win a nuclear war. They argued for the "hardening" of command, control and communications networks and the development of ABM weapons. The "survivalists" rejected the doctrine of mutual assured destruction arguing that their strategic doctrine - mutual assured survival - was morally superior. They were well represented in the Reagan Administration, dominating the National Security Council and the Pentagon hierarchy, according to Tyler.⁴

That Ronald Reagan could be counted amongst the "survivalists" is evident from an interview that was conducted by Robert Scheer in 1980. Reagan complained that the

¹ Bernard Schriever quoted in Jack Manno, Arming the Heavens, op. cit., p. 158.
Soviets had violated SALT I and the ABM Treaty, and didn't hold to the same notion of deterrence:¹

The idea was the Mutual Assured Destruction plan ... that in an exchange of weapons both countries' populations would be decimated. And they didn't hold to that - and for several years this was a failure of the interpretation of our intelligence. ... We paid no attention to the fact that the Soviet Union had put a high-ranking general ... in charge of civil defense. And they had come to the conclusion that there could be a nuclear war and it could be winable - by them.

Reagan thought that it was "time to turn the expertise that we have in that field ... loose on what do we need in the line of defense against their weaponry and defend our population, because we can't be sitting here - this could become the vulnerable point for us in the event of an ultimatum". In addition to developing active and passive defences against nuclear weapons Reagan thought that developing "superior offensive ability may also be another form of defence", pointing to the tension that existed in the CPD between offensive and defensive weapons.²

During his 1980 presidential campaign, Ronald Reagan had argued that the so-called 'window of vulnerability' - one of the important tenents of CPD dogma - represented a major threat to the security of the United States, and what's more that the Carter Administration was responsible for this. The 'window of vulnerability' was the supposed vulnerability of the United States' land-based ICBMs to a first-strike attack by Soviet land-based ICBMs. It was argued that this 'window' would open in the early 1980's with the deployment of new, more accurate, Soviet ICBMs, and would not close until the United States had deployed the MX missile in a survivable basing mode. Reagan was pushing heavily the line that the MX missile, with its ten 300 kiloton warheads and high accuracy was the panacea to cure this problem, along with other offensive strategic weapons such as the B-1 bomber, cruise missiles and so on.³ On entering office, the Reagan Administration initiated a large military build-up aimed at closing the 'window of vulnerability', and seemed to be moving towards a war-fighting capability. In October 1981, fragments of the top-secret National Security Decision Directive #13 were leaked to the press. This included a plan for "controlled escalation" in a nuclear war that would allow the United States to win the war.⁴

² Ibid., pp. 233-234.
⁴ Ibid., p. 203.
5.4 REAGAN'S CIVIL DEFENCE PLAN

As a prelude to ballistic missile defence - an active form of defence - the Reagan Administration attempted to implement a nationwide civil defence programme - a passive form of defence. At a meeting of the National Security Council on 3 December 1981, President Reagan committed his Administration to the first major increase in funding for the civil defence programme in two decades. In so doing Reagan acted against the advice of his Office of Management and Budget and Air Force General David Jones, Chair of the Joint Chiefs of Staff. The decision was, however, in line with the Republican party's 1980 platform, which had pledged "to create a strategic and civil defense which would protect the American people against nuclear war at least as well as the Soviet population is protected".1

The plan was publicly disclosed on March 29, 1982, a seven-year civil defence programme that would, supposedly, save 80 percent of the population in the event of a nuclear war. The aspect of population protection was just one amongst a number of considerations however. Included in a list of four objectives which Reagan issued to the Federal Emergency Management Agency (FEMA), which was to be responsible for the plan, were (i) that civil defence was an element of the strategic balance, which, in conjunction with strategic offensive forces "should assist in maintaining perceptions that this balance is favorable to the U.S."; and, (ii) that civil defence would "Reduce the possibility that the U.S. could be coerced in times of a crisis".2

As part of the US$4.3 billion plan, Reagan proposed to Congress an increase in the civil defence budget for FEMA from US$127 million in FY 1982 to US$252 million in FY 1983. Most of this money was to be used to plan for "crisis relocation", that is, the orderly evacuation of people in "high risk" areas - in major cities or living near military installations - to "low risk" areas in the countryside, where they would be accommodated in primitive, anti-radiation fallout shelters. It was planned that this crisis relocation would take place when the Soviets began to evacuate their cities as a prelude to launching a nuclear attack, supposedly giving the United States three days warning.3

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The civil defence plan proved to be neither popular with the public nor congress, serving only to stir up more opposition to the nuclear arms race. FEMA officials were charged with being advocates of limited nuclear war, civil defence being held to increase the resolve of nuclear war fighters to launch an attack. Furthermore, the idea of crisis relocation became the "butt of ridicule from coast to coast", many cities and counties refusing to cooperate with the FEMA. The City Council of Cambridge, Massachusetts for example "rejected a plan for a mass exodus to Greenfield, Massachusetts" and published instead a booklet advocating nuclear disarmament.¹

In April 1982, the Senate Armed Services Committee refused to support Reagan's plan, and instead set the budget for FY 1983 at US$144 million, much less than the US$252 million that Reagan had sought. It was reported that almost every Senator attending the closed meeting of the SASC "contended that there was no way to protect civilians from an all-out nuclear attack and that to try to do so would be a waste of money". Several Senators "also warned that to undertake such preparations would only fuel the movement here and abroad against further development of nuclear weapons". Even the committee's hawkish chairman, Senator John Tower was reported to have questioned the administration's claims about civil defence.²

5.5 THE NUCLEAR FREEZE MOVEMENT

The movement that the Senators were worried about was the growing Freeze Movement, which had been called into existence largely by the Reagan Administration itself. It seems to have had its origins in 1979 when the Senate refused to ratify the SALT II treaty. The American Friends Service Committee called a meeting of arms control and disarmament advocates to try and develop new strategies to stop the arms race. The strategy devised by the meeting was to freeze the production and deployment of nuclear weapons and to worry about disarmament at some later date.³ By April 1980, Randall Forsberg, one of those present at the meeting, had published the first freeze "manifesto", and along with Randy Kehler was organizing a mass movement based around the freeze. Kehler managed to get non-binding freeze resolutions placed on the ballot in the November 1980 elections, in three senate districts in western Massachusetts. Even while Ronald Reagan

1 Bruce Ingersoll, "Thinking the Unthinkable", op. cit., p. 6.  
was sweeping to power, the freeze resolution carried by a margin of 2 to 1 in those districts, even though all returned a vote for Reagan by a considerable majority.\(^1\)

The freeze movement gained momentum throughout 1981, mainly as a grass-roots movement and it wasn't until early 1982 that it began to make an impact in Congress. The first freeze resolution was introduced by Senators Edward Kennedy (D-Massachusetts) and Mark Hatfield (R-Oregon) on March 10, 1982, and called for the United States and the Soviet Union to "pursue a complete halt to the nuclear weapons race", and to negotiate a mutual and verifiable freeze on testing, production, and further deployment of nuclear arms, and then to pursue mutual and verifiable reductions in the nuclear stockpiles. On the day of its introduction the resolution was co-sponsored by 17 senators and 122 members of the House of Representatives, and it soon had 25 co-sponsors in the Senate and 125 in the House.\(^2\)

However, even before Senators Hatfield and Kennedy had the chance to present their resolution, Senators Henry Jackson and John Warner drafted a counter proposal with the aid of Jackson's former aide Richard Perle. This resolution argued that a freeze on nuclear weapons should be imposed only after the United States and the Soviet Union negotiated "equally and sharply reduced levels of forces". The resolution was introduced into the Senate on 30 March, 1982 and was co-sponsored by 62 senators. President Reagan publicly supported this proposal, claiming that it was the Soviets who had the superior nuclear forces. In the Senate, the freeze was rejected "on a near party-line vote in the Foreign Relations Committee".\(^3\)

Several Freeze resolutions were also introduced into the House, and it was here that it had its greatest success, when on June, 1982, the House Foreign Affairs Committee voted 26-11 to recommend freezing US and Soviet nuclear weapons at current levels, with 19 of the 21 Democrats and 7 of the 16 Republicans voting in favour of the motion.\(^4\) On the 5 August, 1982, a freeze resolution introduced by Clement Zablocki (D-Wisconsin) failed by only a narrow two-vote margin to pass, the vote being 204-202 against.\(^5\) Donner

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claims that this loss was quite impressive nonetheless, given that some 2000 corporate lobbyists opposing the freeze were reported to have applied pressure before the vote.\(^1\)

The Administration's approach to the freeze movement was twofold: firstly, to express sympathy with the ultimate aims of the freeze supporters, but claim that their methods were wrong, and secondly to claim that they were being manipulated by the Soviets. For example, on March 11, 1982, the Assistant Secretary of State for Politico-Military Affairs, Richard Burt, expressed sympathy for the "spirit that motivates the freeze efforts", but argued that it was misguided because: (i) the US would be frozen into a position of military inferiority; (ii) the negotiation of arms control agreements such as START required a strategic modernization programme to give the US negotiators credibility; and (iii) that the freeze did not go far enough, the US being engaged in intermediate nuclear forces talks which would go far beyond the freeze.\(^2\)

President Reagan, at a press conference on 31 March, 1982, said that because the Soviets enjoyed a "definite margin of superiority" it would be "disadvantageous - in fact, even dangerous" for the United States to agree to a freeze.\(^3\)

On October 4, 1982, Reagan, indulging in a bit of red-baiting, claimed that the freeze movement was "inspired by not the sincere, honest people who want peace but by some who want the weakening of America and so are manipulating honest people and sincere people".\(^4\) Casper Weinberger claimed that "A nuclear freeze would be one sided, and would not be matched by the Soviets".\(^5\)

Notwithstanding the admonitions from the Reagan Administration and the difficulties that freeze resolutions encountered in Congress, the freeze movement and the peace movement in general continued to grow. From freeze resolutions being passed at 300 New England town meetings, in 30 city councils and in six state legislatures at the start of 1982, the movement had grown by August 1982 to freeze resolutions being passed at 400 New England town meetings, in more than 120 city councils, and by one or both houses in 12 state legislatures. Active freeze campaigns were underway to put nuclear freeze proposals on the ballots in the elections that were to be held in November 1982. On June 12, 1982, to mark the United Nations' Second Special Session on Disarmament, nearly a million people marched in New York, the largest demonstration in the history of the United States.\(^6\) In the elections, nuclear freeze resolutions won in eight of the nine states and in

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\(^1\) Frank Donner, "But Will They Come? ...", op. cit., p. 456.

\(^2\) "Hot Air and the Freeze", op. cit., p. 4.

\(^3\) Ibid.


the District of Columbia, and in all but two of the other 29 jurisdictions in which they were on the ballot. The freeze resolution passed even in California, President Reagan's home state, by a margin of 52.5 to 47.5 percent, the state in which both sides had mounted their largest campaigns.\(^1\)

Besides coming under mounting pressure from the freeze movement, the Reagan Administration ran into even more trouble in the form of the American Catholic Bishops who were responding to the renewed concern about nuclear weapons. In June 1982 the Bishops put out the first draft of their pastoral letter - 'The Challenge of Peace: God's Promise and our Response' - which outlined the Church's position on nuclear weapons. On 26 October, 1982, the Bishops released the second draft of their pastoral letter, which was even stronger than the first, despite condemnation from and heavy lobbying by the Reagan Administration. (For example, William Clark, Reagan's National Security Adviser had sent a seven-page letter to the Bishops arguing that a nuclear freeze would be counterproductive because it would "remove the incentive for achieving reductions".) The second pastoral letter called for an immediate freeze on nuclear weapons and deep cuts in the nuclear arsenals of the superpowers.\(^2\) Furthermore, the Bishops argued that nuclear weapons were immoral. "We find", the Bishops wrote, "the moral responsibility of beginning nuclear war not justified by rational political objectives". They rejected the production, use and threatened use of nuclear weapons, and even advocated that the United States move forward with unilateral disarmament initiatives.\(^3\)

### 5.6 THE MAKING OF THE 'STAR WARS' SPEECH

In the lead-up to his 'Star Wars' speech, as we have seen, Ronald Reagan had quite a deal of contact with members of the 'space-weapons lobby'. Daniel Graham had spoken to Reagan about his ideas on strategic defence in February 1980; Senator Harrison Schmitt had spoken to Reagan on 12 December 1980 about space-based infrared lasers for ballistic missile defence; Graham had met with Reagan again in February 1981 and shortly after with his Defence Secretary Caspar Weinberger; Karl Bendetsen, William Wilson, Joseph Coors and Edward Teller met with Reagan on 8 January 1982, and subsequently on two other occasions, one in the early months of 1983; Edward Teller had met with Reagan alone on 14 September 1982 and urged him to develop x-ray lasers for ballistic missile defence; between October 1982 and January 1983 Teller is reported to


\(^2\) "Nuclear Freeze Drive Shifts to Debate", Aviation Week and Space Technology, November 22, 1982.

\(^3\) A. Cockburn & J. Ridgeway, "The Freeze Movement ...", op. cit., p. 18.
have met repeatedly with members of the Joint Chiefs of Staff. All in all, before he made his speech, Reagan had met with members of the 'space-weapons lobby' on at least seven occasions.

Although President Reagan was favourably disposed to space-based ballistic missile defence, senior members of the Administration reacted much more cautiously to the approaches made by the 'space-weapons lobby'. One early supporter in the Reagan Administration was Secretary of State, Alexander Haig. On the other hand, Richard Burt, Assistant Secretary of State for Politico-Military Affairs, seems to have been set against it. In an August 1981 memorandum on the High Frontier study Burt argued that while Bud Redding's GBMD concept had an "outside chance of being feasible ... its cost and the stiff technical requirements it would have to meet make its prospects much less sanguine than" General Graham suggests.¹ In a January 1982 memo to Haig, Burt went further, arguing that, on the advice of the Army, the cost of the GBMD and site defence would be prohibitive. "Even then", Burt argued, "many technical uncertainties would remain along with any number of possible countermeasures available to the Soviets". Further, Burt thought that "a high-energy BMD laser system in space is still more than a decade away, if it is feasible at all". Summing up, Burt claimed that "while General Graham's ideas have much innate appeal, they have serious technical and economic shortcomings that are well recognized in the technical community".²

The opinion of the Defense Department seems to have been quite similar. Writing to General Graham in September 1982 Frank Carlucci, Deputy Secretary of Defense, said that it was "somewhat of an overstatement" to say that the High Frontier proposals had been "widely accepted as practicable". Carlucci pointed out that such a system would be very expensive, and he was not sure "[w]hether this would be a wise expenditure of defense funds".³ Even Caspar Weinberger, writing to Graham in November 1982, only four months before Reagan made his speech, was not so sure about the High Frontier proposal. Weinberger told Graham that both he and his Undersecretary of Defense for Research and Engineering, Richard DeLauer, differed with Graham "on availability of


technology to support such a policy”. They were unwilling to "commit this nation to a
course which calls for growing into a capability that does not currently exist". Weinberger
said that his advisers had "serious reservations with High Frontier's projections on the
availability of off-the-shelf technology and components, at affordable cost and within
schedules we can project". It is evident that Weinberger and Burt had been heavily
influenced by the arguments of the Army and Air Force concerning the High Frontier and
'laser lobby' proposal.

That some of Reagan's senior advisers were not overly in favour of space-based ballistic
missile defence was not a major obstacle. The decision to go ahead with the 'Star Wars'
speech was made without consulting them.

In February 1983, General John Vessey, the Chairman of the Joint Chiefs of Staff, called
a meeting with the other Chiefs of Staff to discuss what they would talk about with
President Reagan at the next of their monthly meetings. At this meeting Admiral James
Watkins, Chief of Naval Operations, proposed that the Chiefs consider the "possibility
that new technologies would make it possible to defend against a Soviet ICBM attack".
Watkins did not propose a crash programme. He suggested only that the United States
might pursue the technological advantage it held over the Soviets in this area, in careful
consultation with its NATO allies.

Watkins, a devout catholic, was reported to have been deeply troubled by the pastoral
letter put out by the Catholic Bishops which condemned nuclear weapons, and was
actively involved in the church's nuclear ethics debate. He had, reportedly, made his
doubts about the ethics of the policy of MAD the focus of a secret Navy White Paper. At
the meeting with the other Chiefs, Watkins argued that it was "more moral" to protect
Americans than to leave them vulnerable to nuclear annihilation under the MAD doctrine.
"Wouldn't it be better to save lives than to avenge them", he is reported to have said.
Admiral Watkins was influenced in his thinking by Edward Teller, with whom he had met
on several occasions between October 1982 and January 1983, Teller briefing him at
length on the x-ray laser. Further, during this same period Watkins had several meetings

1 Letter, Caspar Weinberger to Lt. General Daniel O. Graham (Ret), 24
November 1982.
3 Ibid.; Gregg Herken, "The earthly origins ...", op. cit., p. 23; Watkins was not the only member of the Joint Chiefs who had been got
at by the 'space-weapons lobby'. In August 1981 General Graham had
written to General Edward Meyer, the Army's Chief of Staff to tell him
"what brand of snake oil I'm peddling these days". In June 1982, Robert Richardson of High Frontier had written to General Charles
The Joint Chiefs met with President Reagan on February 11, 1983, largely to discuss the vulnerability of land-based ICBMs and the basing of the MX missile. We have already seen that the issue of MX basing had become a major headache for the Reagan Administration and the Pentagon, and that the fortunes of BMD had become closely linked to this. The Joint Chiefs were reported at this time to "see an urgent need for a new ground-based ABM to help overcome the vulnerability of America's Minuteman ICBM force and any future deployment of MX missiles". The Chiefs suggested five options to Reagan regarding the problem of ICBM vulnerability, including shifting from reliance on land-based ICBMs toward sea-based ICBMs, increasing the level of conventional forces, expanding the Navy, and strategic defence. Out of these Reagan selected strategic defence as his preferred option. The Chiefs' ideas about strategic defence were reported to be "vague and philosophic in tone", not distinguishing between the protecting of missile silos and the protection of cities, or between the different forms of ballistic missile defence. According to General Edward Meyer, then Army Chief of Staff, "The next step, we figured, would be to put a group together and see what was feasible and what the alternatives were". However, when Admiral Watkins presented his briefing on strategic defence President Reagan is reported to have "perked up".

Robert McFarlane, who was also present at the meeting is reported to have been preoccupied with strategic defence. McFarlane had read Watkins' White Paper and had been briefed on the x-ray laser by Edward Teller. When Admiral Watkins brought the topic up at the meeting McFarlane is reported to have "stepped in to elaborate on the theme of a new strategic vision". He was concerned about the effect that the growing peace movement would have on the Administration's strategic modernization plan, and with the new weapons systems that the Soviets were bringing on line, especially a mobile land-based ICBM which would put at risk the United States' land-based ICBMs but be...
themselves invulnerable. The idea of a space-based strategic defence system as a way of stealing the thunder of the peace movement had been pushed by Edward Teller, and was one of the main selling points of the High Frontier study. McFarlane in a later interview claimed that strategic defence "was an initiative whose time had come".¹

Robert McFarlane may not have been the only member of the National Security Council who had an interest in space-based ballistic missile defence. In 1981 it was reported that the NSC was considering the policy issues associated with this area "to take advantage of the new technology to defend ourselves against attack and in so doing gain a quantum leap ahead of our adversaries". The NSC was interested to move into this area, an Administration official claimed, "because of departmental policy issues and bureaucratic lethargy".²

Within hours of the February 11 meeting, and unknown to the Joint Chiefs, McFarlane assigned three senior Air Force officers on the staff of the National Security Council to work on the concept of strategic defence. The project for this small group soon became to draft a short speech - known as the 'Annex' - outlining the new vision of strategic defence, which was to be included as the last five minutes of a speech that Reagan planned to deliver on March 23, 1982 to support Defense Secretary Weinberger's call for a 10 percent increase in the defence budget.³ This would be a so-called "threat speech", the alarming depiction of the Soviet threat which routinely preceded an administration's appeal for an increase in military spending. McFarlane ordered that the Annex was to be kept secret from those who were writing the first part of the threat speech, and also from the Pentagon and State Department, and other bureaucracies outside the White House which might expect to be informed. The fear was that the plan might be killed off if knowledge of it leaked out.⁴

George Keyworth, the President's Science Adviser, was given only five days warning of the forthcoming speech, and was given a role in its drafting, but only as an afterthought it would seem. According to an NSC member Keyworth was included only after they asked themselves: "How can the president go on the tube directing a major high-technology

¹ Gregg Herken, "The earthly origins ...", op. cit., p. 25.
³ Greve claims that the NSC staffers were directed to write the Annex after a disastrous speech that President Reagan had made in Orlando, Florida on March 8, 1982. In that speech Reagan had attacked communism as the "focus of evil in the modern world", and argued that the nuclear freeze proposal ignored "the aggressive impulses of an evil empire". (Frank Greve, "Reagan's plan ...", op. cit., p. 25.)
⁴ Frank Greve, "Reagan's plan ...", op. cit., p. 21A; Gregg Herken, "The earthly origins ...", op. cit., p. 25.
initiative and tell his science adviser nothing?" McFarlane called Keyworth into his office on the morning of March 19, 1982, to inform him about the Annex. Herken claims that McFarlane told Keyworth that the President had only decided to go ahead with the speech after discussing it with William Clark, the National Security Adviser and McFarlane the previous day. The President had asked a question, McFarlane told Keyworth. "Is now a good time to renew our efforts in strategic defence?" Keyworth is reported to have been "shocked" by Reagan's question, and inclined initially to say no. However, he remembered the findings of a year long study on emerging defence technologies that had been conducted by the White House Science Council and completed in January 1983. This study, although dubious about the military utility of the exotic beam technologies in the near future, argued that some of the requisite technologies such as adaptive optics, were developing rapidly. After some hesitation, Keyworth finally answered "yes" to the President's question.\(^1\)

Keyworth was to entertain serious doubts about his answer over the next 24 hours. He is reported to have sought advice from Salomon Buchsbaum and William Baker, two members of the White House Science Council, and he may have sought advice from others. The reaction from his scientific colleagues was reported to have been almost entirely negative, Keyworth being encouraged by some to publicly resign over the issue. He had his doubts assuaged at a subsequent meeting with McFarlane and his deputy John Poindexter.\(^2\)

During the next two days after this meeting Keyworth was chosen to be the messenger to inform senior officials in the State Department and the Pentagon of the President's intention to include the Annex in his speech. Some of these officials were reported to be stunned, and "deeply upset" that they had not been involved in the decision to make the speech.\(^3\) In the final days before the speech some of the officials who had been informed weighed in with protests, and managed to influence the eventual form of the speech.

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1 The study by the White House Science Council was conducted largely as a response to the meeting that Bendetsen and Teller's group had with Reagan in January 1982. It considered chemical lasers, beam weapons and x-ray lasers but was dubious about their military applicability. The panel is said to have taken a second look at x-ray lasers at the insistence of Edward Teller, who was also a member of the Science Council and found these to be the most promising technology but still far away from weapons application. The report identified adaptive optics, which could compensate for the distortion of laser light passing through the atmosphere as a promising area. (Frank Greve, "Reagan's plan ...", op. cit., pp. 20A-21A; Gregg Herken, "The earthly origins ...", op. cit., pp. 25-26.)


which was not yet set in concrete. Those writing the speech were evenly divided between including the promise of high technology conventional weapons as well as strategic defence, but decided, for the sake of simplicity, to concentrate only on strategic defence. They were caught between offering protection to only missile silos or to the whole population. Reagan apparently decided this one, telling the speech writers that the last thing he wanted was "some kind of string of terminal defenses around this country". Finally, the speech writers were worried about the offensive potential of the weapons that could be used for strategic defence. (Robert McFarlane is reported to have discussed with Keyworth the possibility of assassinating Muammar Qaddafi using space based lasers, but Keyworth thought that this would not be very cost effective.)

When Secretary of State George Shultz was informed of the Annex, two days before the speech, he was apparently livid. Shultz had not been consulted and was given an "eyes only" copy of the speech which he was not allowed to share with any of his advisers, even Paul Nitze his arms control adviser. (Nitze learned about the speech on the morning of 23 March.) Shultz was worried about the impact the speech - with its hint of a shift away from offensive to defensive weapons - would have on the European allies. On this same day Defense Secretary Caspar Weinberger and Assistant Secretary of Defense Richard Perle - who were in Lisbon, negotiating agreements on several military bases - were also informed, as were the Joint Chiefs of Staff. The draft of the President's speech was cabled to Weinberger and Perle in Lisbon. Seeing the paragraphs outlining the Strategic Defense Initiative tacked onto the end of the speech, Perle said he was "stunned". Perle informed Weinberger of the speech and the Defense Secretary was happy to leave matters in Perle's hands.

Once they learned of the speech, Richard Perle, ringing from Lisbon, and George Shultz arranged a number of meetings with President Reagan and McFarlane to voice their concerns. They felt that the Soviets would find the speech too provocative, as with such a system the United States had the potential to launch a first strike attack and protect itself from the retaliation. These arguments, according to Greve, led to the inclusion of this sentence in the speech: "I clearly recognize that defensive systems have limitations and raise certain problems and ambiguities. If paired with offensive systems, they can be viewed as fostering an aggressive policy, and no one wants that". Both Perle and Shultz argued that the speech had to take into consideration the effect on NATO allies, Perle

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1 Ibid., pp. 23, 26; Frank Greve, "Reagan's plan ...", op. cit., p. A21.
2 Frank Greve, "Reagan's plan ...", op. cit., p.1; R. Jeffrey Smith, "Reagan Plans ...", op. cit., p. 171.
pointing out that as Western Europe was much closer to the Soviet Union its perspective on defence was considerably different to that of the United States, and Schultz stressing the need for consultation. These arguments led to the inclusion of the following line in the speech: "Tonight, consistent with our obligations under the ABM Treaty and recognizing the need for closer consultation with our allies I'm taking an important first step". Further, Perle was able to limit the focus of the strategic defence that was being proposed, to protection against only ballistic missiles. Originally it was proposed that such a system would protect against bombers and cruise missiles as well, but Perle argued that this would make the system too complex and costly.¹

The speech also reflected the concerns of the Joint Chiefs of Staff, that strategic defence not interfere with the acquisition of new offensive nuclear or conventional weapons. According to Greve their influence "appeared more powerful the following day when the White House briefers explained that 'Star Wars' would be a consolidation of existing research programs, not a Manhattan Project, and that no new spending for research was foreseen in 1983 and 1984".²

The list of senior Administration officials who were given little or no warning about the speech is quite long. Fred Ikle, the Undersecretary of Defense for Policy, learned of the speech only nine hours before it went to air, and pleaded in vain to be allowed to inform NATO leaders. Richard DeLauer, the Undersecretary of Defense for Research and Engineering was informed at the same time. John Gardner, the Director of defensive systems at the Pentagon, and Robert Cooper, the Director of DARPA were not informed at all, and listened in surprise as Reagan announced what would potentially be a large new research and development program.³ These were people who might well be expected to have sabotaged the efforts of the President and his NSC advisers to get the strategic defence on the national agenda.

The importance of President Reagan's March 23 speech was that it had raised space-based ballistic missile defence to the level of a national priority which was backed by the President. Before this it had been a collection of research and development projects which were having to play second fiddle to more conventional weapons development programmes of the Army and the Air Force, which were much nearer to operational

³ Ibid., p. 1; R. Jeffrey Smith, "Reagan Plans ...", op. cit., p. 170; "The Star Wars gambit riles the experts", op. cit., p. 22.
deployment. The President's speech was by no means the end of the shaping process for space-based BMD weapons. It just moved it into a new phase, which is still in progress.

5.7 WHY 'STAR WARS'?

That President Reagan played a major role in placing space-based ballistic missile defence on the national agenda is undoubted. But his role must be placed in context. Reagan in many ways was a product of the Committee on the Present Danger. He had swept to power pointing to the growing 'Soviet threat' and a 'window of vulnerability' which was opening and through which the Soviets might launch an attack. Reagan vowed to close the 'window of vulnerability' and to reassert American dominance over the Soviet Union through a massive military build-up. Both the 'Soviet threat' and the 'window of vulnerability' had been contrived and sold to the public by the CPD. Reagan was himself a member of the CPD and his administration was dominated by CPD members. The rhetoric and the policies of the Reagan Administration in the area of foreign policy and defence were copy-book CPD. Both a build-up in offensive counterforce weapons and civil and ballistic missile defence were part of the Committee on the Present Danger's agenda, but many of Reagan's key advisers argued that the build-up of offensive weapons was a priority.

It was this build-up of offensive weapons which created massive problems for the Reagan Administration, problems for which space-based ballistic missile defence was a possible solution. Firstly, there was the MX basing debacle. The MX was, for the Reagan Administration and the Pentagon, the key to closing the 'window of vulnerability'. However, the Reagan Administration was unable to find a solution that was politically acceptable to the public, Congress, and the combined weight of the Air Force and the Army. Because of this, the Reagan Administration was being forced to put MX missiles back in Minuteman silos to keep the MX programme alive. These were the very missile silos which they had claimed were vulnerable to a Soviet first strike. Ballistic missile defence was being pushed by the Army and the Air Force as a way of making the MX invulnerable to such an attack.

Secondly, there was the 'freeze movement', which was just part of a resurgent peace movement in the United States and Europe, which had grown in response to the military build-up instigated by the Carter Administration but continued with a vengeance by the Reagan Administration. The peace movement had influenced groups such as the Catholic Bishops to come out against nuclear weapons and to declare them immoral. Similar action had been taken by the Mormon Church in response to massive opposition to the basing of
the MX in Utah and Nevada. The 'freeze movement' grew so large that it gained influence in Congress, and held the potential to halt the Reagan Administration's military build up, threatening deployment of the MX. From the Administration's viewpoint, the 'freeze movement' threatened to freeze in place the 'window of vulnerability'.

Although Reagan seems to have favoured space-based ballistic missile defence for quite some time, it was not until his meeting with the Joint Chiefs in February 1983 that he was moved to act, and elevate it to national importance. The 'space-weapons lobby' seems to have played an important part in planting the idea of space-based ballistic missile defence in Reagan's mind, and in the minds of his key advisers. This was a deliberate effort on their part. Graham, Wallop and Teller realized that if they were going to have space-weapons deployed in the near future, then they would have to convince the President, as they were sure to, and actually did, run into stiff opposition from the Pentagon. Only the President could impose a decision on the armed services. The groups which had the best access to the President had the greatest chance of influencing the President's decision. All of the groups operated within the same ideological framework as the Reagan Administration which made access easier. It seems to have been Teller's group, which included members of Reagan's so-called 'kitchen cabinet', which had the easiest access. The members of the 'space-weapons lobby' urged that space-based BMD be used to provide a 'nuclear umbrella' and to implement a strategy of Mutual Assured Survival. Such a strategy could be sold as being more moral than Mutual Assured Destruction as it proclaimed to protect Americans but not kill Russians, and so had the potential to undermine the nuclear freeze movement.

That the Joint Chiefs of Staff proposed the possibility of ballistic missile defence seems to have been very much connected to the issue of MX basing. The possibility of space-based BMD to solve the problem of MX basing and to steal the thunder of the peace movement seems to have been taken up and pushed by senior members of the National Security Council. Given the President's predisposition towards space-based BMD it would have taken little to convince him of the need for such weapons. Having gained Presidential support, a deliberate strategy seems to have been developed by these NSC members to keep the scheme under raps, so that the armed services and senior officials in the Department of Defense and State Departments could not sabotage their efforts. When they were informed, only two days before the speech was made, senior officials such as Richard Perle and George Schultz did weigh in with protests, but it was too late to make much of a difference.
The study of the making of the 'Star Wars' speech has shed some light on the function of the Executive Branch in the weapons development process. It is evident that like the armed services, contractors and weapons laboratories, the Executive Branch is itself a complex bureaucracy. In the area of weapons development it seems to be the National Security Council, Department of Defense and State Department which are most important, but departments like the Office of Management and Budget also have some influence. In this case it seems to have been the NSC which played an important role. The political nature of weapons technology is evident also. The importance of space-based BMD to the senior staff in the National Security Council was not so much any military role that it might have, but rather its political function of undermining the freeze movement and regaining support for a build-up of offensive nuclear weapons.
In this thesis I have considered the development of space-based ballistic missile defence in
the late 1970's and early 1980's, leading up to President Reagan's speech on 23 March
1983, in which he announced a research and development programme to make nuclear
weapons "impotent and obsolete". I have focused on four groups, which I call the 'space-
weapons lobby', which were pushing for the development of ballistic missile defence
during this period. I have traced the evolution and progress of the groups which
comprised the 'space-weapons lobby', paying particular attention to the ideology of the
different groups, the interests which they brought to bear on the problem of ballistic
missile defence, and the way in which the ideology and interests of the different groups
influenced the technologies which they were advocating for ballistic missile defence. I
have considered the links that the different groups had with the Reagan Administration
and the way in which they attempted to sell the idea of ballistic missile defence to the
Administration. Also I have considered the way in which the Army and the Air Force
reacted to the proposals which were being put forward by the 'space-weapons lobby'.

A major aim of this thesis was to use the case study of the development of space-based
ballistic missile defence to explore, refine and extend the model of the weapons
development process constructed in section 1.2. This model is based on Kaldor's notion
of a weapons system, a technological system interlinked with a social organization,
around which the armed forces have become functionally organized. The weapons system
serves to differentiate the armed services (Army, Air Force, Navy), and to define the lines
of command within the different armed services. The concept of a weapons system
explains why the armed services act as a conservative force in the weapons development
process. As each service, and military unit, is associated with a certain military mission,
and the capabilities required to undertake this mission have become embedded in both the
weapons and the social organization of that military unit, any radically new technologies
pose a risk for organizational survival, and so are resisted.

Kaldor argued that in peacetime, there were two main institutions which provided an
impetus to the weapons development process, essentially the defence contractors and the
weapons laboratories. Firstly, Kaldor argued that the weapons laboratories act as the
source of 'revolutionary' technologies, which have to be taken up by "maverick
constituencies" in the military. Secondly, Kaldor points out that the defence contractors
are required to make a profit, but also are dependent on the armed services for their
contracts. This leads to a follow-on imperative for the defence contractors in which they
are always seeking to develop the technologies for the next weapons programme in
collusion with the armed services. The impetus to the weapons development process that was provided by these two institutions is then mediated by the armed services.

In this thesis I made four modifications to Kaldor's model. Firstly, it was modified to take into account the role of Congress and congressional committees, and the Executive Branch in the shaping process. In particular, based on the work of Schurmann, the importance of the President is emphasized. Secondly, it was argued that the model needs to take into consideration the different levels of complexity at which bureaucratic politics operates in the armed services: inter-service rivalry, intra-service rivalry, and bureaucratic disputes within military units. Thirdly, it was felt necessary to locate this bureaucratic model within the wider political context, both on a domestic and an international level. Finally, it was felt that the model needs to take into consideration the function that weapons serve beyond their military or economic role. Hence there is a need to consider the ideology of the groups which are involved in the weapons development process.

Although the case study of the development of space-based ballistic missile defence has provided much support for the model developed in section 1.2 it would seem necessary to make four main changes. Firstly, when considering the shaping of a particular weapons system, it is important to take into consideration the different levels of complexity at which bureaucratic politics operates in the defence contractors, weapons laboratories, and Executive Branch of government. Neither the defence contractors nor weapons laboratories can be treated as single actors, but are comprised of different departments and project groups. These departments and groups may be in competition with each other, and any weapons development project must be placed within its institutional context. Similarly, in the Executive Branch it is necessary to be sensitive to the inter-departmental rivalry and intra-departmental rivalry that may have a bearing on the weapons development process.

Secondly, some modification is required to the concept of a follow-on programme. Given that the prime contractors are likely to be working on several weapons contracts and development projects at any one time, and that they are dependent on the armed services for future contracts, it might not be in the contractor's interest to push every development project as a follow-on programme. As was the case with Lockheed and laser weapons, the armed services may oppose certain projects which they feel threaten their more conventional programmes which have near-term deployment prospects. The armed services might threaten to withdraw current contracts from, or not award future contracts to, a defence contractor which is pushing a weapons system which they feel is too exotic.
Thirdly, it is too simplistic to argue that defence contractors with an economic interest, and weapons laboratories with a scientific/technical interest, are the only institutions which provide the impulse to the weapons development process. In addition to these it is possible that the institution providing the impulse might be essentially ideological or political in nature. A good example of this is the High Frontier group led by Daniel Graham. In general it would seem that these groups bring people with a political mission together with those from defence contractors or weapons laboratories. This has important consequences for the nature of the technology that is developed, as it would seem to be the ideology of these groups which shapes the broad nature of the weapons system which is being proposed.

Finally, when considering the development of a particular weapons system it must be remembered that it is just one of many weapons systems that exist or are in the process of being developed. It may be that the development of one weapons system has implications for the development of another. Thus, the factors which are shaping the development of one system may, indirectly, have an influence on the other weapons system. An example of this was provided by the MX missile and ballistic missile defence. The debate on the basing of the MX missile influenced the development of space-based BMD as ballistic missile defence was one of a number of options which could be used to make the MX less vulnerable. As the competing basing modes ran into trouble, the chances for ballistic missile defence improved.


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