
CENTER FOR TECHNOLOGY AND NATIONAL SECURITY POLICY
The Changing Nature of Ballistic Missile Defense
JUNE 2-3, 2009
MARSHALL HALL RM. 155
FT. MCNAIR

The Changing Nature of Ballistic Missile Defense

A Forces Transformation and Resources Seminar
Marshall Hall, Room 155, Fort Lesley J. McNair, Washington, DC 20319
June 2nd & 3rd, 2009

Tuesday, June 2nd

0900-0915 **Conference Mission Statement**
Dr. Hans Binnendijk, Director, Center for Technology and National Security Policy, NDU

0915-1015 **Towards a MAD-less World: The Offense/Defense Equation Revisited**
Theme: Can the U.S. maintain deterrence with BMD systems and a low cap on offensive systems? How would shrinking nuclear stockpiles affect U.S. deterrence strategy? In a world of fewer nuclear missiles, would BMD systems act as a stabilizing or destabilizing influence? What policies could the DoD adopt which would mitigate any potentially negative effects?
Dr. R. Joseph DeSutter, Director, School for National Security Executive Education, NDU
Mr. Bruce W. MacDonald, Senior Director**,** Congressional Commission on the Strategic Posture of the United States, United States Institute of Peace

1015-1030 **Break**

1030-1145 **Changing Nature of the Threats**
Theme: To what degree should BMD be pegged to specific threats? How do these rank in the queue of probable dangers to U.S. security? What is the timeline for potential hazard, and how should BMD development be staggered for maximum cost-effectiveness? How can policy-makers calculate acceptable margins of error?
Dr. Robert P. Haffa, Jr., Director, Northrop Grumman Analysis Center
Mr. Steven Hildreth, Specialist in Missile Defense and Non-Proliferation, Congressional Research Service, Library of Congress

1145-1245 **Lunch**

1245-1330 **Keynote Speaker: Strategic Assessment**
Theme: Overview of the state of BMD development; time horizons, technical risks, and the role of BMD as a potential instrument of national power. What is the proper mix of systems? How will evolving capabilities affect the political landscape? How will it be affected by these considerations, domestically and internationally?
LTG Patrick O'Reilly, Director, Missile Defense Agency

1330-1430 **Layered Defense: Boost Phase, Mid-Course, Terminal**

Theme: Participants will assess the maturity of each development path. What problems are associated with each kind of interception? What are the trade-offs for development capital? What consequences does each technology have for force structure? Are there assumptions about deploying these systems (domestically and internationally) which should be challenged?

Ambassador Henry F. Cooper, Former Director, Strategic Defense Initiative
Lieutenant General Trey Obering, Former Director, Missile Defense Agency

1430-1445 **Break**

1445-1545 **Lessons of BMD Testing and the Way Ahead**

Theme: Discussion of a comprehensive review of MDA testing and five year development plan.

Major General Chris T. Anzalone (USAF), Director of Test, Missile Defense Agency

1545- 1645 **Testing Timelines and Cost Effectiveness**

Theme: Specific examination of the technical feasibility of separate systems, especially against probable defensive measures. Has testing been rigorous enough? Which system holds the greatest promise over the short, medium, and long-term? How should the DoD anticipate development and procurement cycles? What budgetary constraints will affect outcomes?

Dr. Richard L. Garwin, IBM Fellow Emeritus, IBM Research Division, Thomas J. Watson Research Center
The Honorable Philip E. Coyle, Senior Advisor, World Security Institute

1645-1700 **Closing Remarks**

Dr. James M. Keagle, Director, Transforming National Security Seminar Series Center for Technology and National Security Policy, NDU

Wednesday, June 3rd

0830-0845 **Welcome and Introductory Remarks**
Dr. James M. Keagle, Director, Transforming National Security Seminar Series Center for Technology and National Security Policy, NDU

0845-0930 **Enduring Issues of BMD Development**
Theme: The section examines the lessons of past BMD programs, identifying key themes and longstanding issues related to their development and potential deployment.
The Honorable Jacques S. Gansler, Professor and Roger C. Lipitz Chair, Center for Public Policy and Private Enterprise, School of Public Policy, University of Maryland

0930-0935 **Break**

0935-1100 **Defending the United States**
Theme: What is the current operational state of NMD? How do these systems fit in with the broader U.S. strategy of defending the homeland?
Dr. Robert M. Soofer, Strategic Forces Policy Advisor to Senators Kyl, Sessions, and Inhofe
Dr. Keith B. Payne, President, National Institute for Public Policy Head, Graduate Department of Defense and Strategic Studies, Missouri State University
Dr. Peter L. Hays, Associate Director, Eisenhower Center for Space and Defense Studies
Mr. Larry Burger, Director, Space and Missile Defense Future Warfare Center, US Army Space and Missile Defense Command/Armed Forces Strategic Command

1100-1115 **Break**

1115-1215 **Europe, 3rd Site Issues, and Iran**
Theme: Discussions will examine U.S. and European points of view. Can American BMD development be used to enhance other security arrangements? Are there specific U.S. actions that would serve to alleviate international concerns over the deployment of these systems? What special considerations should the U.S. weigh before seeking to improve its BMD air, sea, space, and land infrastructure?
Ms. Anita Friedt, Acting DAS for the Bureau of European and Eurasian Affairs
Mr. Jaroslav Kurfurst, Minister Counselor, Embassy of the Czech Republic
Ambassador Victoria Nuland, Former Permanent Representative to NATO, 2005-2008

1215-1315 **Lunch**

1315-1430 **Russia: Cooperation and Arms Control?**
Theme: How does the development of BMD affect ongoing relations with Russia and its neighbors? What is the likelihood Russia and the U.S. will agree on cooperative security arrangements, such as placing radar sites in Azerbaijan? How should these relations be viewed in the context of arms control negotiations? What role will Israel play with systems like the Arrow, Patriot, THAD, and SM-3?
Dr. Barry M. Blechman, Co-Founder, Henry L. Stimson Center
Mr. Vasily Boryak, Counsellor, Head of Political-Military Desk, Embassy of the Russian Federation
Mr. Baker Spring, F.M. Kirby Research Fellow, Heritage Foundation

1430-1445 **Break**

1445-1600 **BMD and the Asian Challenges**

Theme: This section will examine how BMD will influence the strategic balance throughout Asia. Is China's nuclear strategy likely to change as the U.S. deploys more of these systems? How will the DPRK alter its military and political posture? What role will Japan play over time?

Ms. Elaine Bunn, Distinguished Research Fellow, Director of Future Strategic Concepts Program, Institute for National Strategic Studies, NDU

Mr. Peter Huessy, President, GeoStrategic Analysis

Dr. David Wright, Senior Scientist, Union of Concerned Scientists

1600-1615 **Closing Remarks**

Dr. James M. Keagle, Director, Transforming National Security Seminar Series Center for Technology and National Security Policy, NDU

SPEAKER BIOGRAPHIES

Major General Chris Anzalone

Maj. Gen. Chris T. Anzalone is Director of Test, Missile Defense Agency, Huntsville, Ala. He is responsible for planning, programming, budgeting, managing and executing a comprehensive test, assessment and fielding program that characterizes the Ballistic Missile Defense capability and supports credible decisions with respect to the Ballistic Missile Defense System. General Anzalone received his commission through the ROTC program at Florida Technical University, Orlando. A distinguished graduate of undergraduate navigator training, he has served as an F-111F weapon systems officer as well as test and tactics development chief for the EF-111A tactical jamming system. His commands include a flying squadron, mission support group and an air base wing. He conducted joint war planning for contingency operations supporting the Global War on Terrorism while serving on the Joint Staff. The general was the joint planner for the Directorate for Operational Plans and Interoperability, Assistant Deputy Director of Political-Military Affairs for the Western Hemisphere, and the executive officer to the Director, Strategic Plans and Policy. The general has served as Vice Commander of the Air Armament Center and Warner Robins Air Logistics Center.

Dr. Hans Binnendijk

Hans Binnendijk is currently the Theodore Roosevelt Chair in National Security Policy and Founding Director of the Center for Technology and National Security Policy at the National Defense University. He previously served on the National Security Council as Special Assistant to the President and Senior Director for Defense Policy and Arms Control (1999-2001). From 1994 to 1999, Dr. Binnendijk was Director of the Institute for National Strategic Studies at the National Defense University. For the previous eleven years, he had served as the Principal Deputy Director and Acting Director of the State Department's Policy Planning Staff (1993-1994). He has also served as Deputy Staff Director and Legislative Director of the Senate Foreign Relations Committee (1980-1985). Dr. Binnendijk has received numerous awards for his government service, including two Distinguished Public Service Awards and a Superior Service Award. He is also an experienced academician. Dr. Binnendijk has served as Director of the Institute for the Study of Diplomacy at Georgetown University, where he was also the Marshall B. Coyne Research Professor at the Edmund A. Walsh School of Foreign Service (1991-1993). He was Deputy Director and Director of Studies at London's International Institute for Strategic Studies and Editor of Survival from 1988-1991. He is author or co-author of more than 100 articles, editorials and reports. His most recent book is Seeing the Elephant: The U.S. Role in Global Security (Potomac Books: 2006). Dr. Binnendijk is a 1968 graduate of the University of Pennsylvania. He received his M.A.L.D. and his Ph.D. in international relations from the Fletcher School of Law and Diplomacy, Tufts University.

SPEAKER BIOGRAPHIES

Dr. Barry Blechman

Barry M. Blechman has specialized in international security issues throughout his career, spanning more than 40 years in both the public and private sectors. His government service includes stints at the Department of Defense, the Office of Management and Budget, and the Department of State, where he served as assistant director of the US Arms Control and Disarmament Agency from 1977 to 1980. He founded DFI International Inc., a research and consulting firm, in 1984 and remained its CEO until retiring in 2007. He co-founded the Stimson Center in 1989 and served as its chairman until 2007, as well. Blechman received a BA From Queens College in 1963, an MA From New York University in 1964, and a PhD from Georgetown University in 1971. He has taught at several universities and published more than 100 books, articles, and reports.

Mr. Vasily Boryak

Mr. Basily Boryak currently directs the Political-Military desk at the Russian Embassy in Washington, D.C. Prior to his current position, which began in 2008, Counsellor Boryak served for three years as the Head of the Strategic-Military Desk, Security and Disarmament Department, MFA, Moscow, and was the Russian Representative to JCIC (Commission under START). From 1999-2003, he worked as Counsellor, Political-military, Russian Embassy, Washington DC, for his first of two tours in the area. Mr. Moryak brought with him more than six years of political experience at the Political-military Desk, North America Department, MFA, Moscow.

Ms. M. Elaine Bunn

Elaine Bunn is a senior fellow at National Defense University's Institute for National Strategic Studies, where she is director of the Future Strategic Concepts Program. Before joining INSS in 2000, she was a senior executive in the Office of the Secretary of Defense, where she worked for twenty years in international security policy. She served as Principal Director, Nuclear Forces and Missile Defense Policy, from 1993-98. During that time, she was executive director of the 1994 Nuclear Posture Review. She was a visiting fellow at the RAND Corporation, 1998-2000; from February through June 2001, she co-chaired a panel for the Secretary of Defense, framing issues for the 2001 Nuclear Posture Review. A 1988 graduate of the National War College, she received an M.A. in International Security from Johns Hopkins School of Advanced International Studies and a B.A. from the University of Georgia, and was a Fulbright scholar at l'Université de Neuchâtel, Switzerland. Her publications include a number of articles and book chapters on strategic planning, nuclear policy, missile defense, preemption and deterrence.

Mr. Laurence Burger

Laurence (Larry) H. Burger, a member of the Senior Executive Service, is the Director of

the U.S. Army Space and Missile Defense Command's (SMDC) Future Warfare Center. He outlines the general program policy to support the Future Warfare Center's primary roles in bringing space and missile defense capabilities and concepts to the warfighter through experimentation, requirements development, operational analyses, modeling and simulation, high performance computing, and systems engineering. Included in the Future Warfare Center are the Space and Missile Defense Battle Lab, the Directorate for Combat Development, and the Simulations and Analysis Directorate.

Ambassador Henry "Hank" Cooper

Henry F. Cooper, who holds BS and MS degrees from Clemson University and a PhD from New York University, taught Engineering Mechanics at Clemson and, during the next 20 years—at Bell Telephone Laboratories, the Air Force Weapons Laboratory and R&D Associates, became a nationally recognized expert on nuclear weapons effects, strategic systems survivability and vulnerability matters, and national security policy issues. He designed and/or provided technical direction for numerous underground nuclear tests and major programs to develop and apply both theoretical and experimental methods to simulate nuclear weapons effects. He has been a member or chair of numerous technical working groups and high level advisory boards—including the Defense Science Board, the Air Force Scientific Advisory Board, U.S. Strategic Command's Strategic Advisory Group, the Defense Nuclear Agency's Scientific Advisory Group on Effects, and a Congressional Commission to assess the U.S. government's organization and programs to combat the proliferation of weapons of mass destruction. Since 1979, he has been appointed by the President to serve in the Office of the Secretary of the Air Force with oversight responsibility for Air Force strategic and space systems; Assistant Director of the Arms Control and Disarmament Agency, backstopping all bilateral negotiations with the Soviet Union; Ambassador and Chief U.S. Negotiator at the Geneva Defense and Space Talks with the Soviet Union; and Director of the Strategic Defense Initiative (SDI). During a brief period in 1990, he returned to the private sector as a JAYCOR Senior Vice President, where he led a Presidentially mandated independent review of the SDI program and associated national and arms control policy. Since leaving SDI in 1993, he has been a private consultant, Chairman of the Boards of Applied Research Associates and High Frontier, Senior Associate of the National Institute for National Policy and Visiting Fellow at the Heritage Foundation.

The Honorable Philip Coyle

Philip Coyle is a Senior Advisor to the President of the World Security Institute, and to its Center for Defense Information, a Washington D.C.-based national security study center. He is a recognized expert on U.S. and worldwide military research, development and testing, on operational military matters, and on national security policy and defense

spending. In 2005 and 2006, Philip Coyle served on the nine-member Defense Base Realignment and Closure Commission, appointed by President George W. Bush and nominated by House Democratic Leader, Nancy Pelosi. From 1994 to 2001, Mr. Coyle was Assistant Secretary of Defense and Director, Operational Test and Evaluation, in the Department of Defense, and is the longest serving Director in the 25 year history of the Office. In this capacity, he was the principal advisor to the Secretary of Defense on test and evaluation in the DoD.

Dr. R. DeSutter

National Defense University selected Joe DeSutter in July 2001 to direct its School for National Security Executive Education. He retired as a Colonel in the U.S. Air Force in 1994 after spending seven years in various national security policy-related positions in the White House. In the interim, he directed an international non-profit organization related to the Middle East and served as a self-employed consultant to the Defense Department on ballistic missile defense, the ABM Treaty, proliferation of weapons of mass destruction, U.S. space policy, and the evolution of U.S. national security policy since World War II. Dr. DeSutter was an Associate Professor at the U.S. Air Force Academy from 1977 to 1979, and Director of American Politics for the Academy's Department of Political Science from 1982 to 1985. He served as an advisor to the Air Force leadership on the Air Staff's Arms Control and International Negotiations Division until the end of 1986. He was assigned to the office of President Reagan's Science Advisor in 1986, where he became Executive Director of both the Office of Science and Technology Policy and the White House Science Council. When the Reagan Administration left office in 1989, he joined Vice President Quayle's national security staff, where he bore responsibility for a broad variety of regional and operational issues. Dr. DeSutter is a graduate of St. Louis University, with Masters Degrees from Texas Tech University and the University of Southern California, and a Ph.D. in International Relations from the latter. He has published articles on a variety of national security policy topics.

Anita Friedt

Anita E. Friedt is the Director of the Office of Policy and Regional Affairs of the Bureau of European and Eurasian Affairs at the Department of State. She is currently serving as Acting Deputy Assistant Secretary in the Bureau of European and Eurasian Affairs.
Her office focuses on nonproliferation, arms control and security assistance issues for the countries of Europe and Eurasia. Anita has had enjoyed an almost 30-year career at the Department of State, during which she has focused on European foreign policy issues with an emphasis on the Soviet Union and Russia. She also worked as an analyst in the State Department's Bureau of Intelligence and Research, following Soviet/Russian and European issues, and served two tours at the U.S. Embassy in Moscow, from 1989-1992 and again

from 1997-1999. Anita also serves as the co-chairman of the NATO Missile Defense Executive Working Group/Reinforced. She has a Masters degree from Georgetown University, and speaks German and Russian.

The Honorable Jacques Gansler

The Honorable Jacques S. Gansler is a Professor and holds the Roger C. Lipitz Chair in Public Policy and Private Enterprise in the School of Public Policy, and is the Director of both the Center for Public Policy and Private Enterprise and the Sloan Biotechnology Industry Center. Additionally, he is the Glenn L. Martin Institute Fellow of Engineering at the A. James Clarke School of Engineering, an Affiliate Faculty member at the Robert H. Smith School of Business and a Senior Fellow at the James MacGregor Burns Academy of Leadership (all at the University of Maryland). He also served as Interim Dean of the School of Public Policy from 2003 to 2004, and as the Vice President for Research for the University of Maryland from 2004-2006. He is a Member of the National Academy of Engineering and a Fellow of the National Academy of Public Administration. He currently is chairing three National Academy Committees (one on the "Small Business Innovation Research Program"; one on "Science and Security"; and one on "Special Forces"). Gansler recently served as the Chair of the Secretary of the Army's "Commission on Contracting and Program Management for Army Expeditionary Forces." He is also the National Academy of Engineering's representative on the Academies' Standing Committee on Science, Engineering and Public Policy; and he currently Chairs a Defense Science Board Task Force on the 21st Century Defense Industry. Previously, Dr. Gansler served as the Under Secretary of Defense for Acquisition, Technology and Logistics from November 1997 until January 2001. In this position, he was responsible for all matters relating to Department of Defense acquisition, research and development, logistics, acquisition reform, advanced technology, international programs, environmental security, nuclear, chemical, and biological programs, and the defense technology and industrial base. (He had an annual budget of over $180 Billion, and a workforce of over 300,000.) Prior to this appointment, Dr. Gansler was Executive Vice President and Corporate Director for TASC, Incorporated, an applied information technology company, in Arlington, Virginia (from 1977 to 1997) during which time he played a major role in building the company from a small operation into a large, widely-recognized and greatly-respected corporation, serving both the government and the private sector. From 1972 to 1977, he served in the government as Deputy Assistant Secretary of Defense (Materiel Acquisition), responsible for all defense procurements and the defense industry; and as Assistant Director of Defense Research and Engineering (Electronics) responsible for all defense electronics Research and Development. His prior industrial experience included: Vice President (Business Development), I.T.T. (1970-1972); Program Management, Director of Advanced Programs, and Director of International Marketing, Singer Corporation (1962-1970); and Engineering

Management, Raytheon Corporation (1956-1962). Dr. Gansler serves (and has served) on numerous Corporation Boards of Directors, and governmental special committees and advisory boards. He has been Vice Chairman, Defense Science Board and member for 10 years; Chairman, Board of Visitors, Defense Acquisition University; Director, Procurement Round Table; Chairman, Industry Advisory Board, University of Virginia, School of Engineering; Chairman, Board of Visitors, University of Maryland, School of Public Policy; member of the FAA Blue Ribbon Panel on Acquisition Reform; member of the Federal Emergency Management Agency (FEMA) Advisory Board (10 years); and senior consultant to the "Packard Commission" on Defense Acquisition Reform. Additionally, from 1984 to 1997, Dr. Gansler was a Visiting Scholar at the Kennedy School of Government, Harvard University where he was a frequent guest lecturer in Executive Management courses. He is the author of 3 books, a contributing author of 25 other books, author of over 100 papers, and a frequent speaker and Congressional witness. Dr. Gansler holds a BE in Electrical Engineering from Yale University, a MS in Electrical Engineering from Northeastern University, a MA in Political Economy from the New School for Social Research, and a Ph.D. in Economics from American University.

Dr. Richard Garwin

Richard L. Garwin is IBM Fellow Emeritus at the IBM Thomas J. Watson Research Center Yorktown Heights. His biography and many current and past papers, speeches and Congressional testimony are to be found via www.garwin.us . He has had long experience working with the US government on technology and policy of nuclear weapons, strategic offensive and defensive weapons, and space systems. He is a physicist and is a member of the National Academies of Sciences, and of Engineering. Her has been awarded the National Medal of Science, the Enrico Fermi Award by the President and the Secretary of Energy, and the R.V. Jones Award for Scientific Intelligence. He was named by the National Reconnaissance Office one of the 10 Founders of National Reconnaissance.

Dr. Robert Haffa, Jr.

Dr. Haffa is the Director of the Northrop Grumman Analysis Center, having joined Northrop after retiring from the U.S. Air Force as a Colonel. His Air Force career included operational tours in the F-4 aircraft in Vietnam, the United Kingdom and Korea, two tours teaching political science at the U.S. Air Force Academy where ultimately he served as Professor and Acting Department Head, and a tour with the Air Staff in the Pentagon as Chief of the Long Range Planning Division and Director of the Operations Group supporting the Air Force Chief of Staff. Since joining Northrop Grumman, Dr. Haffa's work has included analyses of U.S. military strategy, force planning, programming, and wargaming for the business sectors of the company, as well as the development of corporate strategic planning scenarios. Dr. Haffa holds a B.S. in international affairs from the U.S. Air

Force Academy, an M.A. in government from Georgetown University, and a Ph.D. in political science from the Massachusetts Institute of Technology. He is an adjunct professor in the Security Studies Program at the Johns Hopkins University.

Dr. Peter Hays

Peter L. Hays is a retired Air Force Lieutenant Colonel who has been analyzing national security space issues for more than 20 years and wrote a dissertation is on the evolution of U.S. Military Space Doctrine during the Cold War. Since September 2004, he has served as a Senior Scientist with Science Applications International Corporation supporting the Policy and Strategy division of the National Security Space Office in the Pentagon, an Associate Director for the Eisenhower Center for Space and Defense Studies at the USAF Academy, and an Associate Visiting Professor with the Space Policy Institute at George Washington University. He has assisted in the development of products such as the Space Posture Review, 05 Quadrennial Defense Review, National Security Space Strategy, Space Situational Awareness Strategy and Roadmap, National Defense University Spacepower Theory Study, and National Military Strategy for Space. He holds a Ph.D. from the Fletcher School of Law and Diplomacy, an M.A. from the University of Southern California, and was a 1979 honor graduate of the USAF Academy. During his Air Force career he served internships at the White House Office of Science and Technology Policy and National Space Council and taught space policy courses at the USAF Academy, School of Advanced Airpower Studies, and National Defense University. He currently teaches the Space and National Security seminar at George Washington University. Major publications include: Spacepower for a New Millennium (McGraw-Hill, 2000), "Going Boldly—Where?" (Aerospace Power Journal, Spring 2001); and United States Military Space (Air University Press, 2002).

Mr. Steven Hildreth

Mr. Steven Hildreth has been Specialist in Missile Defense and Non-Proliferation at the Congressional Research Service (CRS) since 1985. Mr. Hildreth received his B.A. in International Relations and Political Science from Brigham Young University, M.A. in National Security Studies, Georgetown University and M.Sci. in National Security Strategy, The National War College. He has published several books on international security issues, including Modern Weapons and Third World Powers (with Dr. Rodney Jones). He has also published extensively on missile defense and other national security issues in a number of journals, as well as authored scores of reports to Congress. Mr. Hildreth has testified a number of times before the U.S. Congress, including Patriot performance in Desert Storm, missile proliferation, and more recently on technical challenges to ICBM development in developing countries. He headed his agency's support of the Joint Congressional Committee Investigating the Attacks of 9/11.

Mr. Peter Huessy

Peter R. Huessy. Since 1981, Mr. Huessy has been President of GeoStrategic Analysis, a Maryland defense policy consulting company and since 1992 Senior Defense Consultant, NDUF. He specializes in the following policy areas: strategic nuclear, missile defense, counter terrorism, space, energy, port/maritime and homeland security. He is also a featured writer for Family Security Matters, Frontiers of Freedom, Human Events and Washington Times. He regularly appears on Homeland Security radio hosted by Colonel Randy Larsen. He has also a consultant to the office of the Secretary of the USAF for the past 28 years. He has been a guest lecturer at the Joint Military Intelligence College and the US War College, as well as the Institute for World Politics and Johns Hopkins School of Advanced International Studies. He is a member of the Committee on the Present Danger and the Defense Secretary's Energy Task Force. He regularly speaks on nuclear terrorism issues.

Dr. James Keagle

Dr. James M. Keagle is the Director of the Transforming National Security seminar series at the Center for Technology and National Security Policy at the National Defense University. Prior to this position, Dr. Keagle was the National Defense University's Provost (effective 2004) and Vice President for Academic Affairs. Prior to these positions, he served as a professor of National Security Strategy at NDU. In that role Dr. Keagle worked as a research faculty member assisting with NDU's modeling and simulation and work with interagency education and training. Accepting an appointment to the U.S. Air Force Academy, he graduated second academically in his class in June 1974. Following graduation, he went to the University of Pittsburgh to complete his Master's of Arts degree in political science and earned a graduate certificate in Latin American studies. After a tour as a munitions maintenance officer, Dr. Keagle went on to become an assistant professor of political science at the U.S. Air Force Academy. In 1980, he went on to Princeton University where he completed both a Master's of Arts degree and Ph.D. in politics. He proudly notes his honorary Ph.D from the Military Technical Academy of Romania--the only United States citizen so honored. Following his extensive education, Dr. Keagle's next six tours were political-military assignment that included direct access and interaction with Cabinet-level government officials on national security related matters. These assignments included work for two Combatant Commanders as a senior strategist; for the Office of Secretary of Defense pertaining to Cuba; Deputy Director, Office of the Secretary of Defense Bosnian Task Force; and for the Deputy Under Secretary of the Air Force in International Affairs as Senior Strategist. Military medals include the Defense Superior Service Award, the Legion of Merit, and the Purple Heart. Since leaving military service, Dr. Keagle has held the position of adjunct professor at a number of institutions to include: Syracuse University, American University, Central Michigan University, Catholic University, University of Colorado, and Lake Superior State College. He also holds an honorary professorships with Transilvania

University in Brasov, Romania, as well as the Mongolian Defense University--again, the only American so honored . Dr. Keagle and wife Kay are the proud parents of three children.

Mr. Jaroslav Kurfurst

Mr. Jaroslav Kurfürst joined the Ministry of Foreign Affairs of the Czech Republic in October 1997. After finishing Diplomatic Academy program, he was assigned to the Security Policy Department, NATO unit. Between August 1999 and September 2003, Mr. Kurfürst was posted to the Czech Embassy in Moscow, where he was responsible for the agenda of foreign and security policy of the Russian Federation. In November 2003 Mr. Kurfürst was appointed deputy Director of the Security Policy Department and since August 2004 Director of the Security Policy Department of the Ministry of Foreign Affairs of the Czech Republic. In July 2005 he assumed the current position of Deputy Chief of Mission of the Czech Embassy in Washington, DC. Mr. Kurfürst was born in Valašské Meziříčí in 1970. He finished his studies at University of Ostrava (geography) in 1993 and University of Eastern Bohemia (french language) in 1996. From 1993 to 1996 he worked as a teacher in grammarschool and in 1997 as an assistant at the University of Eastern Bohemia. He is fluent in English, French and Russian. Mr. Kurfürst and his wife Radka have two sons and live in Hradec Králové.

Mr. Bruce MacDonald

Mr. MacDonald is an independent contractor serving as Senior Director to the U.S. Strategic Posture Review Commission, a bipartisan body headed by former Defense Secretaries William Perry and James Schlesinger. He was project leader for the Council on Foreign Relations' study of China, Space Weapons, and U.S. Security, which the Council published in 2008. He was Assistant Director for National Security at the White House Office of Science and Technology Policy from 1995-1999 and previously was a professional staff member at the House Armed Services Committee, where he worked on Air Force acquisition, space, and missile defense issues, and earlier was senior national security adviser to Senator Dale Bumpers of Arkansas. He worked at the State Department in the Bureau of Politico-Military Affairs, where he served on and chaired the Interagency START Policy Working Group and served on the U.S. START delegation in Geneva. He started his career as a staff scientist at a consulting firm where he supported the OSD SALT Task Force and worked on advanced missile defense concepts. Mr. MacDonald graduated with honors in aerospace engineering from Princeton University and received two masters degrees from Princeton, one in aerospace engineering with a specialty in rocket propulsion, and the second in public and international affairs from the Woodrow Wilson School. Mr. MacDonald is a member of the Council on Foreign Relations and the American Institute of Aeronautics and Astronautics.

SPEAKER BIOGRAPHIES

Ambassador Victoria Nuland

Victoria Nuland was the 18th United States permanent representative to NATO from 2005 to 2008. She worked on the full range of transatlantic security issues, including operations in Afghanistan and Kosovo, NATO enlargement, cyber security, and missile defenses. In August, she will become senior faculty advisor at the National Defense University in Washington. A career foreign service officer, she was principal deputy national security advisor to Vice President Cheney and worked on the promotion of democracy and security in Iraq, Afghanistan, Ukraine, Lebanon, and the Middle East, among other issues. She has also served as deputy permanent representative to NATO in Brussels and as deputy director for former Soviet Union affairs at the Department of State.

Lieutenant General Trey Obering

Lt. Gen. (retired) Henry A. "Trey" Obering III served as Director of the Missile Defense Agency, Office of the Secretary of Defense, Washington, D.C., from July 2004 until his retirement on January 1, 2009. As Director, General Obering was the Program Manager for the Ballistic Missile Defense System and the Acquisition Executive for all ballistic missile defense programs within the Department of Defense. General Obering, a native of Birmingham, Ala., entered the Air Force in 1973 after graduating cum laude in aerospace engineering from the University of Notre Dame and its ROTC program. After receiving his pilot's wings in 1975, he flew operational assignments in the F-4E. After earning a master's degree in astronautical engineering from Stanford University in 1980, he was assigned to the Space Shuttle program participating in 15 space shuttle launches as a NASA orbiter project engineer responsible for integrating firing room launch operations. Prior to his assignment at MDA, the general planned and programmed 68 joint, Air Force and international programs with a $28 billion budget on the Air Staff. General Obering also is a distinguished graduate of the Squadron Officer School and Air Command and Staff College at Maxwell Air Force Base, and a distinguished graduate of the Industrial College of the Armed Forces at Fort McNair.

LTG Patrick O'Reilly

Lieutenant General Patrick J. O'Reilly is the Director for the Missile Defense Agency (MDA), Office of the Secretary of Defense, Pentagon, Washington, DC. In this capacity, he oversees MDA's worldwide mission to develop a capability to defend deployed forces, the United States, Allies, and friends against ballistic missile attacks. During his career, he served in both command and staff officer positions in a variety of operational units including the 1st Cavalry Division, the 3rd Support Command, Germany, and as an Assistant Professor of Physics at the United States Military Academy. As an Acquisition Officer, he served as Program Manager for Directed Energy Programs, PATRIOT PAC-3 Missile, Terminal High Altitude Area Defense (THAAD) Missile System, Ground-based

Midcourse Defense (GMD) Program, and as the Army Program Executive Officer for Combat Support and Combat Service Support. Lieutenant General O'Reilly is a graduate of the U.S. Military Academy and has Masters Degrees in Physics, National Security and Strategic Studies, and Business. Lieutenant General O'Reilly is a graduate of the U.S. Army Command and Staff College, the U.S. Naval College of Command and Staff, and the U.S. Army War College.

Dr. Keith Payne

Keith Payne is President and co-founder of the National Institute for Public Policy, a nonprofit research center located in Fairfax, Virginia. At National Institute, he directs and participates in studies on U.S. strategic policy and force posture issues, arms control, BMD, and Russian foreign policy. Dr. Payne also is Head of the Graduate Department of Defense and Strategic Studies, Missouri State University (Washington Campus), and was awarded the Vicennial Medal for his years of teaching at Georgetown University. On leave from National Institute in 2002 and 2003, Dr. Payne served in the Department of Defense as the Deputy Assistant Secretary of Defense for Forces Policy. He received the Distinguished Public Service Medal from Secretary of Defense Rumsfeld, and the Forces Policy office Dr. Payne led received a Joint Meritorious Unit Award. In this position, Dr. Payne was the head of U.S. delegation in numerous allied consultations and in "Working Group Two" negotiations on BMD cooperation with the Russian Federation. Dr. Payne is the editor-in-chief of Comparative Strategy: An International Journal, Chairman of the Strategic Command's Senior Advisory Group Policy Panel, co-chair of the U.S. Nuclear Strategy Forum, and a member of the State Department's International Security Advisory Board. He has served as a participant or leader of numerous governmental and private studies, including White House studies of U.S.-Russian cooperation, Defense Department studies of missile defense, arms control, and proliferation, and as co-chairman of the Department of Defense's Deterrence Concepts Advisory Group. He also has served as a consultant to the White House Office of Science and Technology Policy, and the Arms Control and Disarmament Agency, and participated in the 1998 "Rumsfeld Study" of missile proliferation. Dr. Payne testifies frequently before Congressional Committees, and has lectured on defense and foreign policy issues at numerous colleges and universities in North America, Europe, and Asia. He is the author, co-author, or editor of over ninety published articles and sixteen books and monographs. His forthcoming book is entitled, The Great American Gamble: Deterrence Theory and Practice from the Cold War to the Twenty-First Century (National Institute Press®, July 2008). Dr Payne's articles have appeared in major U.S., European and Japanese professional journals, including, Foreign Affairs, Foreign Policy, Orbis, Europäische Sicherheit, Policy Review, Strategic Review, Washington Quarterly, Jane's Intelligence Review, Militare Spectator, Air University Review, Comparative Strategy, Air Force Magazine, Issues In Science and Technology, Military

Review, Parameters, Harper's, The Wall Street Journal, The Christian Science Monitor, and USA Today. Dr. Payne received an A.B. (honors) in political science from the University of California at Berkeley in 1976, studied in Heidelberg, Germany, and in 1981 received a Ph.D. (with distinction) in international relations from the University of Southern California.

Dr. Robert Soofer

Rob Soofer advises Republican Senators Kyl, Sessions, and Inhofe on strategic forces and arms control issues. He supports Senator Kyl in his role as Assistant Minority Leader and Senator Sessions as Ranking Member of the Strategic Forces Subcommittee of the Senate Armed Services Committee. From October 2004 to January 2009, Rob served as Professional Staff lead for the Subcommittee on Strategic Forces, with oversight responsibility for missile defense, strategic forces, military space programs, and U.S. Strategic Command. During the year prior to joining the committee, he was called to active duty as a Lieutenant Commander in the Naval Reserve and assigned to the newly created Terrorist Threat Integration Center (TTIC). Executive branch experience includes serving as Deputy Director in the Office of Missile Defense Policy (Office of the Under Secretary of Defense for Policy), Professor of National Security Policy at the National War College, and with the Strategic Defense Initiative Organization, now known as the Missile Defense Agency. Rob received his Doctorate in International Relations from the University of Southern California (1987) and is a graduate of the National War College (1994).

Mr. Baker Spring

Baker Spring is the F.M. Kirby Research Fellow in National Security Policy at The Heritage Foundation. Spring specializes in examining the threat of ballistic missiles from Third World countries and U.S. national security issues. In 2005, he developed "Nuclear Games, " a table-top exercise to show diplomats from Australia, China, India, Japan, Russia and South Korea the realities in a world where many nations, including rogue states such as North Korea, have nuclear weapons. He served as a defense and foreign policy expert for Sens. Paula Hawkins (R-FL) and David Karnes (R-NE). He joined Heritage in 1989. A graduate of Washington and Lee University, Spring received his master's degree in national security studies from Georgetown University.

Dr. David Wright

David Wright is a senior scientist and co-director of the Global Security Program at the Union of Concerned Scientists (UCS). He is an established expert on the technical aspects of arms control, particularly those related to missile defense systems, missile proliferation, and space weapons. He has testified before Congress on arms-control issues and is a frequently quoted source in the New York Times and on NPR. Dr. Wright has worked for a number of years on projects to help train technical arms control experts in other countries,

especially Russia and China. Prior to joining UCS in 1992, Dr. Wright was a senior research analyst with the Federation of American Scientists and served as an SSRC-MacArthur Fellow in the Center for Science and International Affairs at Harvard's Kennedy School of Government. He received his Ph.D. in physics from Cornell University and worked as a research physicist from 1983 to 1988. He is also currently a research affiliate in the Program on Science, Technology, and Society at MIT. Dr. Wright has authored numerous articles and reports on arms control and international security. He is a co-author of the UCS/MIT Countermeasures report and The Physics of Space Security. Since 1990 he has been a primary organizer of the International Summer Symposiums on Science and World Affairs. These annual meetings help create an international community of scientists working on arms control and security issues. Dr. Wright was a co-recipient of the American Physical Society's 2001 Joseph A. Burton Forum Award for his arms control research and his work with international scientists.

Revitalizing The Test Program
National Defense University

June 2009

Maj Gen Chris T. Anzalone, USAF
Director For Test
Missile Defense Agency

Approved for
Public
Release
09-MDA4629

Purpose

- Describe changes to MDA testing?
- Identify Challenges

Test And Target Summary

What tests has MDA conducted since 2001 ?

- Over 105 flight tests
  - 49 hit-to-kill (HTK) intercept attempts
- 133 Airborne Laser sorties
- Over 33 BMDS multi-element/multi-service/multi-COCOM ground tests
  - Integrated 15 labs in 10 locations
  - Distributed in 19 U.S., 2 Asia, 2 Europe locations

How many targets have flown since 1993?

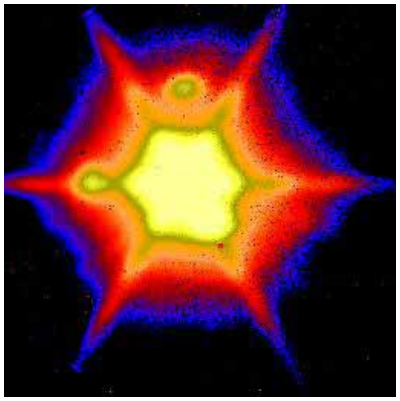
- More than 180 targets

Who participates?

- U.S. Army, Navy, Air Force, FAA, Homeland Security/Coast Guard, NASA, Intel agencies, State Department, and over 20 DoD Organizations

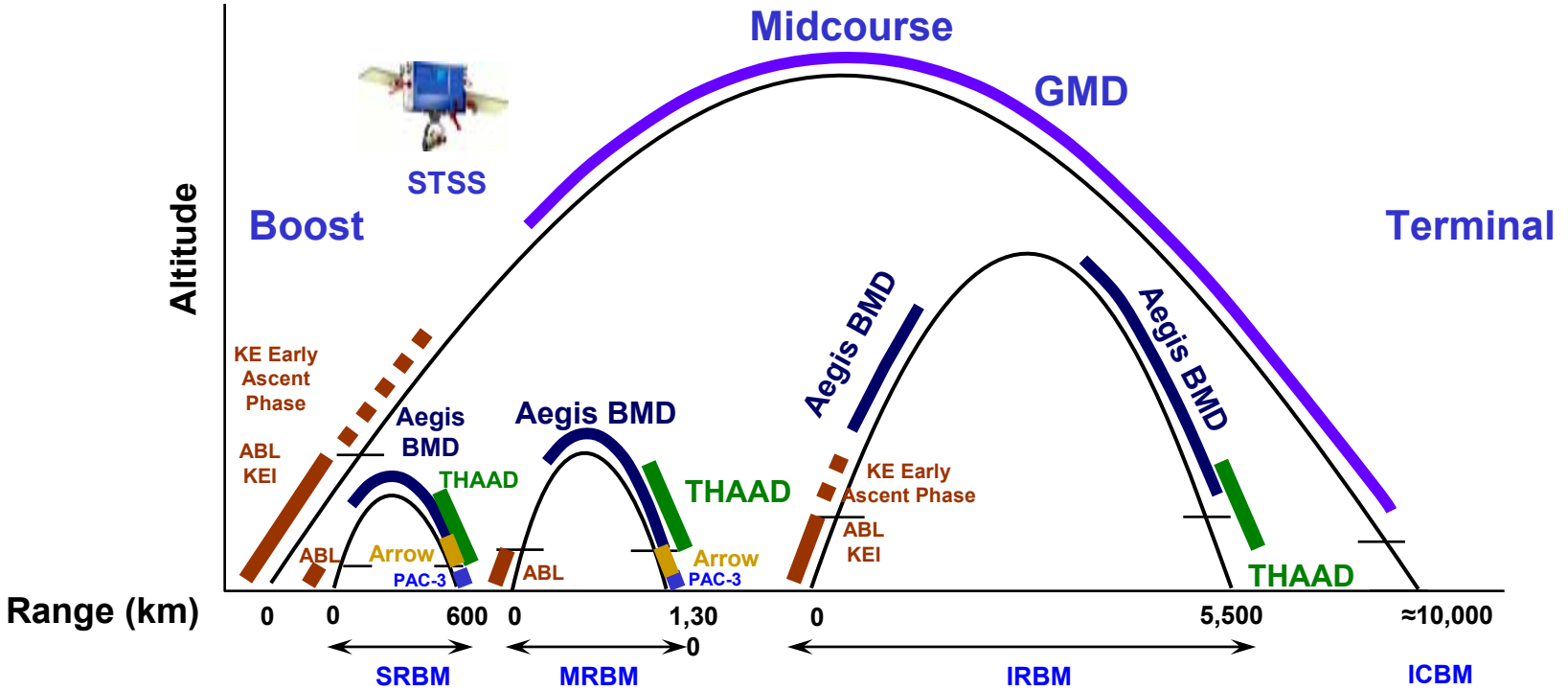
38 Intercepts out of 48 Hit-to-kill Attempts since 2001

What Is Included In The 2009 Test Program ?



- 13 Programs w/ Industry partners
- Over 1,000 test professionals
- Almost $1.6 Billion
- 8 DoD and commercial test ranges
- 10 mobile Test assets
- 16 flight tests - - U.S., International, Patriot
- 5 ground tests / exercises

What Are We Testing Against ?



- Thousands Built, Widely Available
- Commonly Land-Launched
- Sea-Based Launch Demonstrated By Iran, India

- Many Exist In Third World
- More On The Way

- A Few Exist In Third World
- Not Yet Tested As Ballistic Missiles

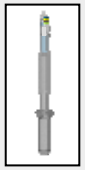
What Is The Level Of Technical Maturity ?

(February 2009)

Version 1.5 (Feb 2009)

Increasing Maturity

Concept Risk Reduction



SM-3 Blk 1b

ABL

CR-2

Capability Development

Sea-Based Terminal

STSS

C2BMC

Ready For Contingency Use

GFC 6b

SBX 2.2

THAAD 4.1 / 7.2

Ready For Operational Testing

Beale 7.0.1.5

Cobra Dane 2.6

Fylingdales 7.0.1.5

C2BMC

GFC 6a

GBI CE1/2

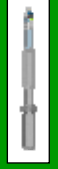
AN/TPY-2 #2

Ready For Initial Fielding

DSP

PAC-3

Aegis BMD 3.6



SM-3 Blk IA

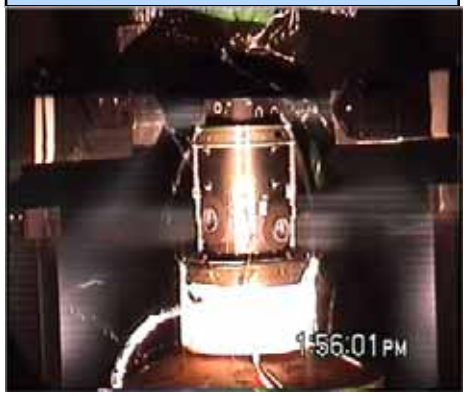
C2BMC

Anticipated Movement Next 6 Months

FOR OFFICIAL USE ONLY

What Is The Structure Of BMDS Testing ?

Component Testing

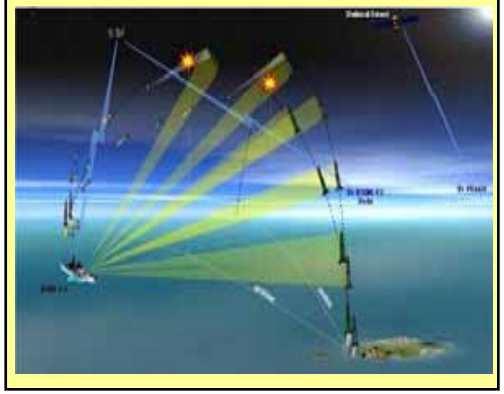


- Element subsystem developmental testing
- Component-level debug and improvement
- Components qualify for production

Element Testing

- Element developmental testing
- Component-level integration
- Verify and validate Models and Simulations
- Test readiness for Integration into BMDS
- Early Operational Test Agency (OTA) System testing

System Testing



- Demonstrate Warfighting Effectiveness
- Engagement Sequence Group (ESG) demonstration
- Test as you fight the System
- Warfighter operates BMDS
- Exercise overlays with Combatant Commanders (COCOMs)
- Full Operational Test Agency (OTA) testing
- International participation

Component → *Element* → *System*

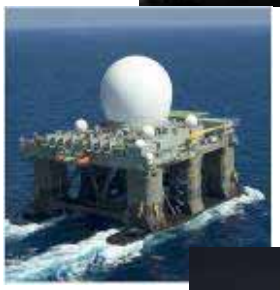
Why Revitalize The Test Program Now?

- The BMDS is maturing, Elements are more integrated and interdependent
- To assure integrated M&S accurately reflect the integrated operational system's performance
- To explore BMDS" integrated, layered-defense capabilities through innovative flight and ground testing
- To synchronize test priorities with emerging warfighter needs
- To optimize test activities and better manage test costs

Increase Confidence Through Test

BDMS Test Design Philosophy

- Establish standard test design methodology
  - Systematically map links of Critical Engagement Capabilities (CECs), Emperical Measurement Events (EMEs) and Critical Operational Issues COIs) to test venues and scenarios
- Develop test design descriptions
  - Document test venue, test interdependencies and test timing
  - Look for efficiencies among Elements
- Operational realism instituted in flight testing
  - Developmental Test / Operational test (DT /OT) and Warfighter feedback critical to engineering development



Deliberate, Rigorous, Disciplined Technical Approach

Review Of Ballistic Missile Defense Testing

Operational Test Agency

Operational Critical Issues

MDA Modeling & Simulation

January

Verification, Validation and Accreditation

Test Scenarios

March-April

Target Requirements

May

Integrated Master Test Plan

June

Flight Testing

Ground Tests

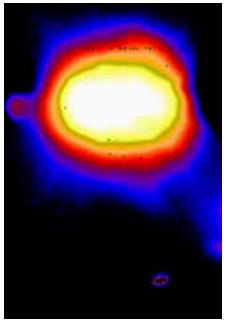
Exercises & Demonstrations

Analysis

STRATCOM

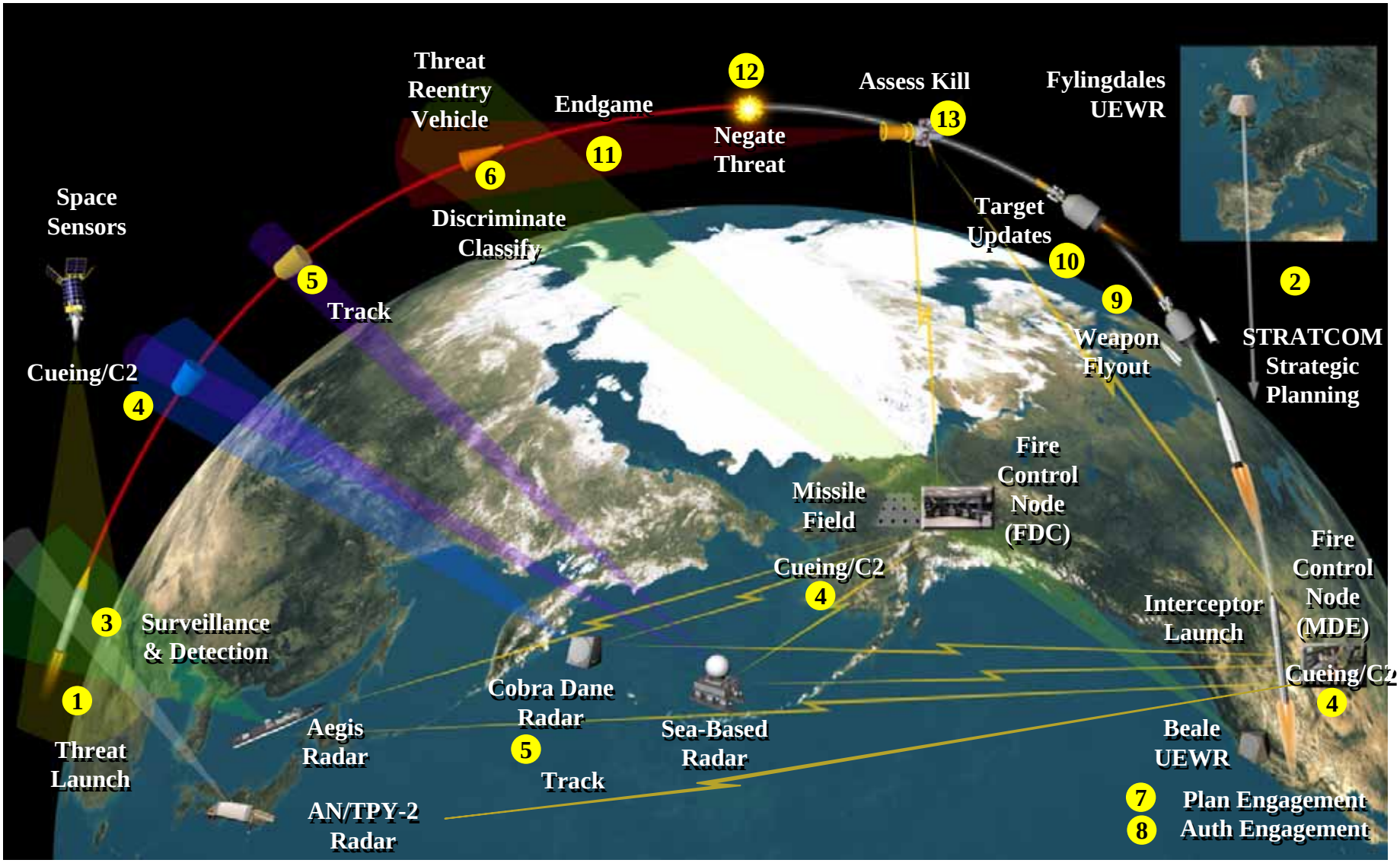
Military Utility Assessment

DOT&E Annual Report To Congress



BMDS Test Challenges

BMDS Engagement Requires A Global, Integrated Sensor Network



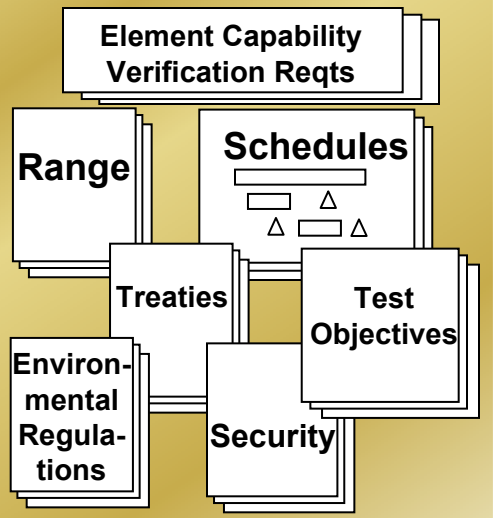
What are the Challenges Of Providing Targets?

Conceptual and Realized Threat Missile Capabilities "Critical Factors"

Target

Prioritized Adversary Parameters

Secondary Requirements



- Performance
- Payloads
- Signatures
- Cost
- Schedule
- Special requirements

Prioritized Target Requirements

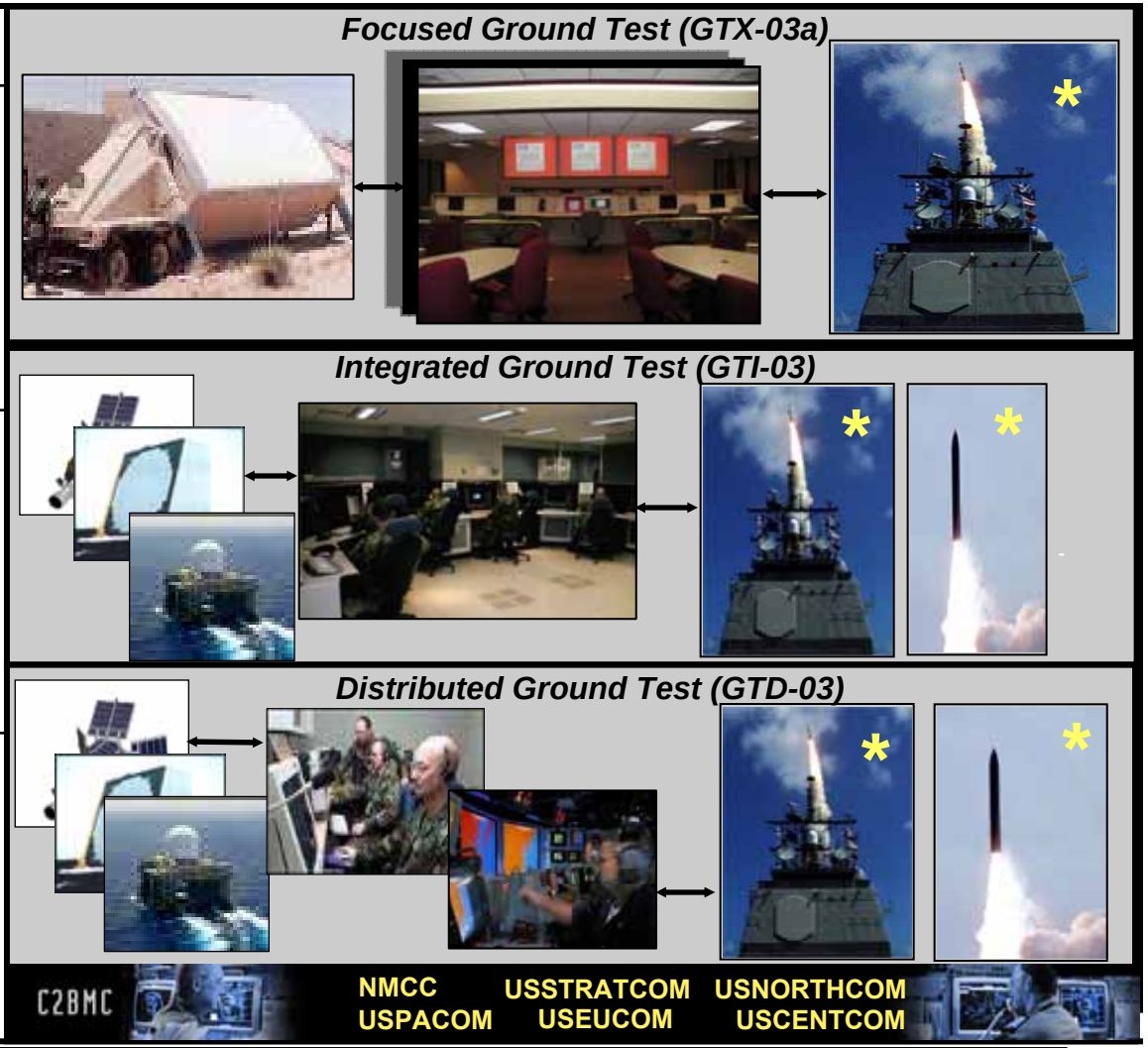
Constraints

- Range
- Security
- Treaties (INF, START)
- Facilities
- Test capabilities
- Environmental

BMDS Prioritized Critical Factors And Verification & Validation Matrix Is Driving Test Objectives And Target Requirements

Challenges Of BMDS Ground Testing

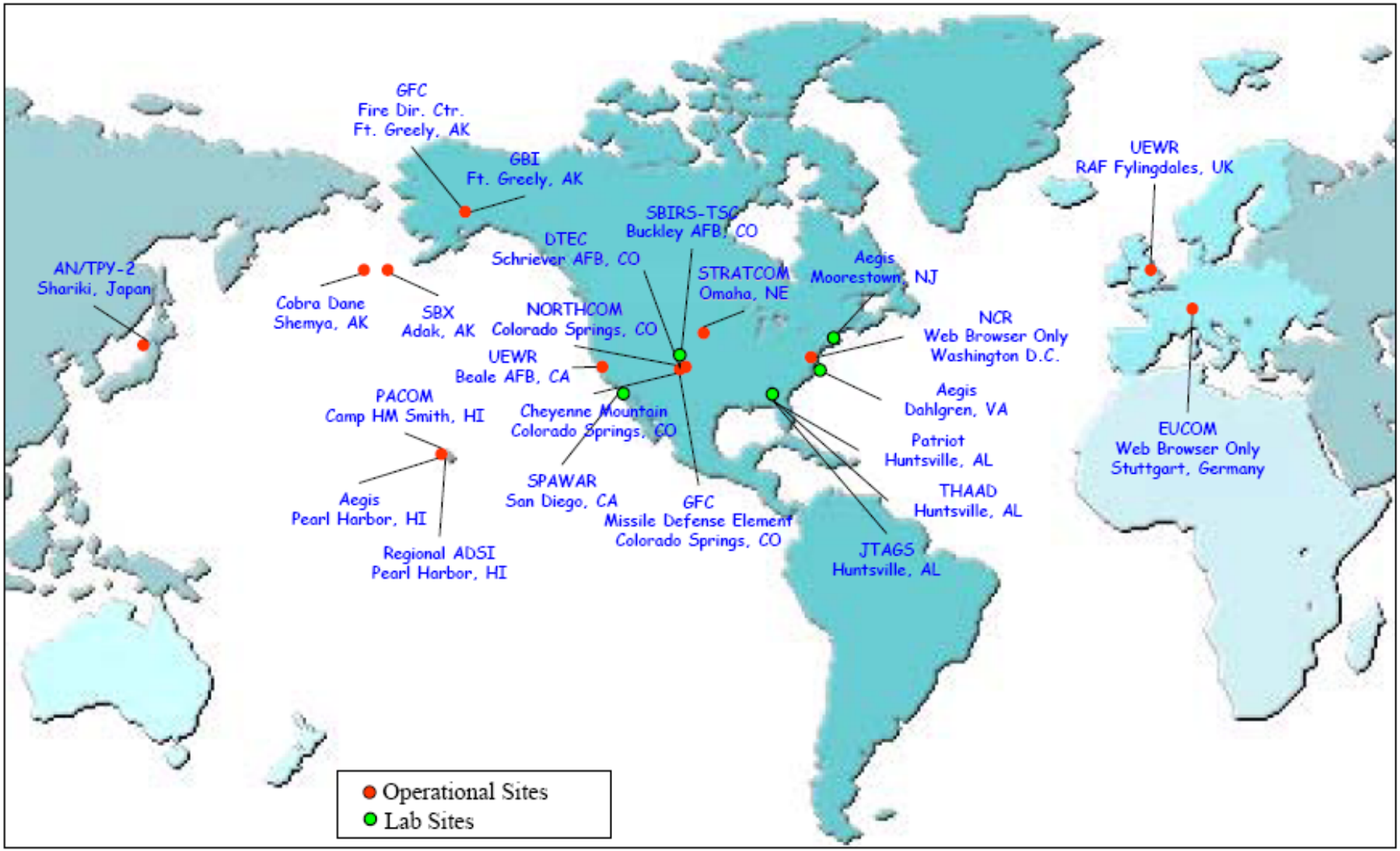
Event	Purpose
GTX *Focused Events On Specific Functionality* *(Approximately $4-6 Million)*	• Risk Reduction For Larger Tests • Test New / Emerging Capabilities • Model Anchoring
GTI *Integrated Events using Element HWIL Representations (Approximately $20 Million)*	• BMDS Critical Operational Issues (COI) Operational Performance • Support Analysis Of Multiple Test Scenarios
GTD *Distributed Events Using Fielded Assets* *(Approximately $26 Million)*	• Operational BMDS • Use Fielded Element HW / SW To Exercise BMDS Comms • Evaluation Of Capability For Early Warfighter Delivery



Interactive, Geographically Distributed Hardware / Software-In-The-Loop Tests Using BMDS Elements

**Simulated Flight*

BMDS Ground Testing
Operational Participant Locations

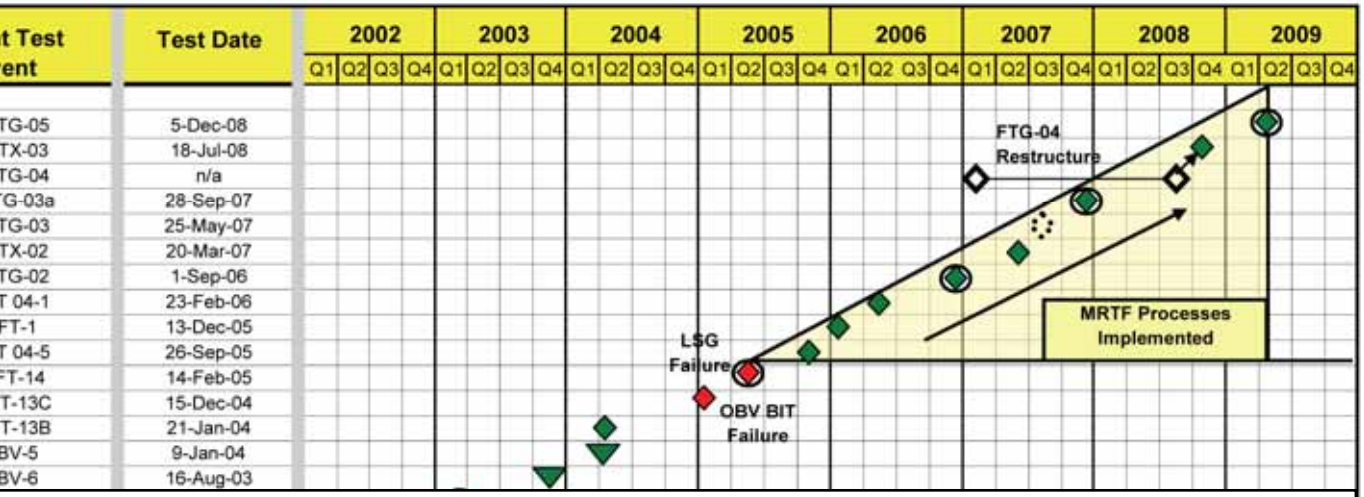


Flight Test Challenges: GMD Flight Test History FY2002 To FY2008

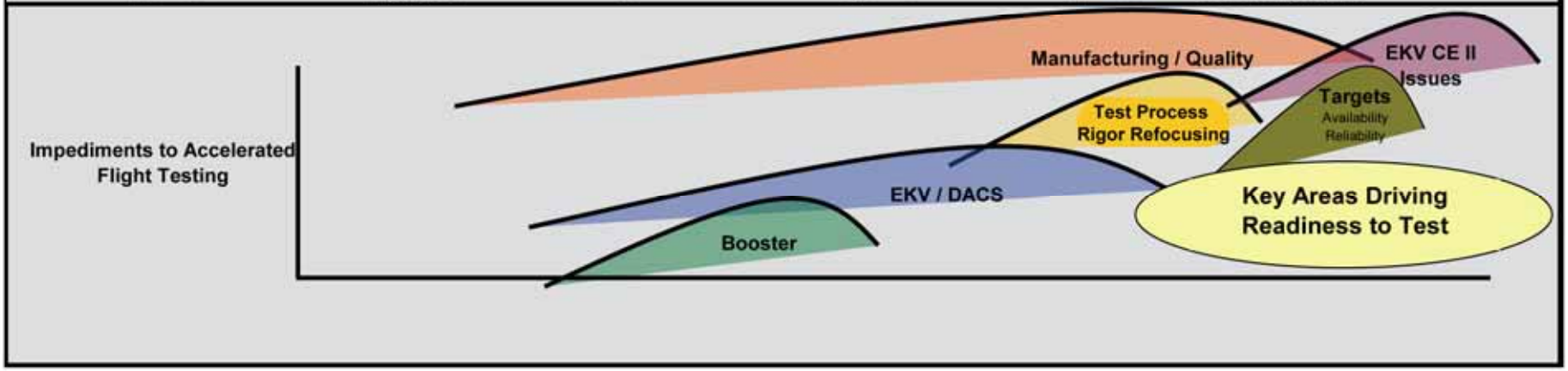
Development Issues

- GBI manufacturing / quality issues
- Early booster issues
- EKV / DACS development challenges
- Test process rigor
- Target availability and reliability

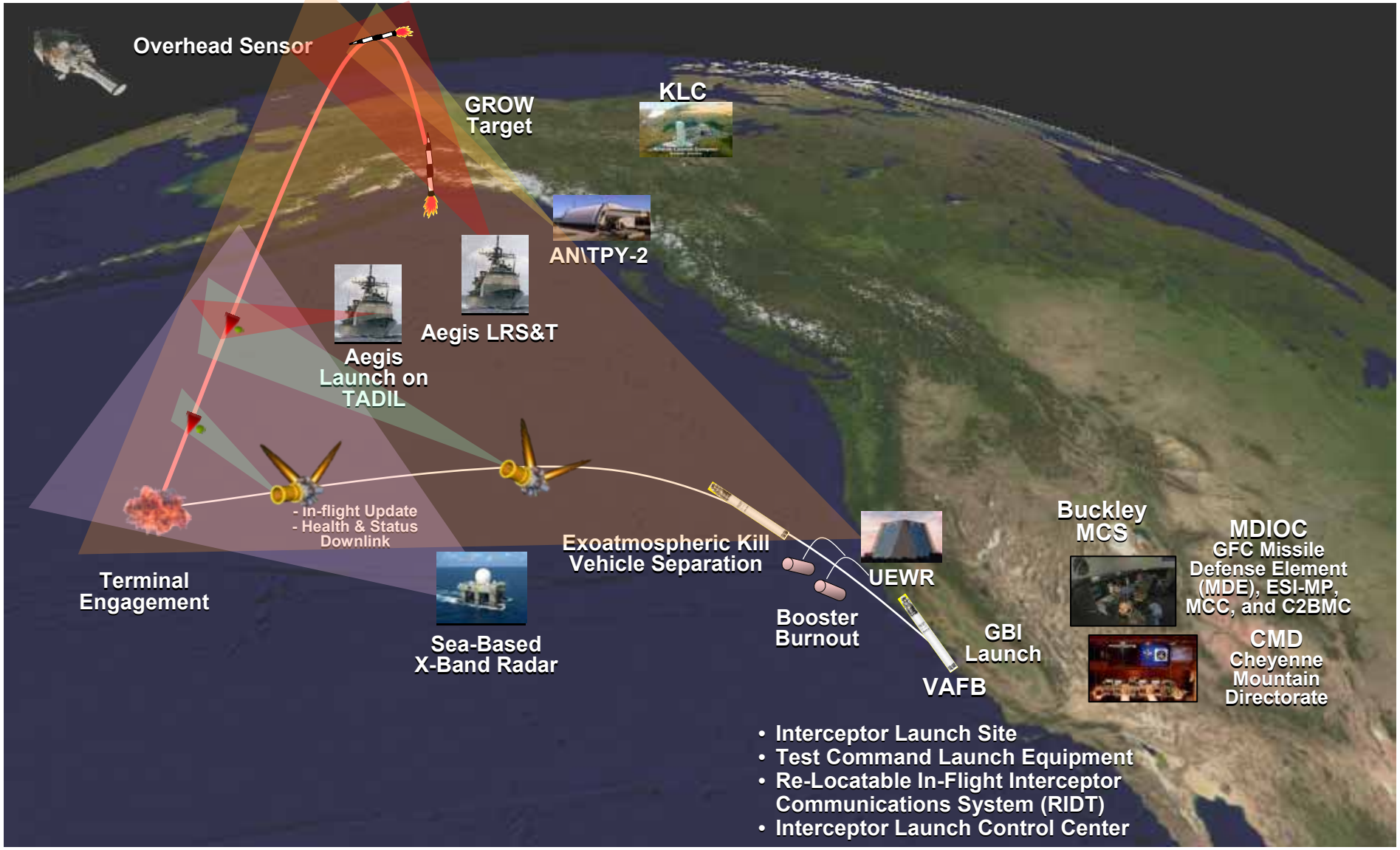
Flight Test Event	Test Date
FTG-05	5-Dec-08
FTX-03	18-Jul-08
FTG-04	n/a
FTG-03a	28-Sep-07
FTG-03	25-May-07
FTX-02	20-Mar-07
FTG-02	1-Sep-06
FT 04-1	23-Feb-06
FT-1	13-Dec-05
FT 04-5	26-Sep-05
IFT-14	14-Feb-05
IFT-13C	15-Dec-04
IFT-13B	21-Jan-04
BV-5	9-Jan-04
BV-6	16-Aug-03



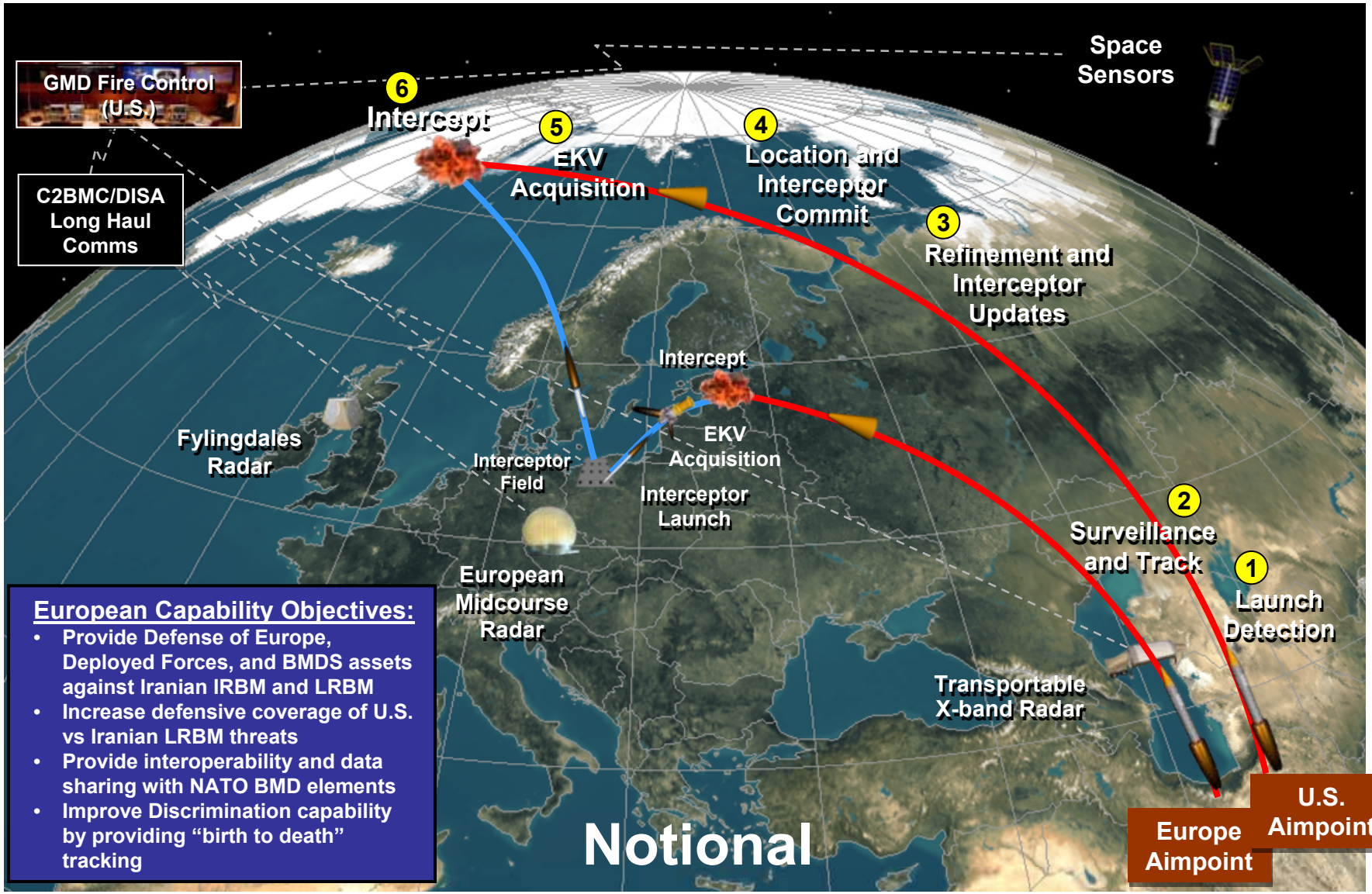
Successful Non-Intercept Flight Test | Unsuccessful Non-Intercept Flight Test | Successful Intercept Flight Test | Unsuccessful Intercept Flight Test | Successful Booster Flight Test | Unsuccessful Booster Flight Test | "No Test"



What Was The FTG-05 Mission 5 DEC 08 ?



Adding the European Capability



European Capability Objectives:

- Provide Defense of Europe, Deployed Forces, and BMDS assets against Iranian IRBM and LRBM
- Increase defensive coverage of U.S. vs Iranian LRBM threats
- Provide interoperability and data sharing with NATO BMD elements
- Improve Discrimination capability by providing "birth to death" tracking

My Experience

- Test as you fight in a global context is mandatory
- Integration is hard…
  - … Multi-service
  - … International / coalition
  - … Multi-COCOM
    - … and should be resourced as a priority
- Threat-based approach does not work in Missile Defense
- Hi-fidelity ground testing required to optimize costs
- It is all about system behavior with operators on console and … the “end game”

Questions?

Backup

What Is DOT&E Assessment Of Operational Realism ?

DOT&E 2008 Assessment Of BMDS

Strategic

MDA/DOT&E Operational Realism Criteria	FY/CY08 Flight Tests	
	FTX-03	FTG-05
Operational Interceptor	NT	A
Threat-Representative Target	P	P
Complex Countermeasures	NT	NT
Operational Sensor	A	A
Operational Fire Control Software	A	P
Tactics, Techniques, and Procedures	P	A
Warfighter Participation	A	A
Unannounced Target Launch	A	A
End-to-End Test	P	A
Block(s) Supported	1	1
Key: A – Achieved, P – Partially Achieved, NT – Not Tested		

Theater/Regional

MDA/DOT&E Operational Realism Criteria	FY/CY08 Flight Tests			
	FTT-08	FTM-13	FTM-14	FTT-09
Operational Interceptor	P	A	A	A
Threat Representative Target	A	A	A	A
Complex Countermeasures	NT	NT	NT	NT
Operational Sensor	P	A	A	P
Operational Fire Control Software	P	A	P	P
Tactics, Techniques, and Procedures	P	A	A	A
Warfighter Participation	A	A	A	A
Unannounced Target Launch	P	A	A	A
End-to-End Test	A	A	A	A
Block(s) Supported	2,5	2	2	2,5
Key: A – Achieved, P – Partially Achieved, NT – Not Tested				

When Will Mid-Course Missile Defense Work?

For the session titled
Ballistic Missile Defense: Timeline, Testing, and Cost Effectiveness

by
Richard L. Garwin
IBM Fellow Emeritus
IBM Thomas J. Watson Research Center
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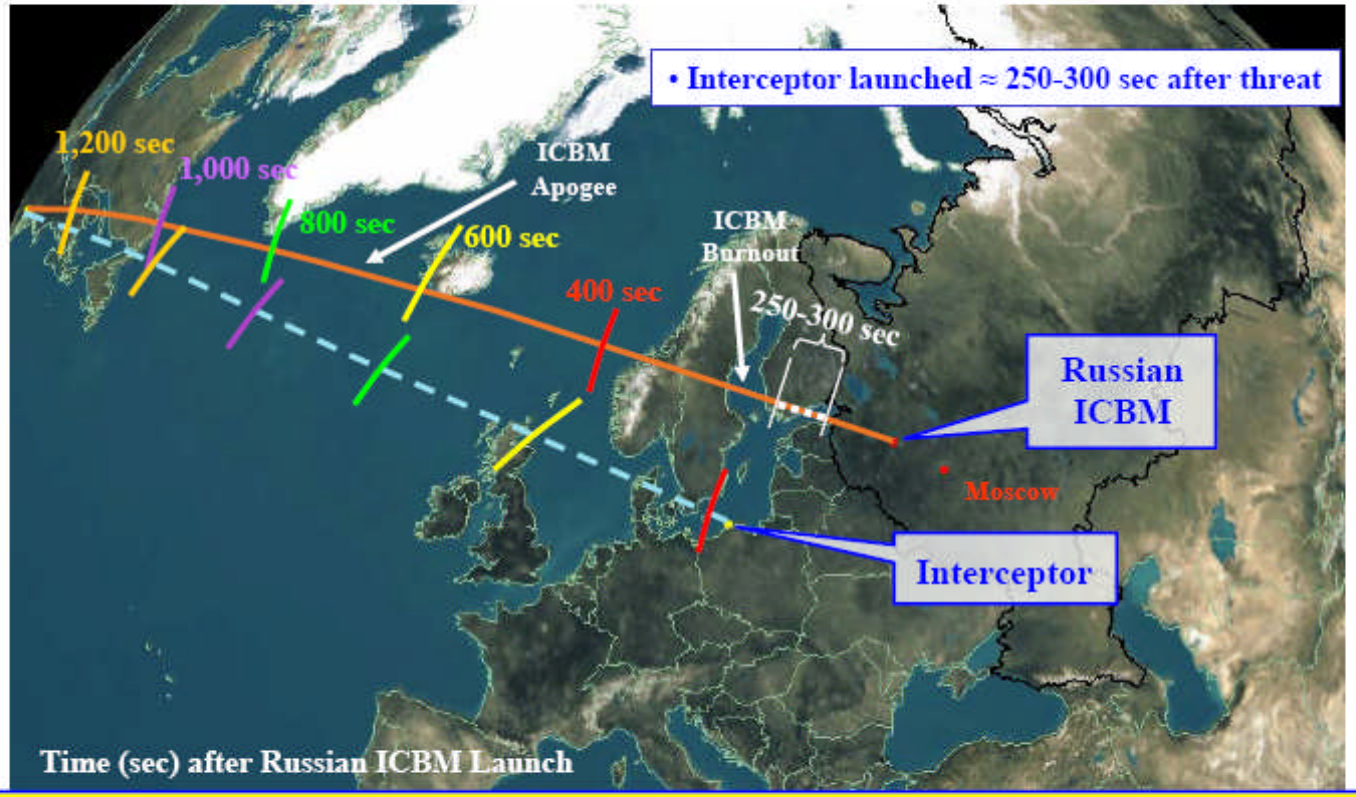
RLG2@us.ibm.com, www.fas.org/RLG/, www.garwin.us

Transforming National Security Series
The Changing Nature of Ballistic Missile Defense Conference
National Defense University, Fort Lesley J. McNair
Washington, DC
June 2-3, 2009

Outline of presentation

- **If countermeasures were taken seriously, what would a mid-course intercept system look like?**
- **MDA offers no protection against biological weapons in the form of bomblets.**
- **Boost-phase intercept—the partial solution to all these problems.**
- **Enter "ascent-phase" defense against ICBMs**
- **Three questions**

Interceptors Cannot Catch Russian Missiles



U.S. European Interceptor Site Cannot Affect Russian Strategic Capability

Approved for Public Release
07-MDA-2623 (13 JUN 07)

ms-109673B / 061407 27

This slide, from a June 2007 MDA presentation to European allies, is highly misleading. Interceptors could be launched 100 s after ICBM launch.

In this prepared contribution, I limit myself to missile defense of the United States, and particularly to the mid-course intercept of intercontinental-range ballistic missiles—ICBMs. I have been involved in analyzing such programs for the U.S. government since the 1950s, and in contributing to such programs as well. This involvement began with my membership in the Strategic Military Panel of the President's Science Advisory Committee (PSAC) which met typically two days a month in the Old Executive Office Building. We faced an emerging missile threat from the Soviet Union to supplement and replace the threat of nuclear weapons delivered by Soviet bombers, with which I had been concerned since 1953, when I worked on Project LAMP LIGHT to extend the continental air defense to the sea lines of approach of Soviet bombers to the U.S. and Canada.

Our Strategic Military Panel tried its hardest to help make U.S. ICBMs and SLBMs effective and to give them the ability to penetrate potential Soviet missile defenses, whether armed with nuclear warheads or conventional. On the other hand, we tried our best to devise and to evaluate systems for defending the United States against nuclear-armed Soviet missiles. So we early-on analyzed such techniques and technologies as multiple independently-targeted reentry vehicles (MIRVs), various other countermeasures and tactics, such as attacking and blinding the defense, and antisimulation.

In the 1960s, the technology was not available to have homing intercept against warheads in space, so that the only feasible BMD systems used nuclear-armed interceptors. Even for the nuclear BMD, mid-course intercept is problematical because of the availability of countermeasures, together with the ability of the offense readily to stretch out the string of warheads and decoys for many hundreds of km along the trajectory even to a specific point target. Hans Bethe and I described many of these problems in a *Scientific American* publication[1].

[1] "Anti-Ballistic-Missile Systems," by H.A. Bethe and R.L. Garwin, *Scientific American*, 218, 3, pp. 21-31, March 1968. http://tinyurl.com/m6pxm9

Countermeasures become a lot simpler against the small kinetic-energy intercept (KEI) kill vehicles that form the core of current U.S. BMD efforts. The homing kill vehicle (HKV) either collides with the warhead or it doesn't. Decoys in the terminal region (within the atmosphere) are far more difficult than are effective decoys to mid-course intercept—a point that I and other technical colleagues have been trying to make to the army BMD folks and since then to the SDIO and the Missile Defense Agency. These discussions and publications have gone on in both classified and unclassified fora, for instance with the year-2000 publication of "Countermeasures".[2]

I note here a couple of what I believe are the most practical countermeasures from that document—the spherical inflated balloon of aluminized plastic as a decoy to an antisimulation warhead. The latter is a real nuclear warhead that is enclosed in a balloon essentially identical to the decoy balloons, which are the easiest type of decoy to make. "Antisimulation" simply means that rather than to go to the trouble to make tens of precise replica decoys per warhead, and to stabilize them so that they and the warhead look the same in the visual, infrared, and radar views, one chooses the cheapest decoy and dresses the warhead so that that decoy would be effective. In fact one prefers to use a sloppy range of decoys.

Other countermeasures to mid-course intercept include a large enclosing balloon, so that an individual HKV can surely strike the balloon, but it will with high probability miss the warhead that is enclosed.

[2] "Countermeasures," A Technical Evaluation of the Operational Effectiveness of the Planned U.S. National Missile Defense System, UCS-MIT Study, A.M. Sessler (Chair of the Study Group), J.M. Cornwall, R. Dietz, S.A. Fetter, S. Frankel, R.L. Garwin, K. Gottfried, L. Gronlund, G.N. Lewis, T.A. Postol, and D.C. Wright, April 2000. http://www.ucsusa.org/assets/documents/nwgs/cm_all.pdf

And if one builds a warhead with very low radar cross section from one range of angles, the warhead can be roughly pointed toward the radar that is essential to conducting the intercept, in order to deny that radar the observation of the warhead.

A 1999 National Intelligence Estimate (NIE) <http://www.cia.gov/cia/publications/nie/nie99msl/html> judged that *"Many countries, such as North Korea, Iran, and Iraq probably would rely initially on readily available technology…to develop penetration aids and countermeasures. These countries could develop countermeasures based on these technologies by the time they flight test their missiles."*

It is often argued that a nation fielding an ICBM system with these mid-course countermeasures would need to test them in space, so that we would pretty soon have a good idea of the details and could therefore discriminate the real warhead from the decoys. This possibility puts a premium on countermeasures that can be effective without test in space, which also saves time and money. These include balloons that are rapidly inflatable, not so much because it is an operational necessity but so that they could be tested in a modest vacuum chamber, even under zero-g conditions. Similarly the inflation of the enclosing balloon around the warhead.

A chamber not much bigger than a warhead would serve for either of these, and the system should be designed to be insensitive to gravity. For the most part, this could be tested with the system right-side-up in normal gravity, and also upside-down. Any remaining uncertainty could be removed by enclosing the warhead or the mechanism in a steel chamber able to withstand the pressure of the atmosphere, and dropping it down a vertical mineshaft while the deployment takes place, observed by a video camera. It does not need to be a deep mine or a mine at all; if the

deployment can be done in a second, which is a reasonable expectation, a mere 10 meters of drop suffices, plus another 5 m or so for arresting the test chamber.

My point has always been *not* that these countermeasures can defeat any conceivable BMD system, but that they will defeat a system that does not take them into account, and there is a history of decades of ignoring or wishing away such countermeasures.

If countermeasures were taken seriously, what would a mid-course intercept system look like?

In "Countermeasures" we provide the details of balloons that cannot be distinguished from the anti-simulation warhead. But this assumes only passive observation. Obviously, if one could push on a balloon and move it gently a few meters, there would be a big difference between the empty balloons and the balloon containing the warhead that weighs at least hundreds of kg.

It is entirely feasible to provide such a gentle push on the warhead and its accompanying decoy balloons, for instance by having the set of decoys (and warhead) collide with a stationary cloud of 10 kg of gas spread over a cubic km. This assumes that the whole "cloud" of countermeasures is spread over 1 sq km or less. Nor need the gas cloud be stationary; it could be deployed by a homing interceptor to collide with the "threat cloud". Thus, a KV that has relaxed accuracy requirement and carries a 10-kg charge of gas-producing high explosive at an assumed "closing speed" of 10 km/s could provide a total momentum of 10 billion dyne-s/sq cm over a sq km. Incident on an empty 1-mil-thick aluminized plastic decoy balloon of 2m diameter (0.3 kg mass) this would induce a recoil of about 1 m/s.

Of course, this would not be detectable until a fraction of a second later, so that a following HKV would need to be at a distance such that it could divert to the real warhead, if indeed it could be distinguished by such active means. An HKV with a 5-g divert acceleration and perfect homing would need 4.5 s for a 500-m divert; at a closing speed of 10 km/s it would have to trail the discrimination burst by 45 km.

But unless MDA and those in the administration and in Congress who provide its direction and funds recognize that the system they have built for mid-course intercept will, from day one, be defeated by an ICBM threat from North Korea or Iran carrying such countermeasures, there will be no chance that we would be able to develop, deploy, and test such active means of discrimination.

Naturally, the offense is not without a response to such a defense that uses active means to detect empty decoy balloons. A simple response would be to put into some of the decoys a 10-kg central mass, which would reduce the decoy's recoil by a factor 33, which reduced recoil speed might be difficult to distinguish quickly from that of a real warhead.

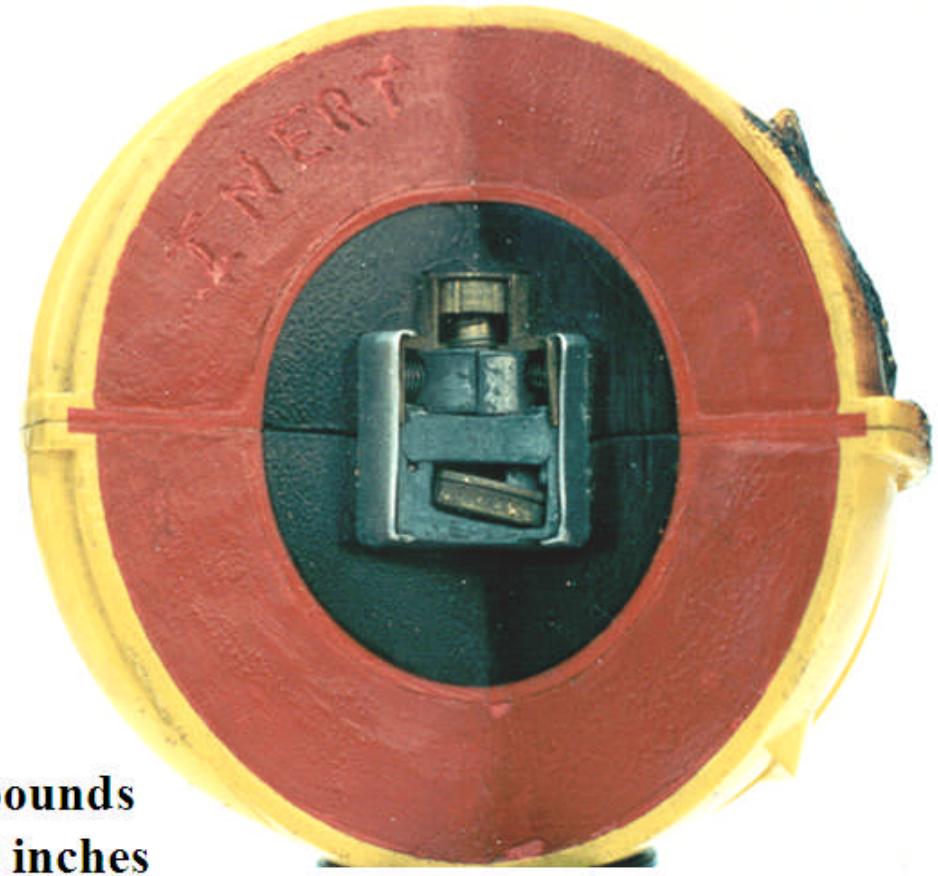
MDA offers no protection against biological weapons in the form of bomblets.

It should be noted that MDA in its early stages promised protection against not only nuclear warheads but also against those containing biological agents, that, despite being banned by international treaty, are nonetheless potentially devastating weapons. MDA has given up this claim, which was never credible, because the defense would certainly have been defeated by a warhead configuration that is not so much a countermeasure but a design for military effectiveness of these weapons.

The most effective ballistic missile attack on a city using BW would come not from a single warhead that would need to disseminate its payload during flight or after it landed, but from the repackaging of the chemical or biological agent into “bomblets” weighing a few kg or less, each equipped with its own heat shield, that would explode on impact with the ground and thus disseminate infectious BW agent essentially at nose level. The United States perfected and stockpiled such bomblets for delivery by aircraft or artillery shell in its programs in the 1960s, as did the Soviet Union. Here is a picture of such an actual bomblet and its packaging in the form of an ICBM-delivered bomblet—one of hundreds that could be fit quite flexibly into an ICBM payload.

M-143 BIOLOGICAL BOMBLET

ca 1965



FILL: 212 ml
WEIGHT: 0.76 pounds
DIAMETER: 3.3 inches
DISSEMINATION: Explosive

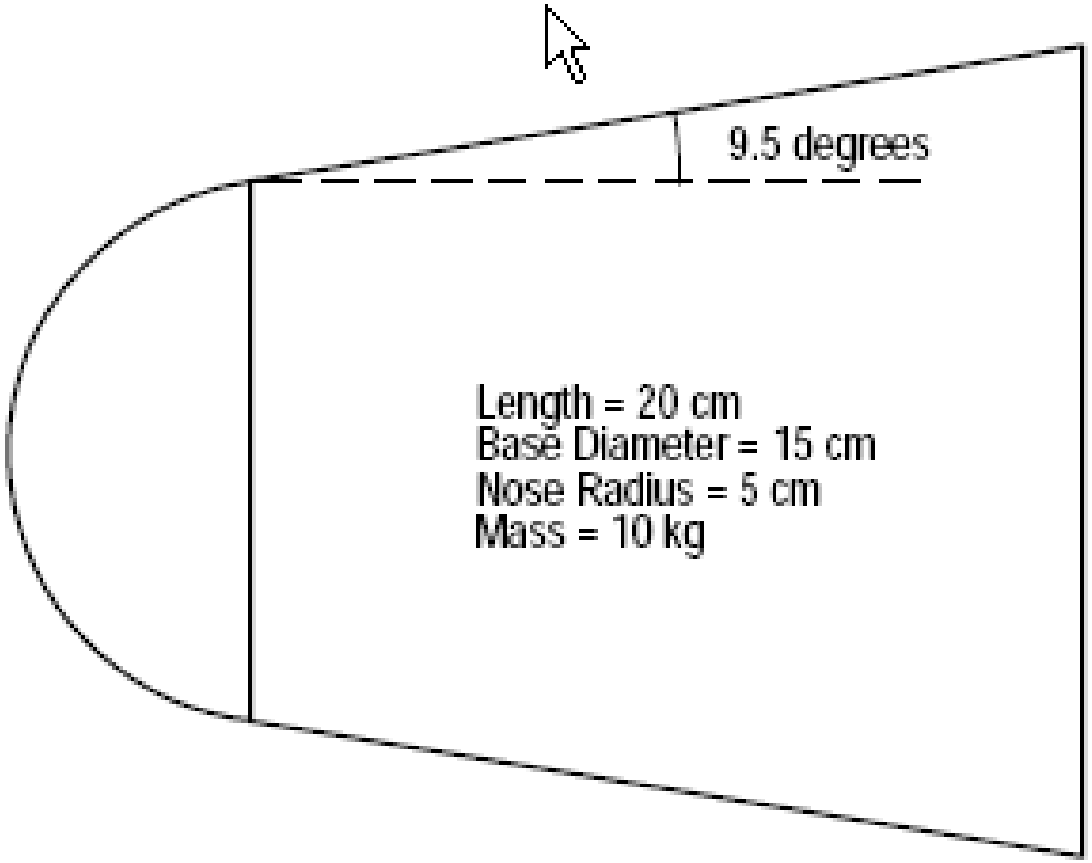


Figure 7-1. The configuration used for calculating the heating of a conical bomblet. *It has a nose radius of 5 cm, a base diameter of 15 cm, a length of 20 cm, a cone half-angle of 9.5 degrees, a mass of 10 kg, and a ballistic coefficient of 12,000 N/m² (250 lb/ft²).*

Boost-phase intercept—the partial solution to all these problems.

Having made these arguments for years, in 1999 I presented a paper at Huntsville and also had discussions with MDA (then BMDO) advocating that mid-course strategic defense be terminated in favor of boost-phase intercept against the most urgent threat, thought then to be North Korea. It was clear that BPI could work ONLY against North Korea and, with more difficulty, against Iraq, at that time also regarded as a threat.

I opposed the airborne laser because to have it permanently on station would require many large aircraft, and to handle the supposedly urgent North Korean ICBM threat I wanted to have both a sea-based fast-burn high-speed interceptor against liquid-fueled ICBMs, and also a cooperative program with Russia, with similar interceptors based on the little strip of Russian territory abutting North Korea.

I have the greatest admiration for Secretary of Defense Robert M. Gates, and support his recent decisions on bringing missile defense into closer contact with reality. Certainly eliminating ABL as a boost-phase defense is the right thing to do. In regard to the cancellation of the KEI ("kinetic energy interceptor"—a confusing name in view of the fact that the MDA mid-course and ascent-phase interceptors are all based on collision with the target warhead-- this KEI is distinguished by faster burn and higher speed in order to complete its intercept while the ICBMs rocket engines are still firing), Gates testified to the House Appropriations Defense Subcommittee on May 20, 2009,

"But a big part of the problem with this program is that it needs to be close to the launch site to be able to be effective. And so it has -- the only potential country where it could have a role with some confidence would be North Korea. It has poor capability against Iran and virtually no capability against either Russia or Chinese launch facilities. And so you have a very limited capability here at considerable cost.

"The other problem that we have is we don't know what to put it on. The missile's 38 or 39-feet long. It weighs 12 tons. There's no extant ship that we can put it on. We would have to design a new ship to put it on. And as I say, it would have to operate in close proximity to the territorial waters of these countries."

I do agree with Gates's comments that the KEI would have no capability against launch of ICBMs from China or from Russia, but if North Korea is the threat that was assumed by the Clinton Administration and the George W. Bush Administration, it would be perfectly reasonable to deploy a defense that would work only against North Korean ICBMs, and even only against early generation NK ICBMs. I do share Secretary Gates's dismay, *"First of all, this was to have been a five-year development program and it now looks like it's about a 16-year development program."*

But if one starts with a merchant ship of typical 20 kt maximum speed, one has great flexibility in mounting such a KEI missile, or a Standard Missile SM-3 Block IIa. I suggest a re-look at a North-Korea only KEI for boost-phase intercept based both on Russian territory and on ships, as proposed in my 1999 paper.

In his testimony of May 14, 2009 to the Senate Armed Services Committee, Gates observed,

"On the Multiple Kill Vehicle, the policy of the Bush administration and the policy of this administration has been to develop a missile defense against rogue nations, not against China and Russia. And the Multiple Kill Vehicle, in addition to schedule and cost and technology issues, was a -- was designed against a far more capable enemy than either North Korea or Iran are going to be in -- for the next 10 to 15 years."

To the extent that the MKV was to handle the decoy threat from North Korea or Iran, as envisaged by the 1999 NIE, this statement appears to be ill-founded. In fact, I don't see how the multiple-balloon decoy tactic, coupled with a balloon-enclosed RV, could be defeated by a modest force of interceptor, even if armed with Multiple Kill Vehicles.

"There are also classified programs that are aimed at giving us the boost-phase capability. So I'm a strong defender and proponent of missile defense, but I want to spend the dollars on missile defense -- both on R&D and operationally -- where they will do us the most good."

I hope that the "classified programs" for BPI have been subject to the same light of reason that Gates has used in rationalizing the open programs. I, too, am a strong proponent of missile defense programs that work.

So to return to the topic of this session, "Timeline, Testing, and Cost Effectiveness," as regards mid-course intercept I don't see progress that will be effective against elementary ICBMs that include feasible countermeasures such as multiple small bomblets for biological weapon payloads and balloon decoys with a matching antisimulation warhead.

Enter “ascent-phase” defense against ICBMs

The advantage of boost-phase intercept is that the missile is to be struck while the large rocket engine is still firing, with the resulting ease of detection and initial homing. It is difficult to hide the flame or to provide effective simulation (decoys) of the large hot plume. And the rocket is much larger and more fragile than the warhead, once separated. Furthermore, a warhead containing BW bomblets, atop an intercepted rocket, will not fall on the target city. Even if the bomblets separate, they will fall short, probably in an area with population density 100-fold smaller than in the target city.

None of these advantages hold in “ascent phase” after the warhead is in free fall. Yes, it is “falling” up, like a batted baseball, but in space decoys can just as well be deployed in ascent phase as in descent. They should in any case be deployed as soon as possible. Indeed, they will not be so far from the real warhead as will later be the case, but if they need to be targeted individually by homing kill vehicles, that makes little difference. If MDA now accepts that it cannot do effective mid-course intercept because of countermeasures, it is time to take seriously countermeasures during ascent phase. I don’t want to go into detail here how a typical, motivated missile engineer would devise or choose effective ascent-phase countermeasures but would be pleased to have these discussions elsewhere.

My current judgment is that BW bomblets will defeat the ascent-phase intercept and can still be targeted all against the same city.

Our best defense against states that might fire ICBMs against the United States is still the commitment to a massively destructive retaliatory strike against the military of that country. We

should not weaken that deterrence in our enthusiasm to replace it with a system to destroy the warhead in flight.

I am troubled by ambiguities in the MDA program and the widespread support for it, so I ask three questions:

Three questions

- As the 1998 Rumsfeld Commission report emphasized, all potential threat countries could sooner and more accurately deliver a nuclear or biological warhead from short-range missiles based on ships. Where is the program to defend United States coastal regions against such a capability?
- In his cancellation of the KEI program, Secretary Gates noted that it had "*virtually no capability against either Russia or Chinese launch facilities.*" But I thought we were developing a BMD system against rogue nation threats. Which brings me to
- MDA's purpose: "*Maintain a ground-based midcourse capability to defeat a limited, long-range, rogue-state attack or accidental launch against the United States."* [3] If our purpose is to reduce the likelihood of destruction of US or allied cities by accidental launch of missiles targeted against us by non-rogue states, whom are we talking about? Russia or China, I suppose. Are we doing all we can to help those states maintain best control of their weapons and to guard against accidental launch, which they surely want to avoid.

My advice continues to be to prize the uncomfortable but effective tool of deterrence of attack by other states, by the capability and commitment to retaliate, while we work to nullify the potential North Korean threat by boost-phase intercept and the evidently difficult effort to eliminate the nuclear threat itself

[3] David Altwegg, Executive Director of MDA, in Defense Department briefing with David Altwegg and Rick Lehner, Missile Defense Agency at 3:31 p.m. EDT, May 7, 2009.

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Deterrence and Defense in "The Second Nuclear Age"

Northrop Grumman Analysis Center
June 2009

Robert Haffa
Corporate Director

Overview: The “Second Nuclear Age”

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- Define the “second nuclear age”—a significant departure from the Cold War
- Describe the policies, practices, and capabilities that comprise nuclear deterrence and defense—then and now
- Explain the need to combine deterrence and defense across a new spectrum of nuclear conflict populated by a range of nuclear actors
- Posit that operational synchronization of deterrent and defense capabilities offers national decision-makers a prudent strategy:
  - To deter attacks upon U.S. and allied interests
  - To defend against attacks should deterrence fail
- Recommend steps toward the goal of synchronizing deterrence and defense to meet the challenges of the second nuclear age

Understanding Deterrence and Defense

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- American defense policy and nuclear strategy during the Cold War relied on the primacy of deterrence over defense
  - Deterrence is “the prevention from action by fear of the consequences”

    - *Joint Publication 1-02*
- Advantage remained decidedly with strategic offensive forces, with investment dedicated to the nuclear triad (ICBMs, SLBMs, bombers)
- Missile defenses were developed, but owing to issues of cost-effectiveness, feasibility, and ultimately treaty compliance, were dismantled
- “We must find some way of combining their value on both yardsticks, ...to make intelligent choices among the various types of forces available.”
  - Glenn H. Snyder, “Deterrence and Defense: A Theoretical Introduction,” 1961

First Nuclear Age vs. Second Nuclear Age

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- The First Nuclear Age
  - Bipolar competition; two technologically sophisticated actors
  - Large inventories of strategic nuclear weapons
  - Sophisticated command, control, and communications systems
  - Transparency of fielded forces through arms control commitments
  - Open discussions of nuclear doctrine and declared policy
  - Escalation restraint
  - Mutual rationality -- neither side would ultimately risk the destructive consequences of nuclear war

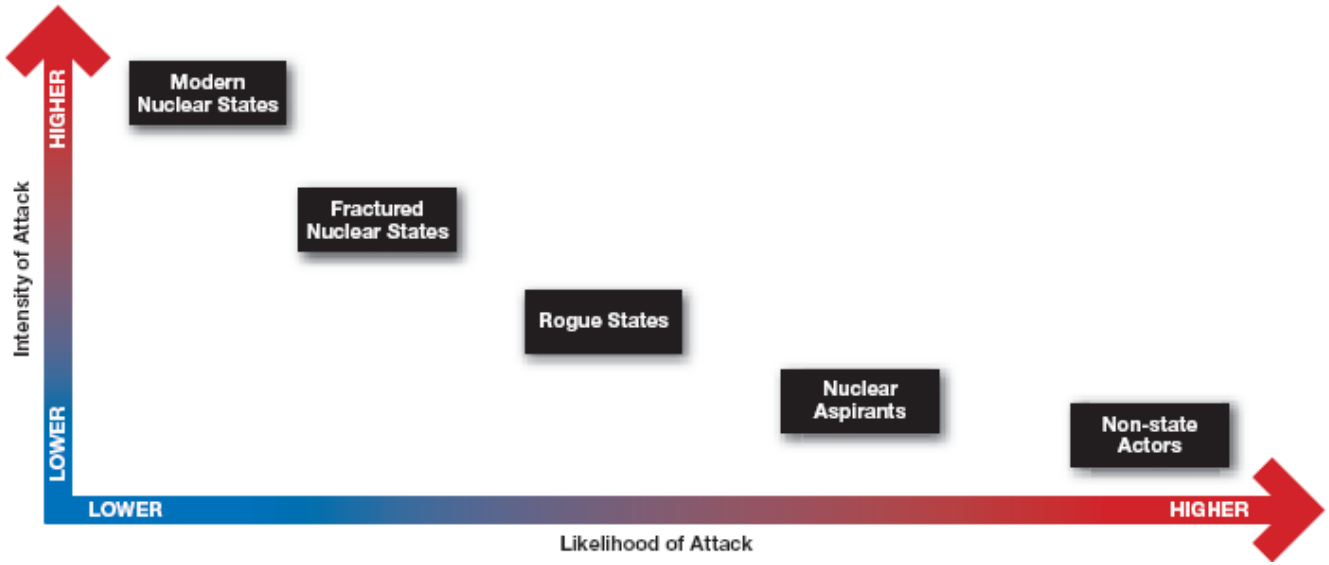
- The Second Nuclear Age
  - Multi-polar security environment; emerging threats and unstable regimes
  - Varied inventories of nuclear arsenals; emerging capability to sophisticated threats
  - Collaboration among state and non-state actors - proliferating nuclear technologies and weapon capabilities
  - Limited communications, uncertain capabilities and intentions among many nuclear actors
  - Questionable doctrine well-removed from traditional deterrence
  - The presence of non-deterrable actors

Second Nuclear Age: Actors and Capabilities

- The Modern Nuclear State
  - Most reflective of what the U.S. faced during the first nuclear age
  - Russia; China
- The Fractured Nuclear State
  - Nuclear weapons capability with political instability
  - Pakistan
- The Rogue State
  - Highly unpredictable nuclear weapons capabilities and intentions
  - North Korea
- The Nuclear Aspirant
  - Desire for nuclear weapons capability and progressing toward the goal
  - Iran
- The Non-State Actor
  - Regional armed groups, e.g. Hezbollah
  - Transnational terror networks, e.g. Al Qaeda

Spectrum of Conflict in the Second Nuclear Age

- The threat landscape defines capabilities to threaten the security of American and allied interests
- Actors presented in terms of capabilities and intentions
- Threats determined by probability of attack and that attack's intensity



Overview of the Current Policy Setting

- U.S. nuclear weapons policy planning framed by two objectives
  - structuring capabilities in accordance with arms control agreements
  - specifying the role of nuclear weapons in U.S. defense policy
- Nuclear Arms Control Commitments
  - Strategic Arms Reduction Treaty (START I)
  - Strategic Offensive Reductions Treaty (SORT)
- Nuclear Posture Review (NPR)
  - Conducted in 1993 and 2002
  - An upcoming NPR is pending
- Quadrennial Defense Review (QDR)
  - 2006 QDR: “tailored deterrence” strategy
  - 2010 QDR planning underway
- Current policy considerations
    - Reducing the number of nuclear weapons
    - Balancing nuclear deterrence and defense

Tailoring Deterrence
- Modern Nuclear States

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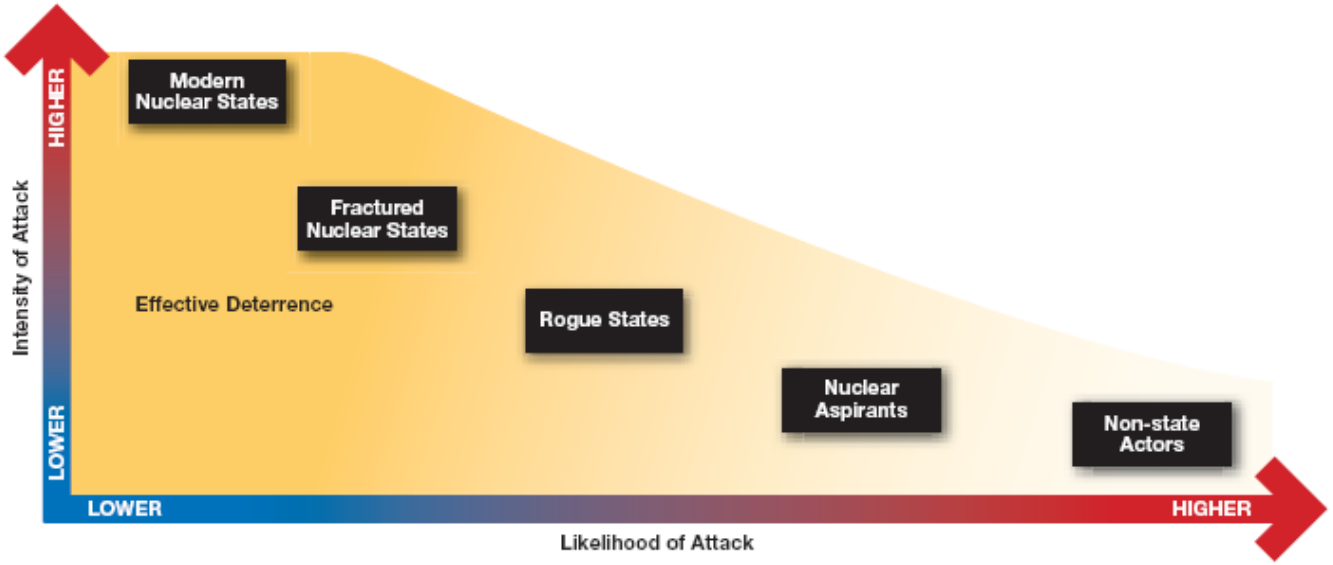
- Deterrence convinces would-be aggressors that the costs of pursuing hostile action outweigh the prospective benefits
- Strategies and forces that have enabled stable deterrence in the past against known nuclear rivals continue to do so
- Together, the three legs of the traditional triad – ICBMs, SLBMs, and the bomber force – possess a number of qualities that factor into the calculus of deterrence against modern nuclear states:
  - Stability
  - Survivability, reliability, and credibility
  - Sovereign basing
  - Responsiveness
  - Cost-effectiveness
  - Flexibility

The U.S. should sustain and strengthen its nuclear deterrence capabilities

Deterrence and the Spectrum of Conflict

- From a deterrence standpoint, the triad forces carry increasing significance as priority is granted to the threats posed by modern nuclear states



Tailoring Deterrence
- Rogue States, Nuclear Aspirants, and Non-State Actors

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- U.S. deterrent policies and forces must be prepared to address a wider range of nuclear threats where the nuclear triad may be less effective
- Additional U.S. capabilities might be required to deter actors emerging along the spectrum of plausible nuclear conflict
  - Persistent awareness
    - Layered, integrated ISR capabilities
  - Next-generation bomber
    - Man-in-the-loop C2, nuclear capable, flexible targeting
  - Conventional prompt global strike
    - Rapid, highly accurate, non-nuclear military effects

Additional force planning initiatives are needed to underwrite deterrence

First Nuclear Age vs. Second Nuclear Age

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- The First Nuclear Age
  - Bipolar competition; two technologically sophisticated actors
  - Distinct separation between national and theater missile defenses
  - Large-scale defense against Soviet threat considered ineffective and infeasible
  - Early defenses focused on defeating small Chinese ICBM threat using limited terminal defenses
  - Anti-Ballistic Missile (ABM) Treaty (1972) limited sites and interceptors, constrained developing, testing, or deploying ABM launchers and prohibited development of sea-based, air-based, or space-based ABM systems

- The Second Nuclear Age
  - Multi-polar security environment; emerging threats and unstable regimes
  - End of Cold War – U.S. formally withdraws from ABM Treaty in 2002
  - Distinction between national and theater missile defense ended in 2002 in favor of global layered BMD system against limited missile attacks
  - Collaboration among state and non-state actors - proliferating nuclear technologies and weapon capabilities
  - Limited ability to deter non-state actors through strategic nuclear means

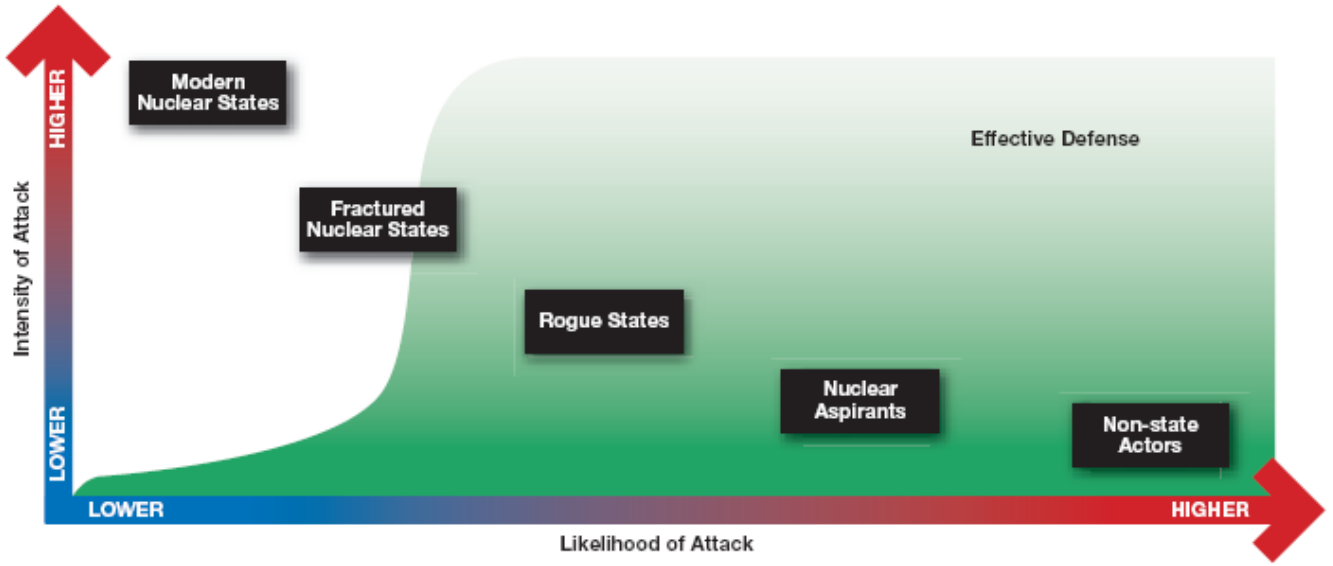
Second Nuclear Age: Actors and Capabilities

- The Modern Nuclear State
  - Most reflective of what the U.S. faced during the first nuclear age
  - Russia; China
- The Fractured Nuclear State
  - Nuclear weapons capability with political instability
  - Pakistan
- The Rogue State
  - Highly unpredictable nuclear weapons capabilities and intentions
  - North Korea
- The Nuclear Aspirant
  - Desire for nuclear weapons capability and progressing toward the goal
  - Iran
- The Non-State Actor

These actors lack qualities of political stability, positive weapons control, or transparency in action—elements that characterized Cold War deterrence

Ballistic Missile Defense (BMD) and the Spectrum of Conflict

- Defense maintains effectiveness against those actors seen as less deterrable by strategic nuclear means
- In absence of sufficient and effective intelligence of these actors' capabilities and intentions, BMD can hedge against these actors' uncertain nuclear paths



BMD contributes to "deterrence by denial"

Tailored Ballistic Missile Defenses in the Second Nuclear Age

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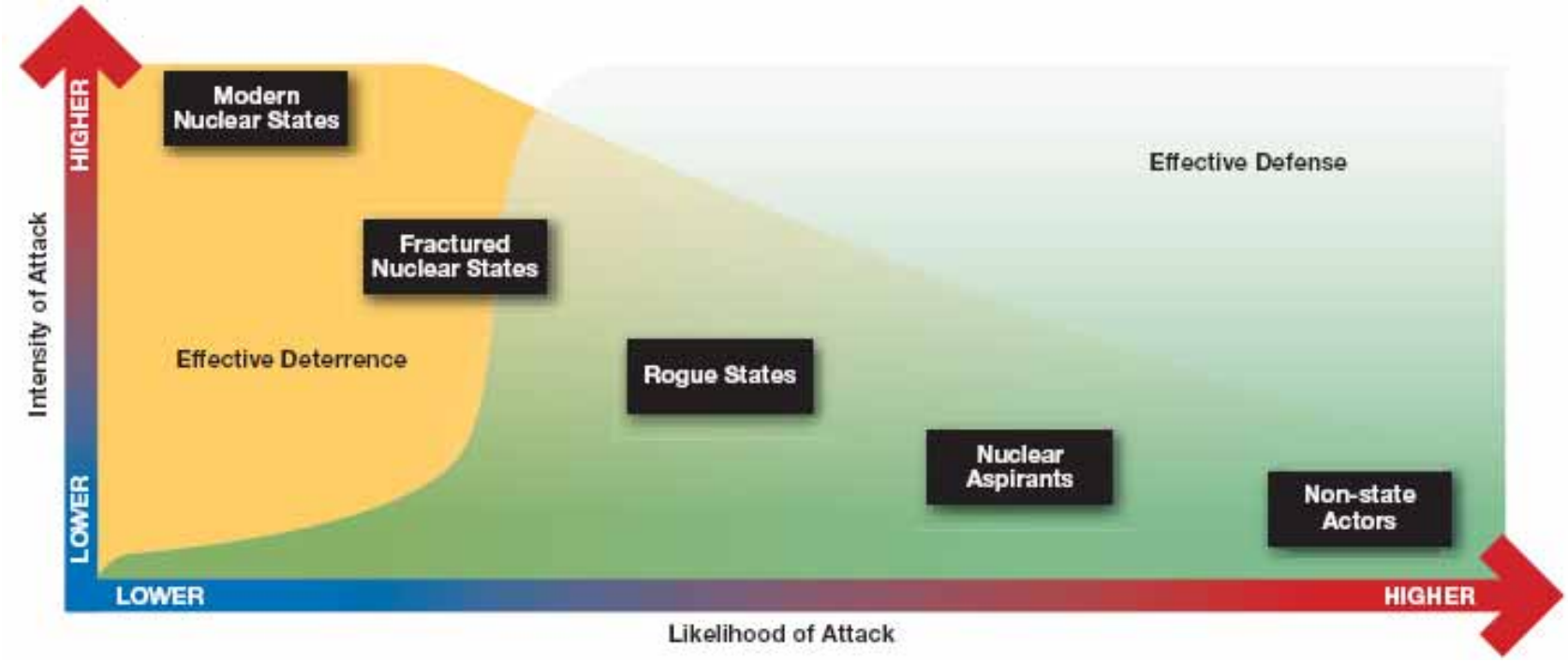
- Structuring defense to meet future threats and support U.S. global commitments
  - Global warning, tracking, and handoff
  - Mobile, flexible, rapidly deployable interceptors
  - Missile defense C4ISR
  - Ground, airborne, and space-based sensors
  - Sea-based missile defense
  - Land-based, rapidly deployable missile defense
  - Airborne boost-phase missile defense

A layered, flexibly based, and rapidly deployable BMDS is required in the second nuclear age

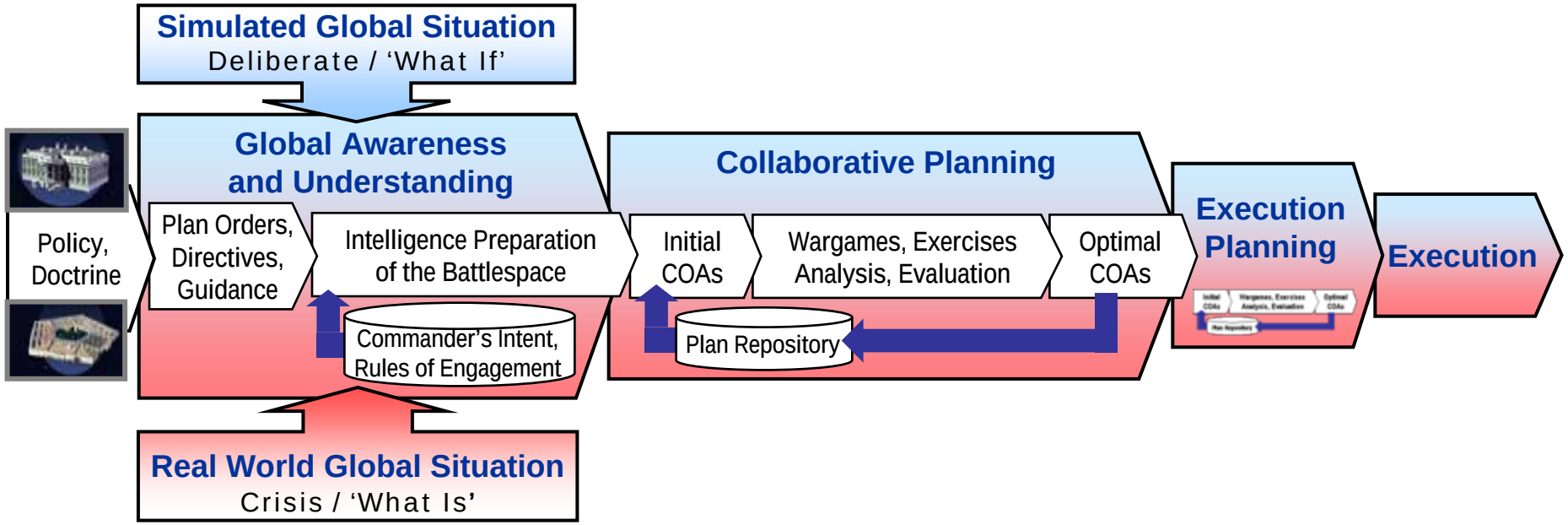
Integrating Deterrence and Missile Defense



The second nuclear age requires a more flexible, comprehensive military strategy that fuses deterrence and defense

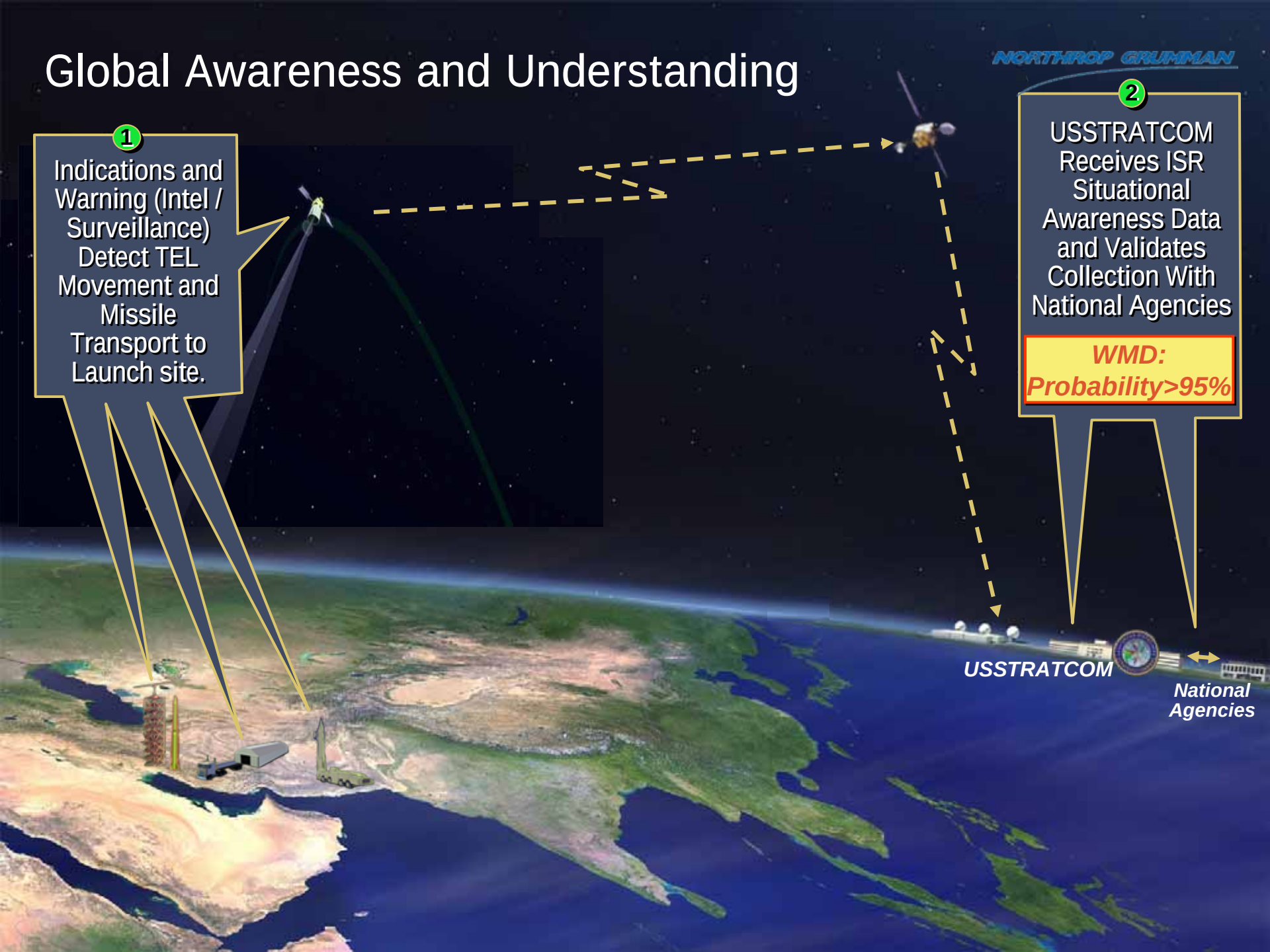
Synchronizing Deterrence and Defense

- Operational Synchronization – Synergistic employment of offensive and defensive capabilities throughout the operational environment
- Enabled by automated, collaborative, multi-dimensional, multi-mission planning



Operational Synchronization enables time-sensitive decisions

Global Awareness and Understanding



Collaborative Planning

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5 Distributed, Collaborative Plan Developed Using Pre-planned COAs

Collaborate, Prioritize, Evaluate

4 Combatant Commanders Collaborate to Develop a Comprehensive Package of Dominant Options

- Space Operations
- Intelligence Surveillance/ Recon.
- Special Ops Mission
- Cyber Operations
- Global Strike/ Attack Operations
- Integrated Missile Defense

3 USSTRATCOM Alerts National Leadership and Combatant Commanders

Centralized Plan Management

Select Courses of Action

Courses of Action Approved

6 COAs for Approval

7 Approved COAs

National Leadership

Early Warning Radars

THAAD

USSTRATCOM

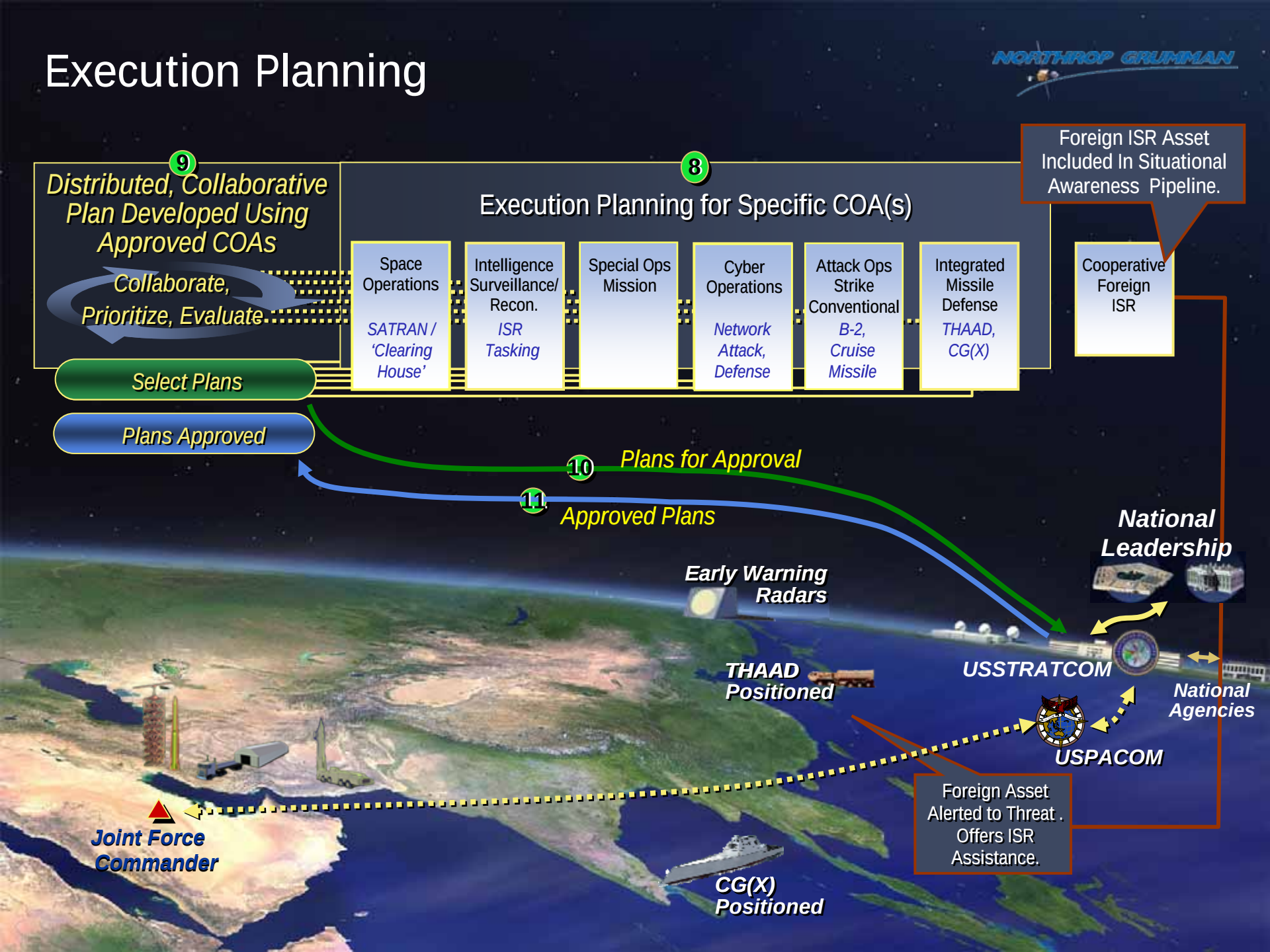
National Agencies

USPACOM

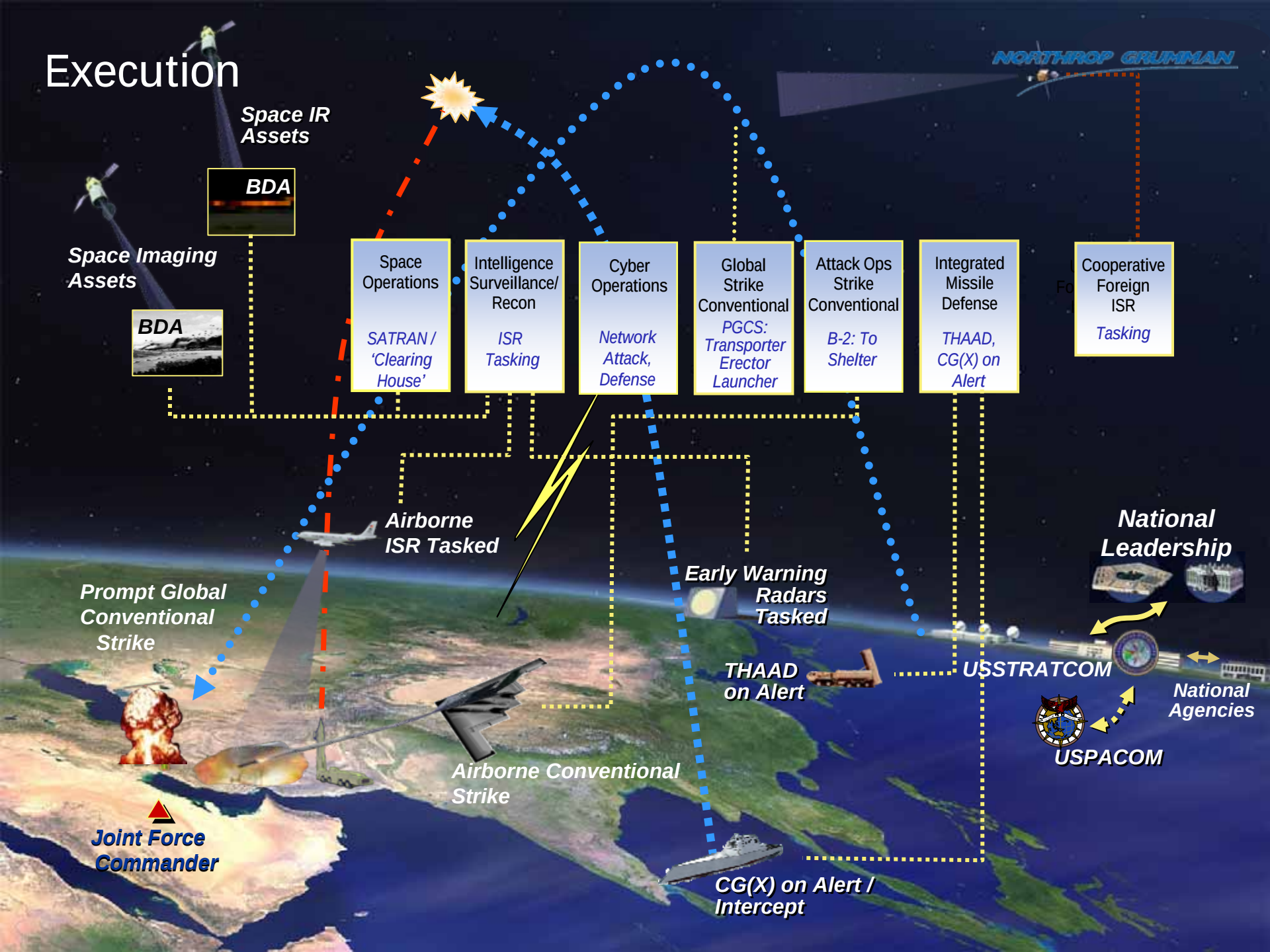
Joint Force Commander

CG(X)

Execution Planning

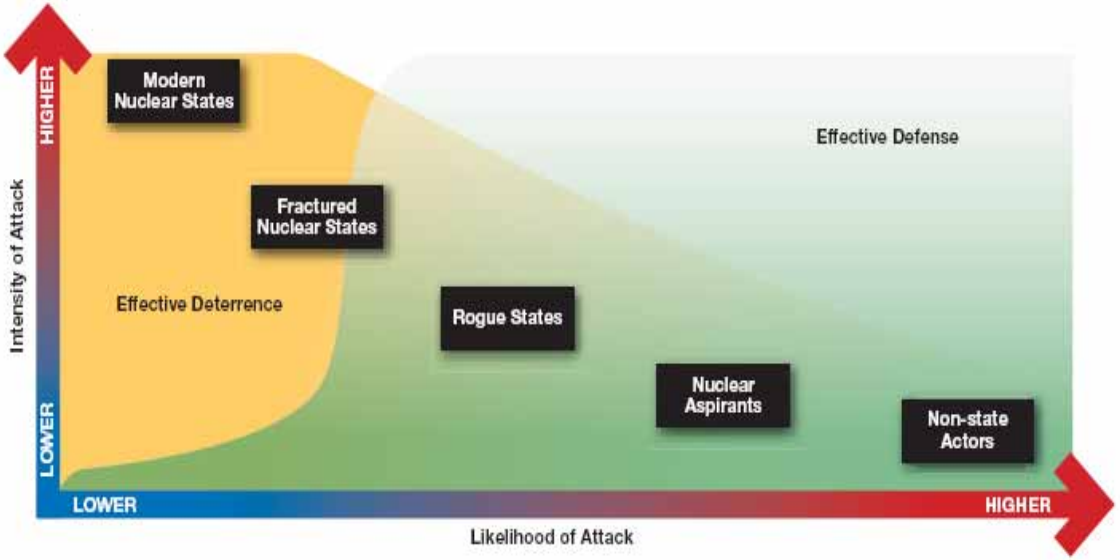


Execution


Space IR Assets
BDA
Space Imaging Assets
BDA
Space Operations
SATRAN / 'Clearing House'
Intelligence Surveillance/ Recon
ISR Tasking
Cyber Operations
Network Attack, Defense
Global Strike Conventional
PGCS: Transporter Erector Launcher
Attack Ops Strike Conventional
B-2: To Shelter
Integrated Missile Defense
THAAD, CG(X) on Alert
Cooperative Foreign ISR
Tasking
NORTHROP GRUMMAN
Airborne ISR Tasked
Early Warning Radars Tasked
National Leadership
Prompt Global Conventional Strike
THAAD on Alert
USSTRATCOM
National Agencies
USPACOM
Airborne Conventional Strike
Joint Force Commander
CG(X) on Alert / Intercept

Benefits of Operational Synchronization

- Responsive to new and emerging threats
- Operationally flexible and agile
- Leverages existing assets, processes for lower cost, minimal retraining
- Produces multiple response options for decision makers
- Enhances Unity of Command and Effort
- Expands the Battlespace



Recommendations: Deterrence and Defense

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- Use the pending QDR and NPR to sustain and strengthen the credibility and capability of the strategic triad
- Direct new investments toward increased awareness of emerging threats and enhanced long range strike, including a next generation bomber and conventional prompt global strike options
- Place priority on building layered, global, rapidly deployable capabilities to defend against ballistic missiles
- Institutionalize operational synchronization of nuclear deterrence and defense. Present opportunities and exercises to key national decision-makers to recognize its value and practice its implementation

The second nuclear age demands a military strategy integrating the policies and practices of deterrence and defense


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Ballistic Missile Defense: Future Review

"There is an ***'unbroken belt of countries'***…from Israel to North Korea, which are developing ballistic missiles and destructive arsenals. A map of these countries' missile ranges shows a series of overlapping circles: Not only is no one safe, but a 1914-style chain reaction leading to wider war is easily conceivable. ***'The spread of missiles and weapons of mass destruction in Asia is like the spread of the six-shooter in the American Old West'…***a cheap, deadly equalizer of states". From Robert D. Kaplan, "The Revenge of Geography", Foreign Policy, May/June 2009, with material in bold and italics quotes from Yale University Professor Paul Bracken's 1999 book "Fire in the East".

Bibliography of Peter Huessy, recent missile defense publications

- The Arms Control Lobby Confronts Ballistic Missile Defense, March 2003, Capital Research Center
- Baking Pyongyang's Multi-Layered Nuclear Cake, Family Security Matters, May 2009
- The Gathering Storm: Nuclear Weapons in Rogue States, Family Security Matters, May 2009
- Prisoners of History: Missile Defense, EMP, and America's Security, Frontiers of Freedom, May 2009

Ten Questions

- 1. Beyond MAD: Divestment, Diplomacy, Pre-Emption, Retaliation, Defense, PSI, Nuclear Forensics
- 2.Threat: 500/650 kilo weapon Indianapolis and Miami; Iran 2000k/solid fuel; Russia low yield nukes, tactical nukes, pre-emption, “de-escalatory measures; PRC upwards of deployed 140 ICBM warheads/240 J2; EMP; Senator Collins—Russia admits Iranian threat

Questions

- 3.Layered Defense Capability: We have the architecture for 900 interceptors/2010, 1400 2015; Endorsed by 2008 and 2009 NATO; Havel/Russia; $1 billion added to THAAD and Aegis; Cong Franks: If that doesn’t light your fire, your wood is wet
- 4. Testing and Procurement: Something is always better over the horizon; current deployment of all missile defense due to spiral development endorsed Gansler 2001 letter; timeline for offensive missile deployments not geared to leisure world testing regimes

Questions

- 5. European Defense: Iran solid fuel & 2000+k range puts S and SE Europe at risk; NK rocket range/All Central Europe; BM25 has 3000k range; top cover for terrorism and deflect against sanctions/divestment; NATO fully endorsed missile defenses against all ranges of rockets; Senator Collins: Russians admits US estimates of Iran missile threat accurate

EAST ASIAN ISSUES

- North Korea, China, Japan and ROK In Light of the Ten Questions
- 1. NK Negotiating Tactics and Long Term Strategy
- 2. 6 Old Think
- 3. 6 New Think
- 4. Some Facts
- 5. Conclusions

KPA NEGOTIATING TACTICS

Step 1: Cause the "appearance" of tension

Step 2: Blame the UNC, ROK and US for the tense situation

Step 3: Quickly agree "in principle" to a major improvement in relations. Publicize the "Breakthrough."

Step 4: Set artificial deadlines to pressure the other side

Step 5: Politicize and draw out negotiations front-loading the agenda and demanding preconditions
(the preconditions are often the true objectives)

Step 6: Blame UNC, ROK and US for the protracted talks

Step 7: Demand compensation or a major concession, before attending future meetings

Step 8: Go back to Step 1

KPA LONG TERM STRATEGY

North Korea…A Crime Family Masquerading as a Country

The Changing Debate

- Six Points
- 1. NK, Iran and PRC feel threatened/build missiles to maintain deterrent/UCS and Pike quote
- 2. “US Hostile Policy”, US “Hyper Power”
- 3. US abandoned arms control 2001-8
- 4. Missile Defense: Not needed, doesn’t work anyway, (missiles always have home address)
- 5. Missile Shield is First Step to Strike First
- 6. “No defense is better than any defense”, (Cong Holt)

Changing Debate

- 1. NK/PRC/Iran/Russia want unfettered capability to carry out terrorism and military coercion
- 2. No factual connection between US lowered levels of nuclear weapons, $ defense, and rogue state missile or nuclear deployments/developments
- 3. During 2001-8, Libya, Taliban/AQ, Iraq out of WMD pursuits; US/Russia reduced from 6000 to <2200 warheads;
- 4. US and allies deploying workable layered defense consisting of close to 1000 interceptors by 2010;
- 5. Shield adds to deterrence, fundamentally integrated part of US and allied defense policy
- 6. Defense Buys President Time; adds to options available; doesn't require massive retaliation or pre-emption, (Perry 1995/2007)

What Are We Forgetting: Some FACTS

- Combat commanders say they need missile defense including NMD
- EWI Report Invalid If One Assumes Outside Help
- 118 count Indictment Against PRC Firm for BM/NW for Iran
- Syrian Plant Destroyed 2007/So Sany/NK Vessel 2002/Tamil Tigers/Hezbollah 2008/BBC China 2003

CONCLUSIONS

- 1. Gates: GBI Works
- 2. Gates: Not Going to Buy the Same Pony Twice
- 3. Jones: NK is a Proliferant Threat
- 4.Libya Option: (Amb Joseph Book: Countering WMD: The Libyan Experience) Demonstrate Seriousness; Make Strategic Decision; Use All Tools; Win-Win Outcome; Verification

New Directions for Ballistic Missile Defense and U.S. Security

Perspectives from the Strategic Posture Review Commission and the Council on Foreign Relations

Presentation to
"The Changing Nature of Ballistic Missile Defense" Seminar
National Defense University
June 2-3, 2009

Bruce W. MacDonald
Senior Director, Strategic Posture Review Commission

Congressional Commission on the Strategic Posture of the United States

- Created by FY2008 Defense Authorization Bill, began in May 2009, chaired by Dr. William Perry; vice-chaired by Dr. James Schlesinger
  - Dems: John Glenn, Lee Hamilton, Bruce Tarter, Ellen Williams, Morton Halperin
  - Reps: Jim Woolsey, John Foster, Fred Ikle, Keith Payne, Harry Cartland
- Bipartisan group supported by five expert working groups and two “tiger teams”:
  - National Security Strategy & Policies (Ash Carter, Jim Miller; Michelle Flournoy)
  - Deterrent Force Posture (Denny Blair)
  - Nuclear Infrastructure (Linton Brooks)
  - Countering Proliferation (Arnie Kanter, Dan Poneman; Rebecca Hersman)
  - External Conditions and Trends (Gordon Oehler)
  - Force Structure tiger team (Jim Miller)
  - Arms Control tiger team (Bruce MacDonald)
- Facilitated by United States Institute of Peace; IDA was subcontractor to USIP (Brad Roberts, Vic Utgoff)
- Back story: Congress unsuccessfully wrestling with a number of nuclear issues, growing concerns over nonproliferation and arms control, awareness of strategic conventional force issues
- Intended to inform the Nuclear Posture Review
- Reprised the role of the Scowcroft Commission of 1982-1983

Council on Foreign Relations Task Force on U.S. Nuclear Weapons Policy

- Begun in mid-2008, timed for release at start of new Administration
- CFR selected Task Force co-chairs (Brent Scowcroft, William Perry) and members:
  - Ash Carter, Michelle Flournoy, Linton Brooks, John Deutch, John Gordon, Arnie Kanter, Frank Miller, Jack Matlock, 13 others
  - Important overlap with Strategic Posture Commission experts
- Gary Samore, now Obama's WMD "czar" at NSC, was CFR VP for Studies when Task Force began
- Task Force focus was next 4 years, shorter than SPRC
- Bipartisan, but not as equal as SPRC
- Missile Defense prominently addressed

SPRC: Missile Defenses An "Integral Part" of U.S. Strategic Posture

- "Missile defenses can play a useful role in support of the basic objectives of deterrence" by:
  - "Raising doubts in a potential aggressor's mind about the prospects of success in attempts to coerce or attack others" and
  - Reducing the risks the United States would face in protecting them against a regional aggressor
- "The Commission strongly supports continued missile defense cooperation with allies"

SPRC on Today's NMD System

- Before the end of the Cold War, "such defenses were essentially impractical, given the massive arsenal of multi-range Soviet missiles."
- Current system is "intended to defend against small numbers of long-range missiles"
- "This system has demonstrated some capability against unsophisticated threats"
- "This long-range missile defense system is now incapable of defending against complex threats," but "these defenses should become capable against more complex limited threats as they mature."
- "Defenses against longer-range missiles should be based on their demonstrated effectiveness and the projected threat from North Korea and Iran."

SPRC: Principles for U.S. Ballistic Missile Defense

- "For more than a decade the development of U.S. ballistic missile defenses has been guided by the principles of:
  1. protecting against limited strikes while
  2. taking into account the legitimate concerns of Russia and China about strategic stability."

- "These remain sound guiding principles. Defenses sufficient to sow doubts in Moscow or Beijing about the viability of their deterrents could lead them to take actions that increase the threat to the United States and its allies and friends. Both Russia and China have expressed concerns."
- "Current U.S. plans for missile defense should not call into question the viability of Russia's nuclear deterrent."
- "The United States should ensure that its actions do not lead Russia or China to take actions that increase the threat to the United States and its allies and friends."

SPRC: U.S., Russia “need to come to an understanding on missile defense if possible”

- “The United States should explore more fully Russian concerns”
- “The two should define measures that can help build needed confidence”
- “This might facilitate and include genuine and mutually beneficial technical and operational collaboration in this area”

SPRC: Need Dialogue on Missile Defense With Russia and Others

"We also recommend seeking a strategic dialogue with Russia **broader than nuclear treaties**, to include civilian nuclear energy, **ballistic missile defenses**, **space systems**, and ways of improving warning systems and increasing decision time. Although the dialogue with Russia is most important in the nuclear field, we also recommend renewing strategic dialogue with a broad set of states **interested in strategic stability, including not just Russia and NATO allies but also China** and U.S. allies and friends in Asia."

SPRC on U.S. Missile Defenses and China

- “China sees its concerns as more immediate, given the much smaller size of its nuclear force”
- “U.S. assessments indicate that a significant operational impact on the Chinese deterrent would require a larger and more capable defense than the United States has plans to construct, but China may already be increasing the size of its ICBM force in response to its assessment of the U.S. missile defense program” [emphasis added]

Council on Foreign Relations on Missile Defense and Russia

- Buy time on third site: delay deployments until viable
- Link deployments and architecture to Iran/DPRK missile threat assessment, include Russia and European allies
- Work with Russia to develop CBMs to assure Russia its deterrent is not being undermined
- Work with Russia, NATO on U.S. MD proposals and determine if U.S., Russia should build cooperative MD

BUT …

- “The subject of missile defense has a global dimension, with significant ramifications outside the U.S.-Russia context … Notably for China, theater missile defense in East Asia has strategic ramifications.”

Council on Foreign Relations on Missile Defense and China

- “Chinese nuclear force modernization is likely driven in part by its concerns about the current and future capabilities and intentions of the United States, including missile defense.”
- “A significant issue for China is whether the United States is willing to accept mutual vulnerability as the basis of strategic relations between the two states. … The United States has not, thus far, decided whether China is a small Russia to be deterred or a large North Korea to be defended against.”

Council on Foreign Relations on Missile Defense and China (2)

- “The Task Force concludes that mutual vulnerability with China -- like mutual vulnerability with Russia -- is not a policy choice to be embraced or rejected, but rather a strategic fact to be managed with priority on strategic stability.”
- Accordingly, “the United States has a clear interest in increased dialogue with China on a range of strategic issues, including U.S. ballistic missile defenses aimed against North Korea” to “help temper the risk of increased Chinese nuclear modernization to counter U.S. ballistic missile defenses without any major improvement in the U.S. ability to limit damage from China.”
- BMD transparency and confidence building measures “should play a major role in a U.S.-China strategic dialogue.”

Former Defense/DOE Secretary James Schlesinger on Missile Defense

From House Armed Services Committee Hearing, May 6, 2009

- "We have to recognize that neither Russia or China are going to be put off by an American missile defense. They have already demonstrated a capacity of maneuverable warheads, penetration aids, against such a defense, and they can penetrate it."

- "Going back to the 1960's, when the Soviet Union deployed the missile defense around Moscow, … [we said] we are going to use offensive weapons to penetrate that defense. That was our strategy then, and that would be the strategy of Russia or China if they thought that we had a thick missile defense."

- "And as a consequence, there is always this interaction with sophisticated nuclear powers that a missile defense that worries them will simply lead to an expansion of their offensive forces, which is something that we do not want to see."

CFR: Trilateral KE-ASAT Ban

- “The Task Force believes that the United States has a clear interest in beginning discussions with China on space weapons, including proposals to ban tests of kinetic antisatellite weapons.”
- “The United States and China, along with Russia, should take the lead in implementing a trilateral test ban, which could form the basis for expansion to a global ban”

The Growing Missile Defense Consensus

- Theater missile defenses are beneficial, subject to normal workability and cost-effectiveness issues
- Limited national missile defenses can be beneficial against non-peer nuclear threats as long as they are effective enough to at least sow doubts in the minds of the threats' decision-makers
- However desirable in the abstract an NMD shield against Russia or China might be, it runs too high a risk of sparking offensive countermeasures that would leave the U.S. and our allies worse off than if we had not tried.
- Limited NMD must recognize credible Russian and Chinese perceptions and avoid being so substantial that the defenses could plausibly be seen as threatening Russian/Chinese nuclear deterrents: how fine a line?

Secretary Gates on NMD

- “The reality is, U.S. policy with respect to missile defense under the current administration and under its predecessor was that our missile defense was intended to deal with rogue threats, not a threat from China or Russia.”
- The current “system really is only capable against North Korea … and 30 interceptors in fact provide a strong defense against North Korea in this respect”

Senate Armed Services Committee

May 14, 2009

Future Missile Defense Issues

- Can we constrain acquisition of MD countermeasures technologies by Iran and North Korea? Will Russia and China cooperate?
- Russia has said it will not agree to more than modest reductions to current strategic force levels without constraints on strategic missile defenses -- are there constraints that both the U.S. and Russia can accept? If so, what form should they take?
- Can national missile defense have a greater role in a deeper START reductions era? What improvements in the political order would be required?
- Can U.S. NMD counter-countermeasures keep pace with Iranian, North Korean ICBM developments in countermeasures?
- What appropriate role is there for boost/ascent-phase missile defenses?
- Will we see substantial cruise missile threats over the next decade or so? How would we address them?

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Lt Gen O'Reilly Remarks
NDU: "Changing Nature of BMD"
June 2, 2009

Thank you, Dr. Keagle, for that introduction and to National Defense University for inviting me to participate in this forum.

The title and theme of this conference is "The Changing Nature of Ballistic Missile Defense". I would like to start by stating that I don't concur with that title – the fundamental nature of Ballistic Missile Defense (or BMD) has ***not*** changed. The mission of the Missile Defense Agency (or MDA) has also ***not*** changed and remains one of developing defenses to protect the U.S. homeland, deployed forces, Allies and friends against ballistic missiles of all ranges and in all phases of flight. For over 25 years, MDA, and its predecessor organizations, has recognized that to effectively destroy a ballistic missile you must: first, detect a launch of a ballistic missile, second, track it to determine where it is going, third, decide how to shoot at it, fourth, launch an

appropriate interceptor, fifth, intercept the threat missile, and finally, verify that you have destroyed that missile. And the earlier you destroy a threat missile in its flight, the better. The technical solution to missile defense has always been to build a network of sensors, battle management, communications, command and control, and a layering of interceptors to give you multiple shot opportunities. We call this network and layers of interceptors the Ballistic Missile Defense System. Over the past several years we have developed and deployed, to one degree or another, 3 interceptors to destroy threat missiles in the mid-course or terminal phases of flight: the Ground Based Interceptors (GBI), the Navy's Standard Missile-3, and the Army's Terminal High Altitude Area Defense (or THAAD) interceptor. However, the development and fielding of command, control, communications, and a sensor network (especially using sensors to track missiles in the early phases of their flight) requires more emphasis. Additionally, since even short range missiles (less than 1,000 km range) can fly across many borders, missile defense has always

been regional or global in nature and best fought as part of an international coalition.

So what has changed? As I stated, not much has change in the fundamental nature of missile defense, but many aspects of missile defense have matured over the last decade. First, the maturation of the threat. Our intelligence community has noted that threat missiles are becoming more accurate, reliable, longer-range, transportable and easier to support in the field. And, we expect the threat to become more challenging over time. Although, the ***long-range*** rogue nation threat has not yet emerged in the numbers predicted 10 years ago, Iran and North Korea continue to make progress developing intercontinental ballistic missile technology as evidenced by Iran's successful launch of a satellite into orbit on 2 February and the successful performance of North Korea's first and second stages of their recent Taepo-Dong II missile flight on 5 April. North Korea also deploys a No Dong ballistic missiles capable of reaching Japan and South Korea and U.S. bases throughout the region, and

continues to develop a new intermediate-range ballistic missile capable of reaching Guam and the Aleutian Islands.

Meanwhile, while the number of potential Intercontinental Ballistic Missiles remains small, there has been a dramatic increase of over 1,200 additional short and medium-range ballistic missiles just over the past 5 years, bringing the total of ballistic missiles, not including the United States, NATO, Russia and China, to over 5,900. 93 percent of those missiles are short-range, with ranges less than 1,000 km. Six percent, or 350, are medium-range ballistic missiles with ranges between 1,000 and 3,000 km. Less than 1 percent are intermediate or intercontinental ballistic missiles. This explains our war fighters' strong interest in fielding more regional and theater missile defenses.

A second aspect of our maturing missile defense capability is our missile defense technologies. We have conducted 16 of 18 successful hit-to-kill tests over the past three years. As we are completing the production qualification and verification of the

performance of our missile defense interceptors at shorter ranges, we are expanding our flight test program to test our capability against medium, intermediate and long-range targets. Our basic research programs are also showing promise. Last year we demonstrated laser beam atmospheric compensation twelve times in flight, and we just did it again over this past weekend as we prepare for our first shoot down of a ballistic missile in flight with a laser beam later this year. Additionally, last year we used an experimental satellite to collect essential data on tracking missiles in their boost phase. Recently, we used Unmanned Aerial Vehicles to track the intercept of ballistic missiles to demonstrate the potential to see missiles very early in their flight. Finally, later this summer, we will launch two prototype satellites that will track from space missiles in all phases of their flight.

A third aspect of our maturing missile defense development are the processes that the Missile Defense Agency relies on to collaborate with the war fighter community on setting missile defense development priorities and with OSD to correlate

our plans with policy, funding, and acquisition guidelines. The Missile Defense Agency, Joint Staff, Combatant Commanders, and Armed Services have intensified collaboration on developing missile defense capabilities. As a result, a great deal has been learned about the analysis and integration of our BMDS technology, doctrine, tactics and needs. The Missile Defense Executive Board, chaired by the Undersecretary of Defense for Acquisition, Logistics and Technology with participation of senior DoD leadership provides timely guidance and oversight of the development and fielding of missile defense capability. The FY10 President's Budget reflects the product of these maturing processes and the maturing relationships between the Missile Defense Agency, the war fighting community and DoD.

We have also collaborated with the Services' Operational Test Agencies, with the support of the Director of Operational Test and Evaluation, to restructure our test program to build the confidence of U.S. and allied stakeholders in the Ballistic Missile Defense System. This new test program will also bolster

deterrence by sending a powerful message to potential adversaries, that we are able to destroy the ballistic missiles they are looking to acquire.

A fourth aspect of our maturing missile defense capability is our international collaboration to develop missile defenses and to counter the proliferation ballistic missiles and their technologies. At the recent NATO summit on 4 April, the Heads of States issued a statement that, quote, “ballistic missile proliferation poses an increasing threat to Allies’ forces, territory, and populations. Missile defense forms part of a broader response to counter this threat” (endquote). Missile defense complements that “broader response” of using all the facets of National Power, including Diplomatic, Economic and Informational power. Today, we are collaborating with 21 countries on various missile defense activities. We have co-development efforts with Israel and Japan, and have deployed missile defense surveillance radars with the Danish and the British. Additionally, we continue to share ideas

with the Russians on collaborating on future missile defense efforts. How we will deploy missile defenses in Europe and other parts of the globe is a key question that will be influenced by the Quadrennial Defense Review and other policy reviews during the remainder of this year.

Let me repeat, we are still building the same integrated missile defense architecture we have been developing for years to perform the fundamental functions of missile defense. However, instead of emphasizing the part of the BMDS architecture where we have over-match capability against long-range rogue nation threats for the foreseeable future, we will maintain that over-match capability, but we will also emphasize the development of fundamental sensor, communications, battle management functions, and the layer of missile defense that has not been sufficiently developed to date – intercepting missiles in their ascent phase to hedge against threat growth. I believe the development of intercept capabilities for this phase of flight can

realize the greatest potential for reducing cost and increasing the operational effectiveness of missile defenses.

The technological and operational challenges of intercepting threat missiles in the ascent phase (the phase after powered flight, but prior to the deployment of objects or executing maneuvers in post-boost) is significantly less challenging than boost phase intercepts yet achieves almost the same benefits. By giving our mobile interceptors the opportunity to shoot early, we will be able to put hundreds of interceptors in the air at a given time to defeat large raids of threat missiles in a theater or region within the next several years.

Now our focus on the rogue-state threat was not done at the expense of our long-range defenses. We are maintaining a ground-based midcourse capability to defeat a limited long-range rogue state attack or an accidental launch against the United States. We will maintain this long-range defense capability with missile fields at Fort Greely, Alaska, and Vandenberg Air Force

Base (VAFB), California. Thirty fully operational GBIs will provide the United States with a substantial inventory of operational interceptors ready to launch at any one time. However, we are not limiting the production of GBIs and will continue to produce, upgrade and test GBIs to maintain a more operationally ready capability to defeat long-range missile threats to our homeland.

All of these steps will lead to the development and fielding of a more effective and affordable missile defense system and will have implications across our national security posture. Deployed missile defenses can bolster deterrence and give confidence to our allies and friends by reducing opportunities for adversarial intimidation or coercion and creating uncertainty in the minds of the potential adversaries of the effectiveness of an attack on U.S. or allied retaliatory military power. And if hostilities break out, missile defenses can limit damage to U.S. and Allied infrastructure, population centers, and military capabilities needed for responsive operations.

In conclusion, the Secretary of Defense announced that “we must rebalance this department’s programs in order to institutionalize and enhance our capabilities to fight the wars we are in today and the scenarios we are most likely to face in the years ahead, while at the same time providing a hedge against other risks and contingencies.” With the solid support among the senior leadership of the Executive Branch, Congress, and the governments of our allied partners, we can take advantage of the maturation of missile defense capabilities and accomplish Secretary Gate’s vision. I understand that missile defense is expensive, but the cost of mission failure is much higher – so we must continue to work to ensure ***one*** “nature” of BMD ***does change***: the cost and operational effectiveness of missile defense.

Thank you and I look forward to your questions.

Missile Defense and Asia

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Gregory Kulacki:

"Anti-Satellite (ASAT) Technology in Chinese Open-Source Publications"

www.ucsusa.org/china-asat-literature

Li Bin and Nie Hongzhang:

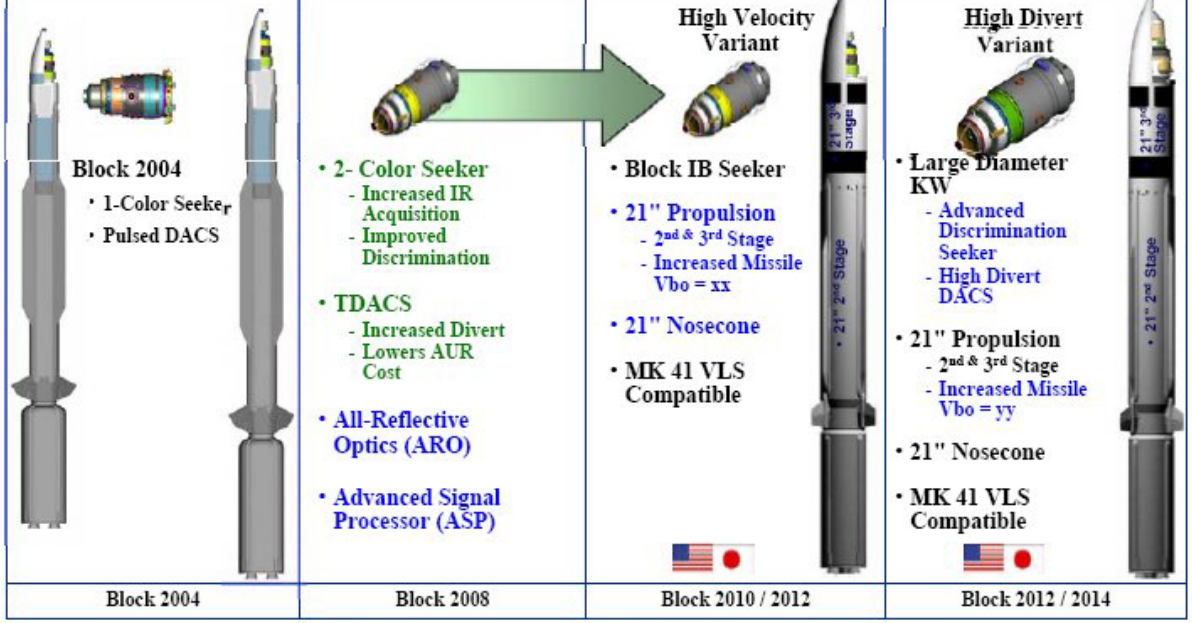
"An Investigation of China-U.S. Strategic Stability"

-paper and summary available at:

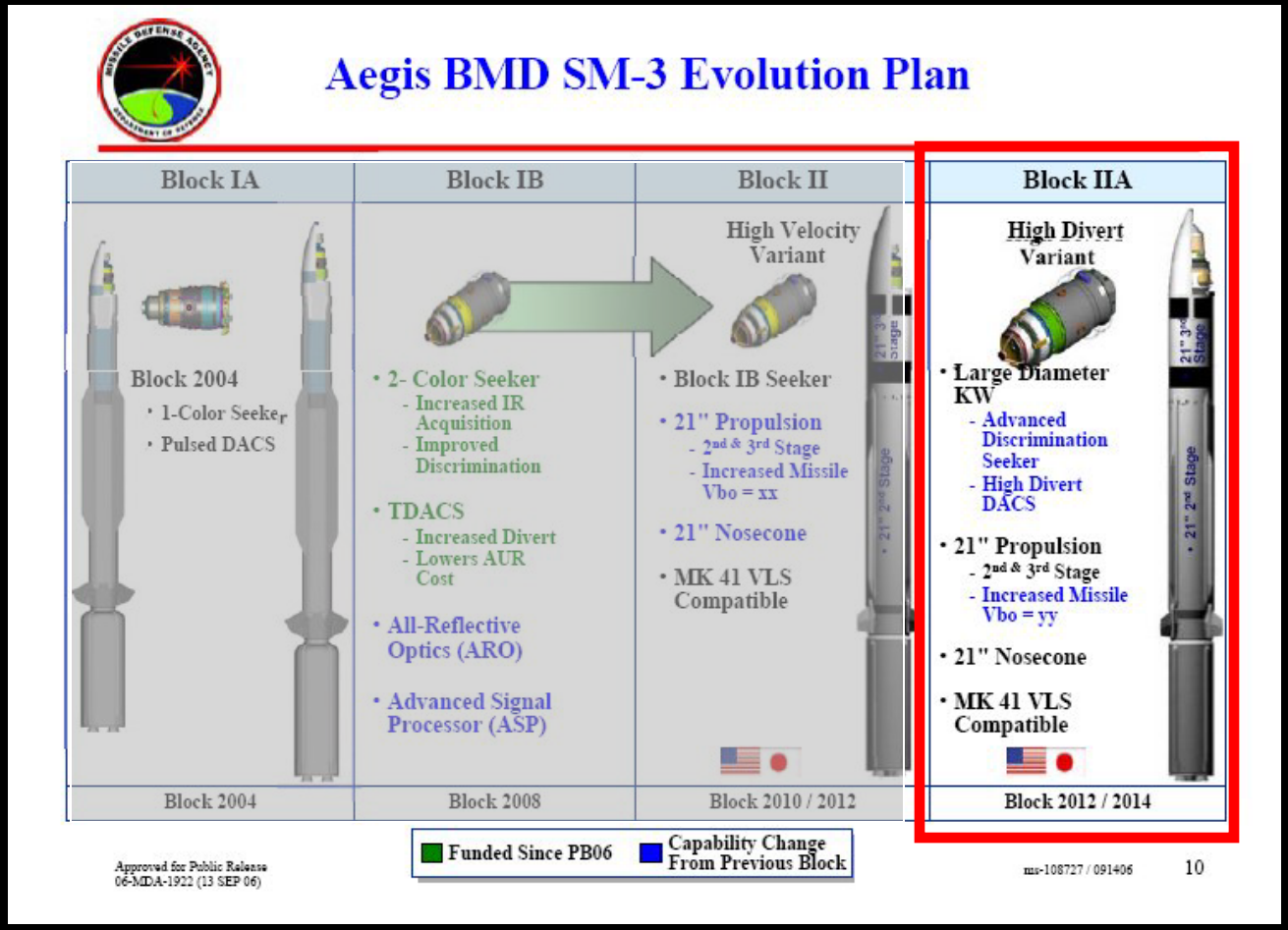
www.ucsusa.org/china-us-stability

Aegis SM-3 Block IIA

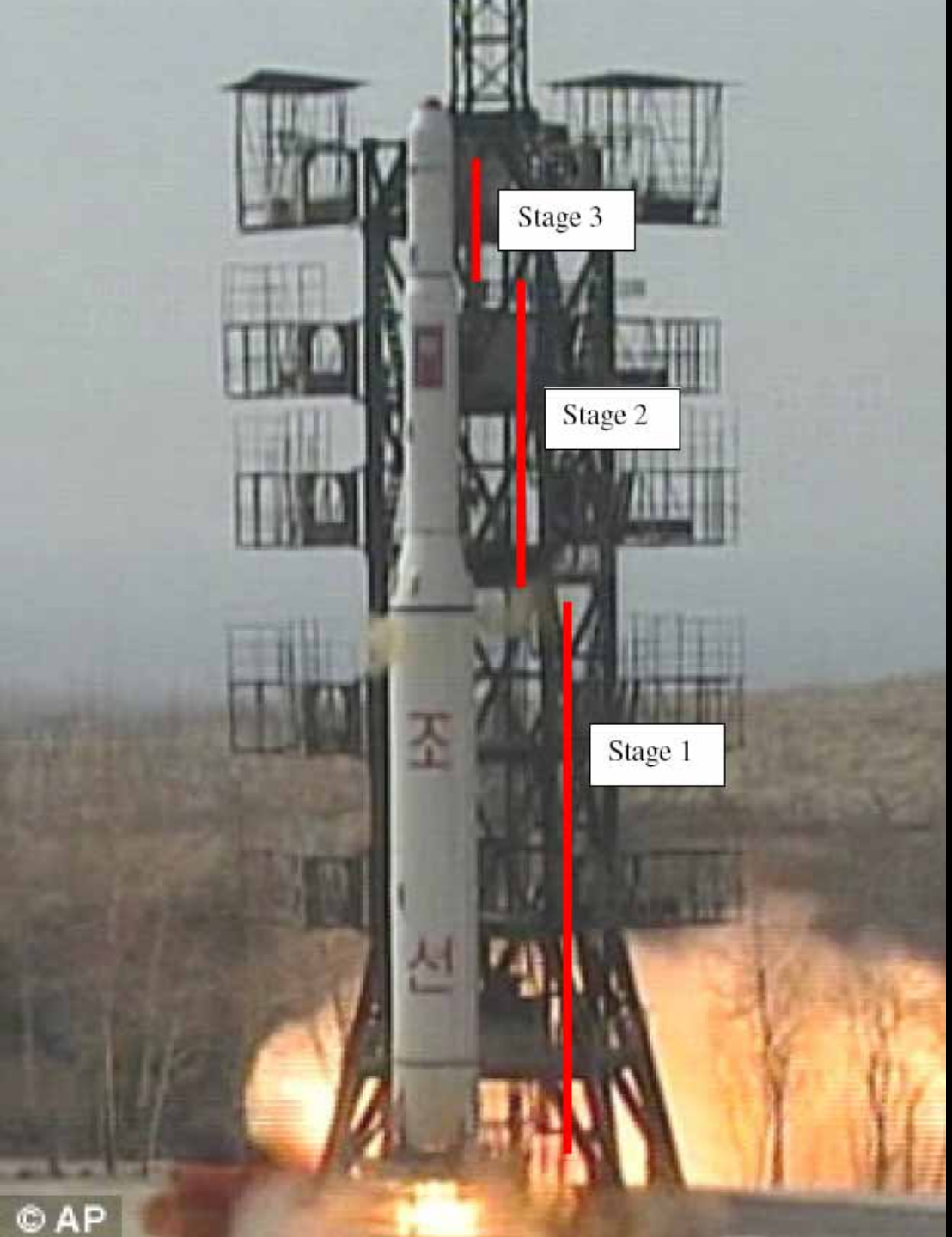
Aegis BMD SM-3 Evolution Plan



Aegis SM-3 Block IIA

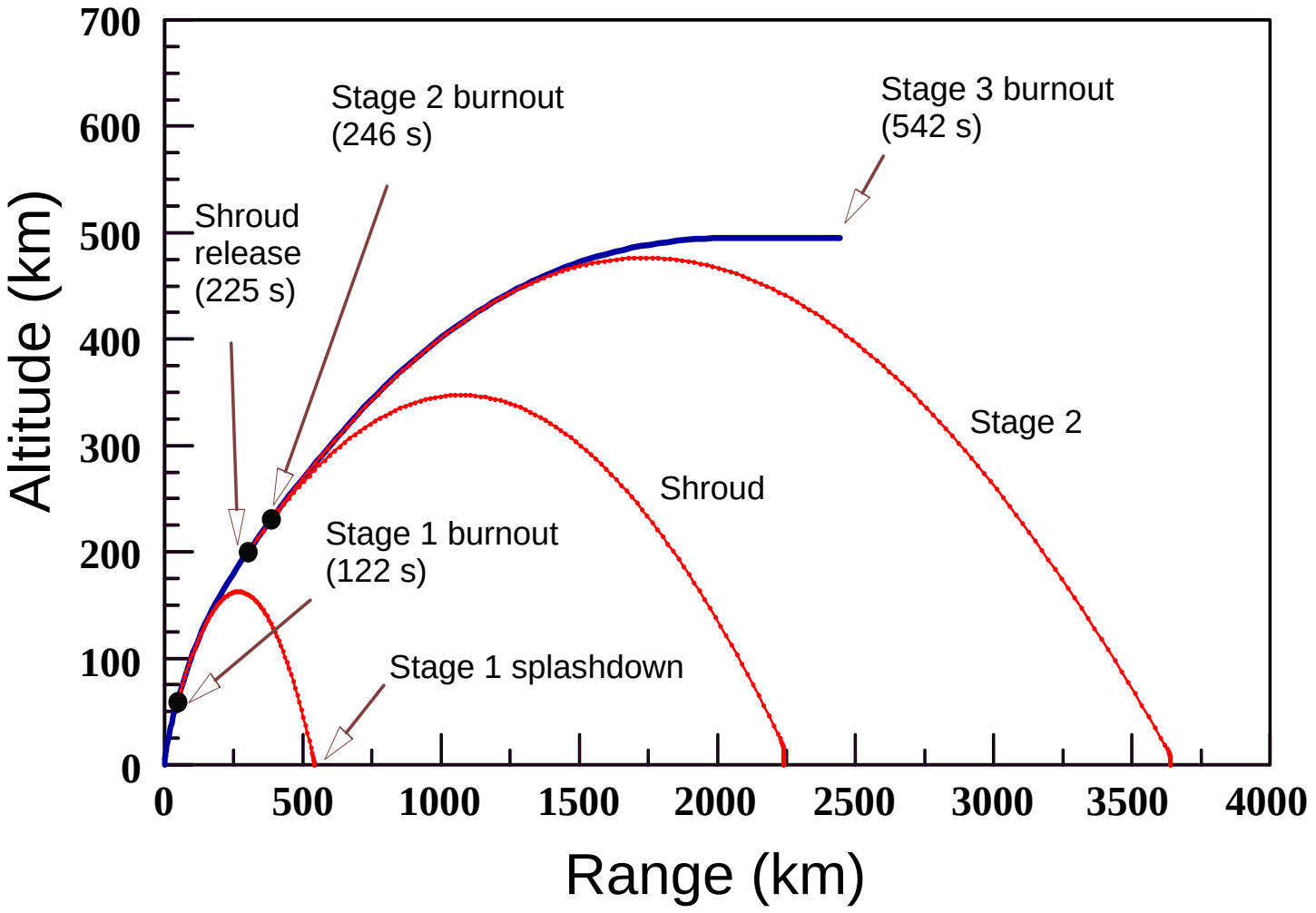


Based on its size, Block IIA will have a speed > 6 km/s, and will fit into existing launch tubes on Aegis cruisers



North Korean Unha-2 Launcher

Unha-2


Altitude (km)
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
3000
3500
4000
Range (km)
Stage 2 burnout
(246 s)
Stage 3 burnout
(542 s)
Shroud
release
(225 s)
Stage 2
Shroud
Stage 1 burnout
(122 s)
Stage 1 splashdown