

On: 9 July 2008
Access Details: Free Access
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Defense & Security Analysis

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713412200>

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Victoria Samson^a

^a Center for Defense Information, Washington, DC, USA

Online Publication Date: 01 June 2008

To cite this Article: Samson, Victoria (2008) 'Spiraling Out of Control: How Missile Defense's Acquisition Strategy is Setting a Dangerous Precedent', *Defense & Security Analysis*, 24:2, 203 — 211

To link to this article: DOI: 10.1080/14751790802125011

URL: <http://dx.doi.org/10.1080/14751790802125011>

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Critical Comment

Spiraling Out of Control: How Missile Defense's Acquisition Strategy is Setting a Dangerous Precedent

Victoria Samson

Center for Defense Information, 1779 Massachusetts Avenue, NW Washington, DC, 20036, USA

Nick Schwellenbach

Project of Government Oversight, 666 11th St NW, Suite 900, Washington, DC, 20001, USA

Missile defense has long grabbed headlines, thanks to disputes over foreign policy implications, technical capabilities and cost growth. One dimension of its development, however, could have ripple effects long after the George W. Bush administration has left office: the acquisition model of spiral development.

This process has resulted in a behemoth of a weapons system – the single most expensive weapons system in the Pentagon's annual budget – that is held to no firm development benchmarks, has complete freedom of action in setting its own priorities and has no end in sight to its cost increases. Unfortunately, the Pentagon is working to establish spiral development as the go-to model for weapons development, which could compromise US national security.

On 2 January 2002, senior officials at the Department of Defense (DoD) were met with a memorandum from then-Secretary of Defense Donald H. Rumsfeld.¹ Brief and sweeping, Rumsfeld's memo launched the New Year by radically restructuring the nation's missile defense program. He exempted missile defense from the many laws on the books intended to hold programs accountable for cost and performance, and instead mandated use of a strategy known as evolutionary acquisition with spiral development (referred to as "spiral development" for reasons of brevity).

With the goal of fielding operationally-useful weapons more rapidly, spiral development intends to provide an initial threshold capability to be improved over time in what are called blocks or spirals. Eventually, proponents argue, a weapon will, after several spirals, fulfil objective capabilities envisioned at the start of the program. It would also entail a great deal of feedback from the users as part of the developmental process. So far this is not entirely unlike the way weapons were procured for decades, but with one

major caveat. Though “a desired capability is identified . . . the end-state requirements are not known at program initiation”, a DoD policy directive states.²

But therein lies a great deal of the problem; there is much confusion as to what “spiral development” means. Colloquially, “spiral” development has been used for decades in developing weapon systems, such as the use of block upgrades in the F-16 fighter program. Though spirals, block or incremental upgrades (different words often casually used interchangeably) are nothing new, spiral development as employed by Rumsfeld and promoted by many Clinton-era acquisition reform proponents is a different animal. Unlike spiral development, the previous means of developing upgrades – formally known by some as incremental development – used testable requirements when work began to judge and guide each iteration of a weapon system.

“The problem in missile defense is that the requirements have been a moving target at best; at worst, no target at all”, said Philip E. Coyle III, a former Director of Operational Test & Evaluation (DOT&E) (and currently (2008) a senior adviser to the Center for Defense Information).³

The usual steps weapon programs are required to meet before deployment – establishing baseline technological capabilities; creating benchmarks where progress or lack thereof would be marked; and determining lifetime development, operations, and maintenance costs – were, if not discarded, rendered less important for missile defense by Rumsfeld’s memo. Greater flexibility was granted to the director of the Missile Defense Agency (MDA), including the ability to move funds between different missile defense programs; the ability to blur the budgetary line between research and development and deployment; and the possibility to spread out funding for production over multiple years. In short, barriers came down, arguably speeding deployment of initial missile defense capabilities. But at what cost?

Last year, the Government Accountability Office (GAO) pointedly noted that, “the question remains as to whether this degree of flexibility should be retained on a program that will spend about \$10 billion a year for the foreseeable future. It does not seem unreasonable to expect a program of this magnitude to be held to a higher standard of accountability than delivering some capability within budgeted funds.”⁴

Although missile defense is the first major weapon system to be associated with the new version of spiral development, this acquisitional model’s popularity has been on the rise. In May 2003, the DoD released new acquisition directives making spiral acquisition the standard acquisition strategy for weapon programs, not just missile defense. The next year, a new space acquisition policy document within DoD reflected the same preference.⁵

Several new weapons programs are using spiral development, such as the Army’s Future Combat Systems and aspects of the inter-service and multi-national F-35 Joint Strike Fighter program. Like missile defense, these are all very large, very expensive weapons systems that have already suffered enormous increases in their costs and are running behind schedule – not a ringing endorsement of spiral development.

But before spiral becomes the new norm, some serious examination of how well it has worked (or not) would be well advised. Indeed, a RAND Corporation study conducted for the Air Force noted, “little documented objective experience and

evidence exist to assess the [spiral acquisition] policy and very little systemic analysis of what does exist has yet to be published”.⁶

The GAO takes this type of acquisition policy to task. In fact, David Walker, Comptroller-General of the United States, warned Congress in 2006 that if the Pentagon does not move away from it, DoD “will continue to start more programs than it can finish, produce less capability for more money, and create the next set of case studies for future defense reform reviews”.⁷

Sadly, cost growth, schedule slips and faulty parts are not specific to missile defense programs. One can see such faults easily in every branch of the Pentagon. However, where MDA differs is in the extent of autonomy and decision-making freedom given to its officials, in large part due to their interpretation of spiral development.

THE TRACK RECORD

Measuring missile defense’s evolution is difficult, as there are no hard-and-fast benchmarks that can be used to compare goals versus reality. However, the past five years of missile defense after the Rumsfeld memo have created a track record that can be examined. Even granting that there has been some limited progress in the missile defense program, GAO argued in a March 2007 report that spiral development as an acquisition strategy “delivers less at a higher cost”.⁸

The Ground-based Midcourse Defense (GMD) is the largest part of the MDA’s Ballistic Missile Defense System (BMDS). Perhaps not surprisingly, it is also responsible for the largest budgetary breaches. For example, per the GAO, “Collectively, the prime contractors developing elements included in Block 2006 exceeded their budgets by approximately \$478 million, with GMD accounting for 72 percent of the overrun.”⁹

A look at one easily measurable aspect of GMD – the number of interceptors installed in ground-based silos – illustrates the schedule problems of spiral development. In February 2003, MDA planned on delivering 20 interceptors by the end of 2005. Progressively that quantity goal wound down to 18 as of February 2005, 14 in mid-2005 and, finally, to the reality of only ten interceptors installed by the end of December 2005.¹⁰ As of December 2007, there were 24 interceptors emplaced in Alaska and California, with the optimistic goal of getting a total of 44 interceptors fielded in those two sites around 2011.¹¹

But MDA will not be penalized for deferring the number of interceptors installed to later blocks, observes the GAO: “MDA also has the flexibility to defer other work activities from a current to a future block. This creates a rolling scope, making it difficult to keep track of what an individual block is responsible for delivering.”¹²

One would imagine, having been granted all this leeway, that MDA would have sufficient time to develop, create and field reliable interceptors. However, there are problems with the interceptors which have already been emplaced and that are part of the GMD flight test program. Two flight test failures in a row – Integrated Flight Test (IFT)-10 in December 2004 and IFT-14 in February 2005 – prompted the creation of an Independent Review Team (IRT) by MDA Director Lt Gen. Trey Obering to discover the cause of the failures.

One major culprit is poor quality control procedures. The IRT found that interceptor design requirements were often vague and not finalized, and that changes to design specifications were not vetted properly – both factors that resulted in questionable reliability of the GMD interceptors. The IRT pointed out, “Acquisition reform in the 1990s led to reduced usage of military specifications and standards on government contracts.”¹³ This in turn led to MDA’s special application of spiral development, where it never has spelled out what the specific requirements are for each block, but instead lets the blocks bleed into one another.

According to Jacques Gansler, former Under-Secretary of Defense for Acquisition and Logistics in the Clinton Administration, there is a relationship between poor quality control and spiral development’s lack of firm requirements. Indeed, robust quality controls can be a requirement and the Defense Department as the customer should ensure it is achieving value, said Gansler.¹⁴

The quality control issues were so serious that parts of the GMD interceptor would have to be replaced and, per the GAO, would necessitate the removal of already-emplaced interceptors from their silos.¹⁵ In testimony to the Senate Armed Services Committee on 4 April 2006, Obering acknowledged this problem and stated that this component would be replaced on the interceptors that have already been fielded.¹⁶ Even so, the interceptor continues to be built at a rate of one a month, which highlights one of the biggest problems with spiral development: it often does not catch the big mistakes until they are well entrenched in the development process and thus are extremely expensive to rectify.

Since the 2005 IRT report, MDA has taken steps to improve its oversight of subcontractors, and has attempted to improve the quality control of its flagship product, the GMD program. But the quality assurance problems that led to problems with the interceptors are only part of the accountability problem.

No one knows how much each interceptor was supposed to cost versus how much they actually do. As the GAO wrote, because MDA is not required to report increases in unit cost, “we were unable to compare the actual and planned cost of a GMD interceptor”. This contrasts against other major weapon systems, which are required to report to Congress if there are significant increases in their cost growth over the space of a quarter of a fiscal year and, if the costs rise high enough, must have the Secretary of Defense certify that the programs are still warranted.

Furthermore, the GMD program flight test record leaves something to be desired. It has made seven intercepts out of 13 attempts, all of which were done under highly scripted circumstances that do not reflect real-life operational circumstances for the program. While a limited test situation may make sense in the early part of a weapon system’s development, the GMD system has been undergoing tests since 1997: it is hardly the new kid on the developmental block any more. Additionally, MDA has never stated at which point it will consider the system to be fully operational or what sort of testing goals it needs to meet in order to declare the system done with its development.

Charles McQueary, the Pentagon’s current DOT&E, testified before Congress in May 2007 that, “MDA is increasing the operational realism of each successive test”.¹⁷ But in actuality, the last successful test in September 2007 was simpler than many of the

tests that preceded it: it did not include decoys, something that had been part of flight tests from the very beginning of the GMD test program. It is widely agreed that any country that can launch an ICBM could also include rudimentary decoys, so the lack thereof in a testing situation makes it much less realistic.¹⁸

Indeed, the lack of a rigorous testing regime with missile defense is at odds with the original tenets of spiral development. As Coyle wrote, “The term ‘spiral development’ originates with Professor Barry Boehm, Director of the University of Southern California Center for Software Engineering. In Boehm’s model, rigorous testing is needed at each loop in the developmental process. In the Defense Department, however, spiral development is seen as a way to avoid testing and to cut corners.”¹⁹

The GMD interceptors are only part of the GMD system’s problems. For example, the upgrade that the Thule Early Warning Radar needs to make it a comprehensive part of the BMDS has been pushed back several years. The Sea-based X-Band Radar (SBX), essential for missile detection and tracking, was deployed over a year late and, according to a source within the MDA, has problems with aiming its powerful radar below ten percent above the horizon. This problem cuts back on the amount of time the radar can be used to distinguish between decoys and actual warheads, among other problems. SBX has spent a lot of time in Honolulu, Hawaii, undergoing repairs, instead of being in its home port of Adak, Alaska.

THE CLINTON YEARS

Intellectually, MDA’s version of spiral development is an outgrowth of the Clinton-era “Reinventing Government” acquisition reform. In the late 1990s, the Clinton administration’s “three-plus-three” plan, introduced in 1996, was missile defense’s primary acquisition model. This consisted of three years of development, a presidential decision to deploy, and then three years of construction of a system within the boundaries of the Anti-Ballistic Missile Treaty that could defend against very limited “rogue” nation ICBM threats. Essentially, though its timeline was conditioned by the political environment of that era, it was still a “single step to capability” program.

By 1998, it was becoming clear that the administration would have to deviate from its plan. Reviews by the GAO and an outside panel of the Terminal High Altitude Area Defense (THAAD), chaired by retired Air Force General Larry Welch, had detailed the “rush to failure” undertaken by the Pentagon. THAAD was following a schedule-driven development schedule, instead of an events-driven one – very similar to what happened to GMD after the 2002 presidential directive to deploy an initial missile defense capability by 2004.

Meanwhile, that same year, then-Under-Secretary of Defense for Acquisition and Logistics, Jacques Gansler, began what were called Section 912 studies, which were meant to overhaul the defense acquisition process. In 1999, according to *Washington Post* editor Bradley Graham’s book *Hit to Kill*, “the Section 912 study team, as well as the Chairman of the Joint Chiefs of Staff (JCS), formally endorsed ‘evolutionary acquisition’”. This was soon followed by Gansler’s establishment of “a dedicated team to revise the DoD 5000 acquisition policy guidance series to reflect the findings of the Section 912 study.”

As development times grew longer, the “three-plus-three” plan began to break down and the deployment dates slipped further into the future with political risks for whichever party controlled the White House. Meanwhile, the promise of evolutionary acquisition with spiral development offered an out: the deployment of initial capabilities could be sped up, while upgrades and more technologically immature elements would come later. In the Clinton administration, the deployment decisions would be tempered by more factors than just the maturity of the technology, such as its effectiveness, cost, effect on relations with Russia and on the Anti-Ballistic Missile Treaty.

Regardless of these other concerns, spiral development took root in the missile defense program in piecemeal ways at the end of the Clinton administration. In early 2000, then-Secretary of Defense William Cohen made the decision to use spiral development with the Space Based Infrared System-Low (SBIRS-Low) element of the missile defense program, a network of satellites with radars intended to track incoming ICBMs, now known as the Space Tracking and Surveillance System (STSS). Along with Gansler’s groundwork, the stage was set for the Bush administration to embrace spiral development for missile defense.

Gansler still promotes spiral development. In May 2007, he asserted at a defense industry conference that spiral development “gets needed systems into the field in five years, with lower risk and lower costs” – at least in terms of missile defense; this is almost the opposite view of Paul Francis, a GAO defense acquisition expert, according to his testimony one month earlier to Congress.²⁰ However, Gansler argues that for spiral development to be used successfully, relatively mature technologies need to form the basis of the initial block capability for any system. Gansler also distinguishes between the acquisition strategy a program utilizes and its program management. To him, program management is the key to obtaining results while using spiral development: for example, the government should adjust contractor award fees depending on the contractors’ performance.²¹

Judging performance is the crux of the problem. With the lack of firm requirements, extraordinary budget flexibility, and the ability to roll goals onto other blocks, the MDA has fewer hard criteria for its contractors and its own performance than most other Pentagon offices. In short, MDA does not have much to be held accountable for, making it hard to sort out what Congress appropriates money for and what MDA is actually doing. Speaking on the “rather unglamorous topic of value for money”, Francis told the Senate Armed Services Committee in April 2007 that, “while we can report on what [the Missile Defense Agency] accomplished and what it cost, we can’t reconcile this with the budget that you’ve approved”.²²

Congress may be taking heed of warnings about allowing MDA to continue largely unfettered, causing what could be cracks in spiral development’s façade. In fiscal year 2008 House Defense Authorization, the members worried about MDA’s free use of money across traditionally tight borders of research and development versus deployment and said that, while a one-year extension would be granted, Congress “will require the Department of Defense to request operation and maintenance funds for MDA in the fiscal year (FY) 2009 budget request, and to develop a plan for using procurement funds where practicable for missile defense fielding activities in the future”.²³

The Senate FY 2008 Defense Authorization would also insist that the DoD, starting in FY 2009, submit MDA's budget request using regular budget categories and make certain acquisition and oversight improvements. The members observed that the original cause for MDA's flexibility was to meet a 2002 presidential directive to get an initial deployment of GMD by 2004. Thus, "now that the system has been developed and deployed, the rationale for this extraordinary flexibility and the resultant lack of accountability has expired".²⁴

Even MDA is starting to realize the limitations to spiral development. In the documents justifying its FY 2009 budget request, MDA notes that it intends to "report to the Committee on Appropriations, US House of Representatives, on our detailed plan, including the steps related to acquisition program baselines, unit cost reporting, independent cost estimates performed by the Cost Analysis Improvement Group (CAIG), and operational testing".²⁵ It additionally plans to "establish newly formulated schedule, budget, and performance baselines based on fielded Ballistic Missile Defense System (BMDS) capabilities against specified threats", and to "explain any significant variances from expected outcomes". It still includes spiral development as something it is working toward in its budget justification documents. Most importantly, it takes pains to point out that it will make this information public *only* when it feels it can "make a firm commitment to Congress", which implies that it will only present Congress with a *fait accompli*, instead of allowing Congress to monitor the program's real progress (or lack thereof).²⁶

This new direction comes along with an entirely new prioritization by MDA, where it works to achieve system-wide Block capabilities, instead of breaking it down system by system, block by block. Its new block system is as follows:

- Block 1.0: Defend the United States from Limited North Korean Long-Range Threats.
- Block 2.0: Defend Allies and Deployed Forces from Short- to Medium-Range Threats in One Region/Theater.
- Block 3.0: Expand Defense of the United States to Include Limited Iranian Long-Range Threats.
- Block 4.0: Defend Allies and Deployed Forces in Europe from Limited Iranian Long-Range Threats and Expand Protection of US Homeland.
- Block 5.0: Expand Defense of Allies and Deployed Forces from Short- to Intermediate-Range Threats in Two Regions/Theaters.²⁷

This change in how MDA refers to its planned capabilities is confusingly and vaguely worded and will probably take the rest of the Bush administration for Congress to figure out. In the meantime, the overall concept of program officials setting their own terms for progress and allowing oversight largely when they feel like it remains intact.

Perhaps fittingly for a term that has become synonymous with constantly changing requirements – or a lack of them – "spiral development", though not the concept it refers to, is to be eliminated from the official Pentagon acquisition lexicon. Dr Charles McQueary told an interviewer for the Pentagon's internal defense acquisition journal recently that, "It's the concept that is important, not what you call it – especially when you consider that the phrase 'spiral development' is scheduled to be dropped from the

Acquisition Guidebook.”²⁸ Spiral development will continue, but presumably with a different name. For a concept that is meant to become the Pentagon’s new default acquisition strategy, but has also become a red flag phrase for weapons watchers in the Pentagon and in Congress, one has to consider speculating on the change with some degree of skepticism.

Overall, extending the “extraordinary flexibility” of “spiral development” – even if it is no longer called that – to other programs, and making “spiral development” the default acquisition model, would essentially eliminate any real oversight of Pentagon programs. This is dangerous as it leads to open-ended spending; but it also hurts overall defense capabilities. The oversight process was established to ensure that systems would be put out in the field that worked and would protect our troops. By allowing weapon systems to continually exist in the shadowy world of “spiral development”, where they are never fully developed or fully deployed, the American public can never be certain of US defense capabilities.

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