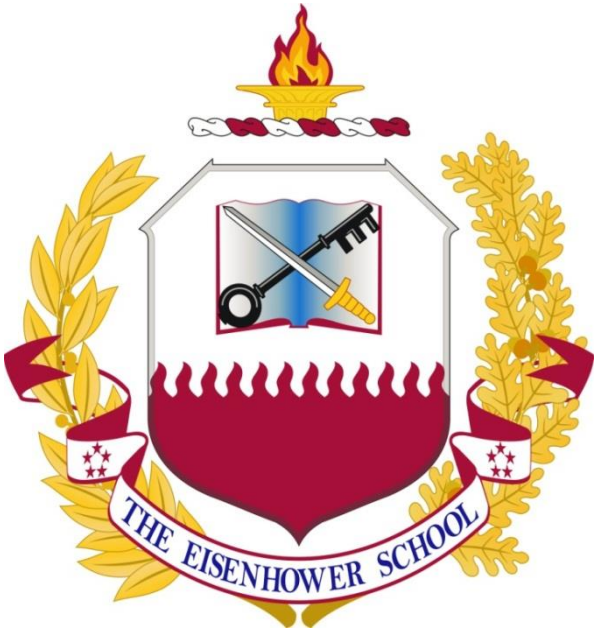

Acquisition and Innovation Lesson 15

Understanding Sources of Military Innovation and Implications for Acquisition Policy I

19 February 2019

The Eisenhower School

A&I Position Update

Block 0: Introduction

A&I 1: Introduction to A&I

Block I: Mobilization

A&I 2: Economics of Mobilization: WWI

A&I 3: Mobilization as Public Policy: WWII

A&I 4: Law and Politics of Mobilization: Korean War

A&I 5: National Framework for Mobilization of Industrial Resources

A&I 6: Assessment of Industrial Base Risks & Mitigation Strategies

Block II: Requirements and Resource Allocation

A&I 7: Political Realities of Acquisition and Innovation

A&I 8: Ethics and Politics in A&I: Tanker Case Study

A&I 9: Choosing Strategic Capabilities: JCIDS

A&I 10: Resourcing Decision-Making in Action: Trident Case Study

A&I 11: Planning, Programming, Budgeting, and Execution

A&I 12: Strategic Resource Allocation

A&I 13: Risk within the President's Budget

A&I14: The Purse and the Sword: The Congressional Budget Process

Block III: Innovation and Acquisition

A&I 15: Understanding Sources of Military Innovation Part I

A&I 16: Understanding Sources of Military Innovation Part II

A&I 17: Defense Acquisition System

A&I 18: Current Trends in Acquisition

A&I 19: Contracting and Acquisition Strategy

A&I 20: Acquisition Strategy in Action: MLRS/CUC-V

A&I 21: Acquisition in Support of Urgent Wartime Requirements

A&I 22: Acquiring Services & Operational Contract Support

A&I 23: Life Cycle Logistics and Supply Chain Management

A&I 24: International Acquisition and Cooperative Programs

A&I 25: Defense Trade and Technology Security

A&I 26: Program Evaluation Paper Team Outbriefs

Block IV: Strategy and Resource Alignment

A&I 27: Resourcing Trade-Offs

A&I 28: Strategy and Resource Analysis - Practicum

A&I 29: Strategy and Resource Analysis - Practicum

A&I 30: Course Wrap-up

The Eisenhower School

Next Lesson (Land)

LESSON 16 (Case Assignments) – Understanding Sources of Military Innovation

- You will apply the military innovation theories from A&I Lesson 15 (Grissom & Sapolsky readings) and brief out your case during this lesson (A&I-16). Use the attached slides to help shape your analysis.

- Discuss with your group in advance. I will give you about 15 minutes to align last minute thoughts and then each group will present their case highlighting the issue and the innovation theories/situation for approximately 15 minutes.

- **Case A. Development of the A-10 Thunderbolt II (Warthog)**: Balogun, Mabbutt, Rockward-O'Saben
- **Case B. Development of Airmobile Warfare**: Douglas & Scoggin
- **Case D. Developing the Intercontinental Ballistic Missile (ICBM)**: Castro, Mahoney, St. Laurent
- **Case E. Lieutenant Sims vs. Washington Navy Yard: Adoption of Continuous-Aimed Naval Gunfire**: Fitzgerald & Kovacevic
- **Case H. Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS)**: Harris & Moorman

International Fellows on travel have been assigned the same case so that you can discuss amongst yourselves during the travel period.

- **Case E. (IF Group): Lieutenant Sims vs. Washington Navy Yard: Adoption of Continuous-Aimed Naval Gunfire**: Kagombola, Kasumovic, Masi, Redzepagic

NOTE: One reading from Case E required a log-in. It is now uploaded so you don't have to.

Next Lesson (Cyber)

LESSON 16 (Case Assignments) – Understanding Sources of Military Innovation

- You will apply the military innovation theories from A&I Lesson 15 (Grissom & Sapolsky readings) and brief out your case during this lesson (A&I-16). Use the attached slides to shape your analysis.

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- **Case A. Development of the A-10 Thunderbolt II (Warthog)**: Belle, Burke, Gillikin
- **Case B. Development of Airmobile Warfare**: Curry, Kendall, Ugural
- **Case D. Developing the Intercontinental Ballistic Missile (ICBM)**: Cirillo, Emanuel, Miller
- **Case E. Lieutenant Sims vs. Washington Navy Yard: Adoption of Continuous-Aimed Naval Gunfire**: Lee & Nordgren
- **Case H. Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS)**: Blackston, Meyers, Vargas

International Fellows on travel have been assigned the same case so that you can discuss amongst yourselves during the travel period.

- **Case E. (IF Group): Lieutenant Sims vs. Washington Navy Yard: Adoption of Continuous-Aimed Naval Gunfire**: Al Busaidi, Binder, Kassim

NOTE: One reading from Case E required a log-in. It is now uploaded so you don't have to.

A&I-15 Readings

W. Michael Cox and Richard Alm, "Creative Destruction," *Concise Encyclopedia of Economics.* (5 pages)

Edward L. Katzenbach, "The Horse Cavalry in the Twentieth Century: A study in policy response," Public Policy, vol. 8 (1958), p. 406-422 (17 pages). Available on BLACKBOARD

Adam Grissom, "The future of military innovation studies," *Journal of Strategic Studies*, 29:5, October 2006, 905 – 937. Pages 905-920 are required reading. (16 pages) NOTE: Pages 920 from "Evidence of Bottom-Up Innovation" through 937 are optional. Will not cover bottom up innovation in this lesson.

Harvey M. Sapolsky, "On the Theory of Military Innovation," *Breakthroughs* 9, no. 1 (Spring 2000): 35-39 (5 pages). Available on BLACKBOARD

Eugene Gholz & Harvey Sapolsky, The Very Healthy US Defense Innovation System, Study of Innovation and Technology in China Research Brief, 5 May 2018 (3 pages). Available on BLACKBOARD

Lesson Objectives

- Analyze the similarities and differences between how creative destruction occurs in markets and in military organizations.
- Analyze and evaluate competing theories that attempt to explain how military innovation occurs during peacetime.
- Analyze and evaluate the implications of the military innovation theories with respect to defense acquisition policy.

Issues for Consideration

a. How does creative destruction occur in commercial markets? How does creative destruction occur in the defense sector during peacetime? Wartime?

b. To what extent are the four major theories of military innovation mutually exclusive? Compatible? Overlap?

c. How useful are the four major theories of military innovation in explaining what we observe, predicting behavior and outcomes, and identifying means for influencing innovation via big "A" acquisition decisions?

d. How well do these theories address industry's role in influencing investment decisions?

e. What are the implications of these theories with respect to how DOD organizes itself to make and execute acquisition decisions? Who should make and execute what decisions? OSD? JCS? Services? What roles should civilian and military leaders play in the investment decision process? What role should industry play in the investment decision process?

f. How do our "shared powers" form of government and the existence of multiple principals influence military innovation in the United States? Do they hinder, promote or have a neutral effect on military innovation?

g. When should the investment decision process – an important part of military innovation -- prize cooperation? Competition? Centralized decision-making? Decentralized decision-making?

Agenda

- Creative Destruction & Entrepreneurs
- Military innovation defined
- The Horse Cavalry in the Twentieth Century
- Four major theories of military innovation
- Policy implications for big “A” acquisition (investment decision making process)
- The Very Healthy US Defense Innovation System?

Innovation

What is military innovation?

Why do militaries innovate?

Innovation

Throughout history, the process of innovation - that is, the process of turning ideas and invention into more effective products or services (in this case, the creation of more effective militaries) - was at the heart of gaining military superiority over a rival (or rivals). This includes the introduction of new ways of fighting (the phalanx, employed by the Greek city-states), of organization (the levee *en masse* of the French Revolution), or of technology (the so-called "gunpowder revolution" of the 16th century, or aviation and mechanization in the 20th century).

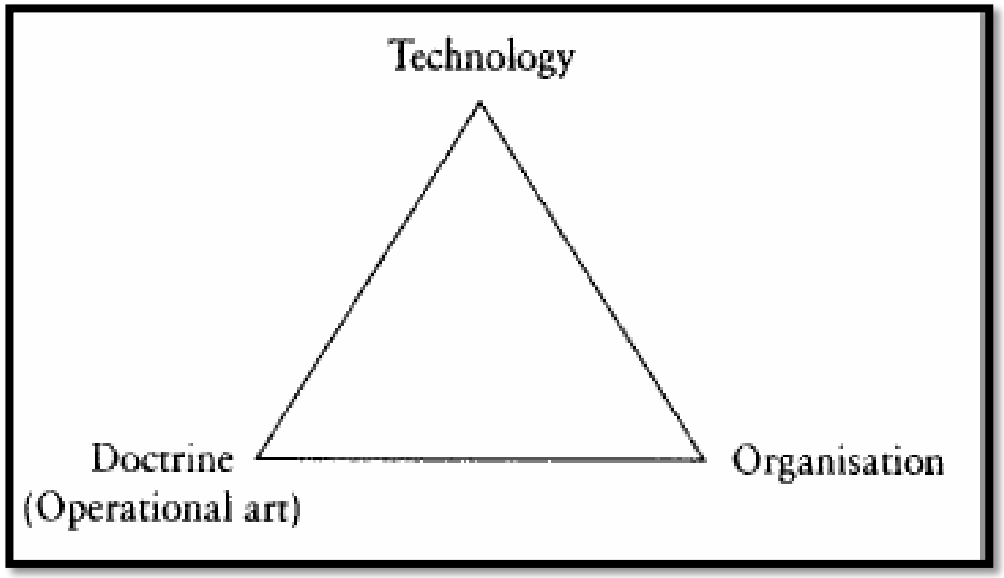
Richard A Bitzinger

Definition of Military Innovation (Grissom, 2006)

- Innovation *changes the manner in which military formations function* in the field
- Is *significant in scope and impact* (a consequentialist understanding of military innovation)
- Leads to *greater military effectiveness*

These three elements constitute a tacit definition of military innovation that is, approximately, 'a change in operational praxis that produces a significant increase in military effectiveness' as measured by battlefield results, Correlli Barnett's 'great auditor of institutions'.

The Military Innovation Triad



- **Rarely do these components of military innovation change simultaneously; one tends to lead while the others follow.**
  - Technology, for instance, may leap ahead, requiring organizations and doctrine to play catch up, perhaps for decades.
  - Doctrinal visions, e.g., BMD, can spur organizational change, drive technological development.

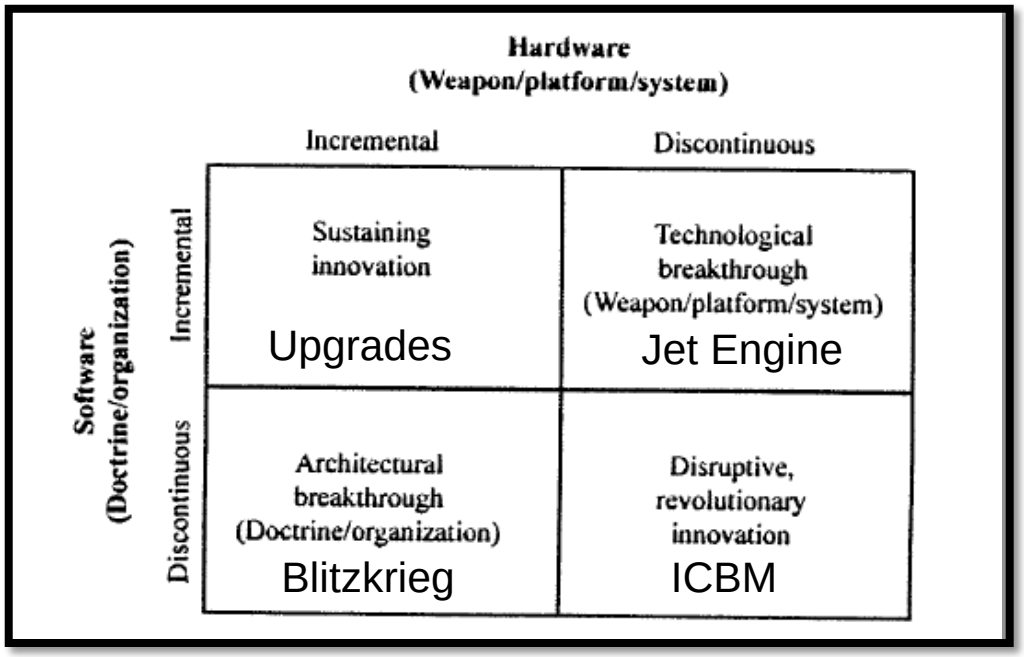
Ross, 2010

Innovation – Clayton Christensen

A **sustaining innovation** does not create new markets or value networks but rather only evolves existing ones with better value, allowing the firms within to compete against each other's sustaining improvements.

A **disruptive innovation** is an innovation that helps create a new market and value network, and eventually goes on to disrupt an existing market and value network (over a few years or decades), displacing an earlier technology.

Military Innovation



The manner in which hardware and software innovation, product and process innovation (technology, organization and doctrine) come together and are integrated (or are not) is of great importance.

It determines whether change is modest or profound, continuous or discontinuous, sustaining or disruptive, incremental or transformational, minor or radical, evolutionary or revolutionary. Ross, 2010

Military Innovation

Means of Innovation?

- Doctrine/operational art
- Organization
- Technology

Type of Innovation?

- Sustaining
- Disruptive (creative destruction)

When does it occur?

- Peacetime
- Wartime
- In response to exogenous technological change in the non-military sector (i.e. Information technology)

What forces drive creative destruction during peacetime?

Creative Destruction

What is Creative Destruction?

How does it occur in markets?

What role does the entrepreneur play?

Creative Destruction

How does Creative Destruction occur in military organizations?

Example of Creative Destruction in Defense
Bombers vs. ICBMs

	Bombers	ICBMs
1950	1140	0
1955	1711	0
1960	2194	0
1965	1245	854
1970	570	1054
1975	497	1054
1980	417	1054

After which, bomber pilots lost the mantle of service leadership to the fighter pilots.

Creative Destruction

How does Creative Destruction occur in military organizations?

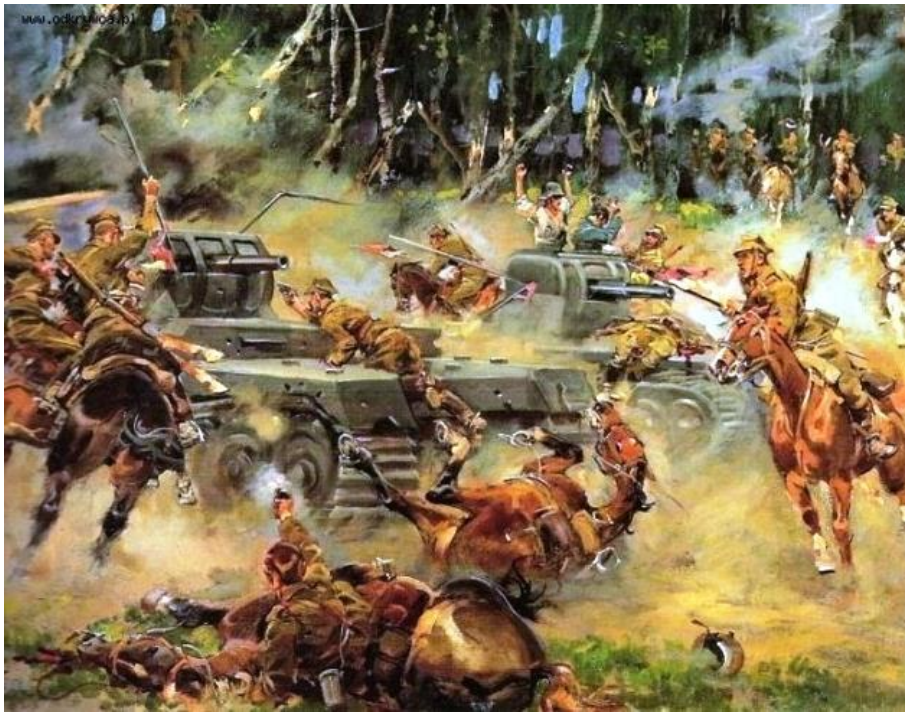
When is creative destruction in military organizations more likely to occur?

Wartime or Peacetime?

Markets vs. Military Organizations (Decision Making and Resource Allocation)

Military	Markets
Public Good	Private Goods
Supplier Centric	Consumer Centric
Enterprise/Federation	Market (many firms)
Command & Control	Free Exchange
Hierarchical	Nonhierarchical
Centralized	Decentralized
Groups	Individuals
Interdependence	Independence
Few Actors	Numerous Actors
Consensus	Self interest

Why did the Horse Cavalry persist well into the 20th Century?



Creation Without Destruction

Why do we tend to see more "creation without destruction" in military organizations during peacetime?

This destructive element of innovation is important and often overlooked, which has important implications for the current innovation effort underway at the Department of Defense. Much of the ongoing discussion on innovation has centered on new technologies, such as robotics and artificial intelligence. But technology is insufficient for innovation.

Moreover, as James Q. Wilson has written, bureaucracies, including military organizations, are generally happy to take on new technology that is additive. It is when that technology threatens existing organizational practices and structures that bureaucracies resist it.

Because innovation necessarily threatens these practices and structures, bureaucracies do not readily innovate. Instead, new technologies—and the resources that they require—are often incorporated in line with existing organizational prerogatives (or rejected when they cannot be).

Points to Ponder
1994 Study of Naval Innovation

- 90 percent of innovations are **sustaining** in nature and most senior military leaders are adept at championing these innovations.
- 10 percent of innovations are **disruptive** in nature and *most senior military leaders are not adept at championing these innovations*.
- Civilian leaders can help champion sustaining innovations but have failed to champion disruptive innovations.
- Disguising a disruptive innovation as a sustaining innovation is necessary but not sufficient for success.
  - *Compliment vs. Supplement to Existing Weapons System*
- Small innovation groups are necessary but not sufficient for disruptive success.

Four Major Schools

- Civil-military relations (Barry Posen)
- Intraservice politics (Steven Rosen)
- Interservice politics (Owen Cote & Harvey Sapolsky)
- Organizational culture (Theo Farrell)

Each school has constructed its own explanatory model of military innovation, postulating that certain factors determine whether a military organization will innovate

Civil-Military Model of Military Innovation

Barry R. Posen, The Sources of Military Doctrine (New York: Cornell University press, 1984)

- What prompts the need to innovate?
- Who pushes for innovation?
- How are the armed service prompted to innovate?
- Techniques and tactics used to facilitate innovation?

Interservice Model of Military Innovation

Harvey M. Sapolsky, Polaris System Development: Bureaucratic and Programmatic Success in Government (Cambridge, MA: Harvard UP 1972).

Owen R. Cote, 'The Politics of Innovative Military Doctrine: The U.S. Navy and Fleet Ballistic Missiles' (Cambridge, MA: PhD diss. MIT 1998).

Harvey M. Sapolsky, 'On the Theory of Military Innovation', Breakthroughs 9/1 (2000)

- What prompts the need to innovate?
- Who pushes for innovation?
- How are the armed service prompted to innovate?
- Techniques and tactics used to facilitate innovation?

THE POLITICS OF WEAPONS INNOVATION:

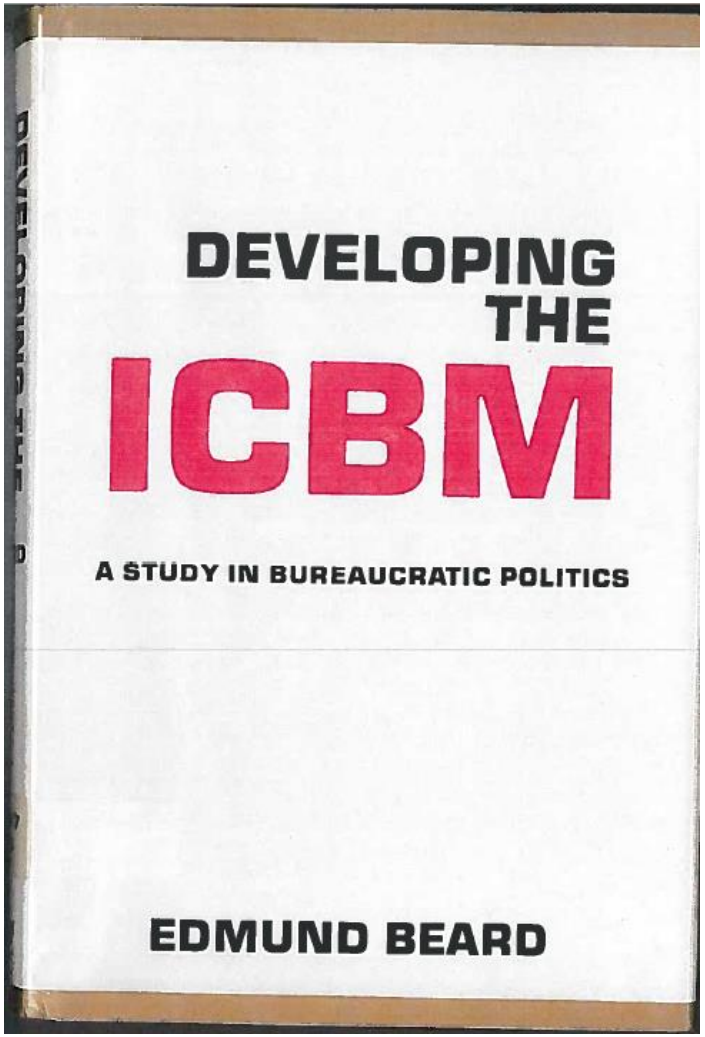
THE THOR-JUPITER CONTROVERSY

BY MICHAEL H. ARMACOST

The Intraservice Model of Military Innovation

Stephen Peter Rosen, Winning the Next War (Cornell University Press: Ithaca, NY, 1991)

- What prompts the need to innovate?
- Who pushes for innovation?
- How are the armed service prompted to innovate?
- Techniques and tactics used to facilitate innovation?



Gen. Curtis E. LeMay, who led Strategic Air Command from 1948 to 1957, considered America's first ICBM, the Atlas, an extravagant boondoggle that wouldn't perform as anticipated. It would achieve a "satisfactory state of reliability [only after] long and bitter experience in the field," he argued. Of course, LeMay consistently put ballistic missiles last among SAC funding priorities, meaning the Atlas wouldn't get a chance to gain the "long and bitter experience in the field" that he demanded.

Furthermore, LeMay disparaged ICBMs as mere "political and psychological weapons," insisting any money budgeted for them would be better spent on "penetration aids"—air-to-surface missiles—for his bombers.

In March 1953, Gen. Thomas S. Power, LeMay's deputy and successor at SAC, outlined his boss's resolute stance in a letter to USAF's director of requirements.

"Regardless of the missile program," Power wrote, "it is the opinion of this headquarters that the continued advance in the art of manned flight to high altitudes and long ranges should be at all times a priority objective of the Air Force's development program."

Gen. Thomas D. White, who became vice chief in June 1953, and later Chief of Staff from 1957 to 1961, vehemently disagreed. In May 1954, over LeMay's heated objection, White raised the ICBM to the top of USAF's research and development priority list. Over the next seven years—the remainder of White's time on

Chief of Staff Gen. Thomas White (l) and Vice Chief of Staff Gen. Curtis LeMay in 1961. White appointed LeMay vice chief in order to stifle the bomber advocate's criticism of the missile program.

White vs. LeMay: The Battle Over Ballistic Missiles

By Lawrence J. Spinetta

Gen. Thomas White triumphed in an epic battle to develop and field the Atlas, overcoming fierce resistance from Gen. Curtis LeMay.

Three Champions In The Development of the ICBM

Plate 5. Air Force Assistant Secretary for Research and Development Trevor Gardner (*left*) and Major General Bernard Schriever (*right*)-two champions in the development of the ICBM
(Courtesy U.S. Air Force, History Division)

Gen. Thomas White holding an Atlas rocket model. White acknowledged that the strategic missile buildup may not be good for the traditional Air Force, but insisted it was good for the nation.

Harvey Sapolsky
"On the Theory of Military Innovation"

- Innovation is an organizational dilemma
  - *Complex and diverse organizations are like to produce more innovative ideas*
  - *But organizational complexity and diversity complicates the internal bargaining required for consensus on the desirability of instituting significant change*
- Innovation is largely the outcome of a well-managed political process
- Jointness has increased the "cost" of innovation
- Organizations need a strong motivation to accept the "costs" of innovation, i.e. a competitive threat (interservice competition)

Terry C. Pierce
"Jointness is killing Naval innovation"

- Jointness that fosters unification kills interservice competition – the engine that drives disruptive innovation
- Too many high quality officers are serving on Joint Staffs rather than leading naval innovation
- Senior leaders need to foster disruptive innovation
  - *Establish and manage a nonpermanent organizational structure -- a disruptive-innovation team*
  - *Manage the political struggle that leads to the creation of new, stable career paths for younger officers*
  - *Formulate and implement a successful strategy for gaining political control over the naval services. Senior naval officers should use their political power to ensure officers favoring the new way of war succeed them*

The Cultural Model of Military Innovation

- What prompts the need to innovate?
- Who pushes for innovation?
- How are the armed service prompted to innovate?
- Techniques and tactics used to facilitate innovation?

Compare & Contrast

In what ways are the theories different?

In what ways are the theories similar?

Differences

- **Civil-Military Model** – argues that when senior civilian decision-makers sense the development of an unfavorable balance of powers they become motivated to pay close attention to military affairs and impose innovation upon the military services with the help of maverick proxies within the service.

- **Intraservice Model** – contends that senior service leaders imagine a new 'theory of victory' then leverage the internal politics of their service to put the new theory into practice.

- **Interservice Model** – maintains that scarcity compels senior service decision-makers, such as the chiefs of staff, to determine the best course that allows the service to compete for resources needed to sustain the health and status of the service and then induce the service bureaucracy to innovate accordingly.

- **Cultural Model** – asserts that a set of implicit beliefs exerts fundamental (if largely unseen) influence on the direction of military innovation. Senior leaders are the key to setting this culture and will manipulate the culture to ensure that the bulk of the service complies with the required innovation.

Similarities

- All view military organizations as being intrinsically inflexible, prone to stagnation, and fearful of change
- All argue that military organizations must be goaded into innovating
- All view military innovation as a top down process
- Senior officers/civilians are the agents of innovation
  - *They recognize the need for change*
  - *They formulate a new way of warfare*
  - *They position their organization to seize the opportunity of innovation*
  - *They bludgeon, cajole, politically leverage, or culturally manipulate the organization into compliance*

Implications for Big "A" Acquisition Policy
How we make investment decision

- Roles of civilian and military leadership
- Requirement system
- Technological Innovation vs. Doctrinal Innovation
- Jointness vs. Interservice Competition
- Role of OSD
- Role of Services (Title X)
- Combatant Commanders
- PPBE
- S&T