



“Defense Affordability”

Jacques S. Gansler , Ph.D.

Professor and Roger C. Lipitz Chair

Director, Center of Public Policy and Private Enterprise

School of Public Policy

University of Maryland

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**Dr. Gansler served as Under Secretary of Defense (Acquisition, Technology, and Logistics) from 1997-2001; he is currently a member of the Defense Science Board*

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Definition of Affordability

Affordability is that characteristic of a product or service that enables military users to:

- ➔ Acquire it for a reasonable life-cycle cost, that falls within their budget; and in the quantity required
- ➔ Use it to meet their performance requirements, at a level of quality that they demand
- ➔ Use it whenever they need it, over the expected life span of the product or service

Adapted from: Redman, Quentin. 2012. Why Affordability Is A Systems Engineering Metric. Procedia Computer Science. Volume 8, 2012, Pages 376–381



The Environment

- Declining Defense Appropriations (Budgets and Supplementals)
 - Costs are rising (equip., services, labor, health, energy, etc.)
 - Declining force structures (after Iraq & Afghanistan); but equipment worn out
 - Trends in U.S. demographics and debt payments are adverse
- Broad Spectrum of Security Concerns; and Much Uncertainty
 - Pirates; terrorists; cyber attacks; bio./chem./nuclear; IEDs; widespread proliferation; regional instabilities (that draw us in); nuclear Armageddon; etc.
 - “war among the people” different from tank-on-tank
- Rapid Changes (in technology, geopolitics, economics, globalization security)

“Affordability”; “Uncertainty”; “Flexibility” are critical drivers for the coming era - - and the last two traditionally increase costs



To Successfully respond to this 21st Century Environment

- 20th Century policies, assumptions, laws, structures, acquisition practices, must change!
- Requires a focus on:
 - Affordability (in “requirements;” equipment selection; design; force structure; incentives [government and industry]; etc.)
 - Changes to resource allocations (dollars; people; organizations; education and training; etc.)
 - Flexibility and responsiveness (from government and industry)
 - Staying ahead



Affordability is Key

“...[T]he budget of the Pentagon almost doubled during the last decade. But our capabilities didn’t particularly expand. A lot of that money went into infrastructure and overhead, frankly, I think a culture that had an open checkbook.”

Robert Gates
Former Secretary of Defense
Interview on 60 Minutes
May 15, 2011

Affordability will drive DoD’s procurement of goods and services in the next decade (unlike post 9/11 decade)



Expect Significant Resistance to Change

- From Congress
- From Military
- From Incumbent Businesses
- From Unions
- Etc.

This resistance must be overcome!

For “culture change,” need:

- Widespread recognition of the need for change
- Proactive leadership (with a vision, a strategy, and a set of actions)

Post-WW II Defense Spending

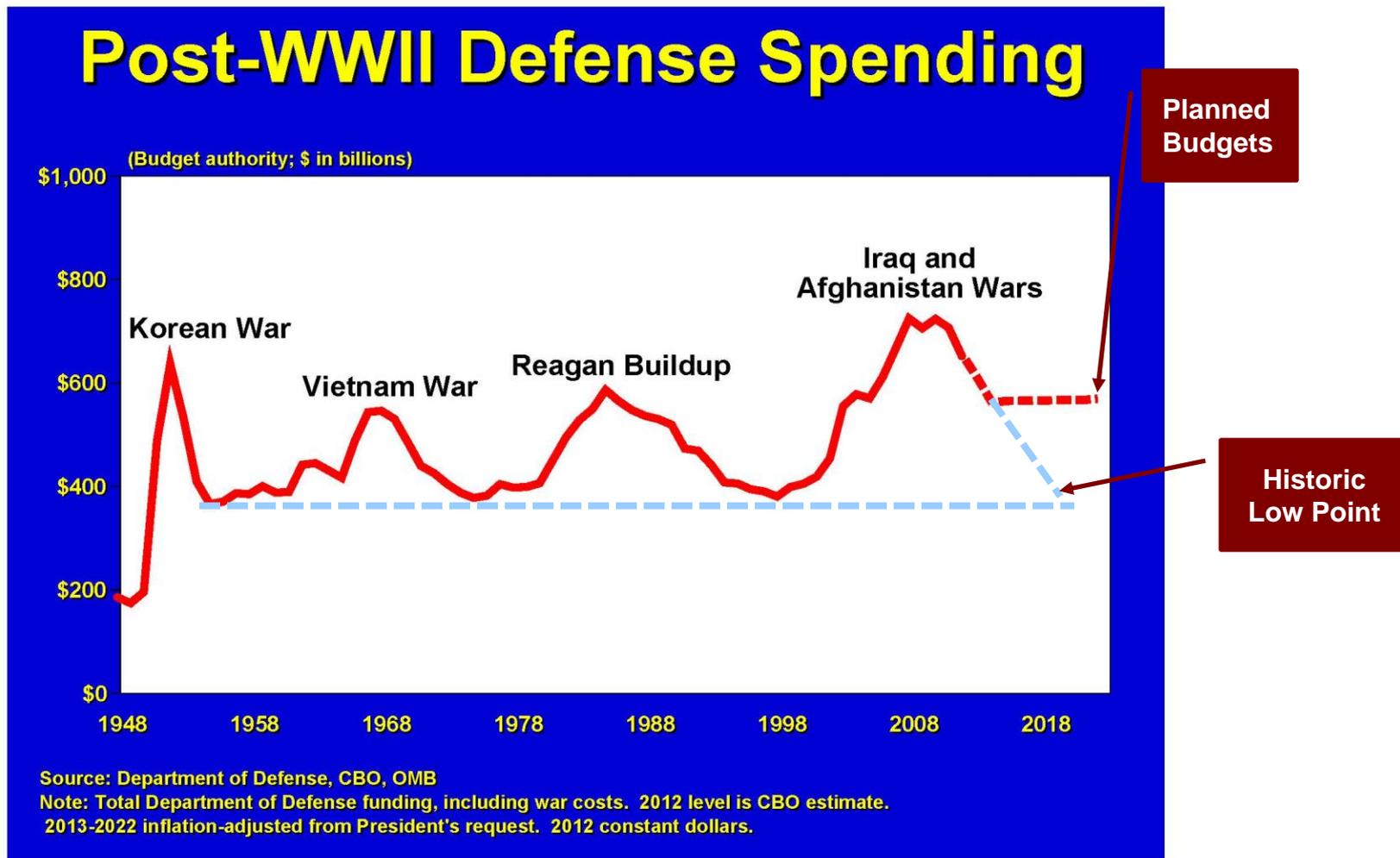
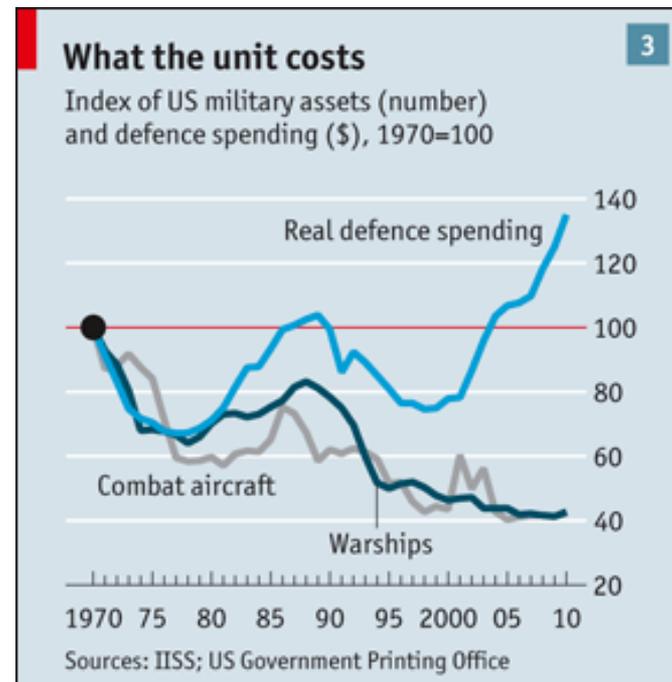
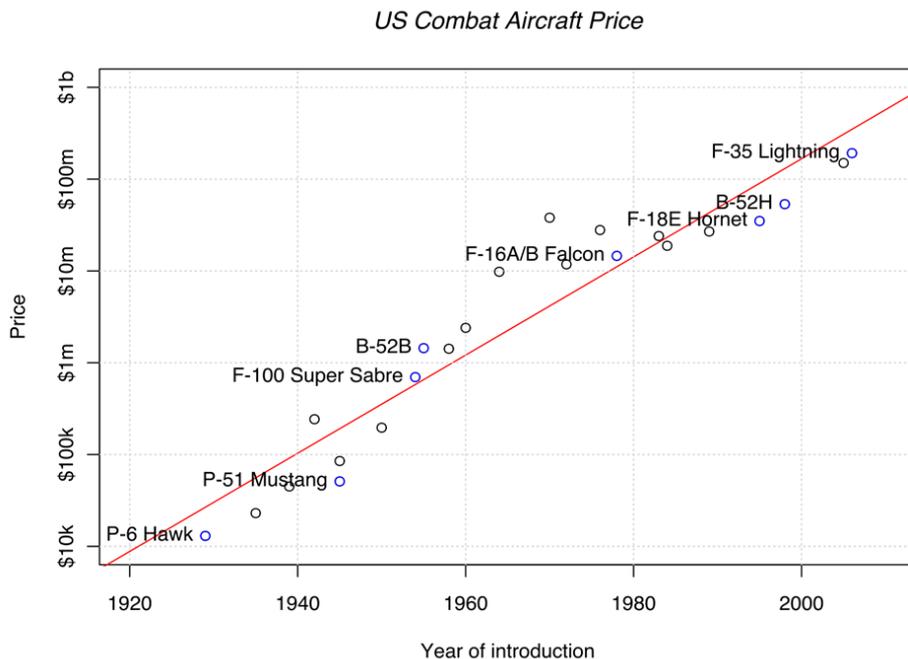


Chart appeared in: *Hearing: President's Fiscal Year 2013 Budget Request for Department of Defense (February 28, 2012)*

Augustine's 16th law



Two recent examples (in constant 2009 \$) of increasing unit costs:

- F-15E: \$40.9mil
- F-35A: \$116.4mil

“In the year 2054, the entire defense budget will purchase just one aircraft.”
Norman Augustine,



Numbers Matter -- Lanchester's Law

- ➔ In 1914, Frederick William Lanchester proposed a simple model of combat dynamics to illustrate the principle of concentration of forces.
- ➔ Came to be known as “Lanchester's laws,” they provide algorithms for predicting the dynamics of attrition in a model of combat.
- ➔ “Law” states that total force effectiveness is proportional to individual weapon’s effectiveness times the number of weapons squared (which essentially states that the strength of a military unit is proportional not to the number of elements [planes, artillery, tanks, or soldiers], but to the square of the number).

“Quantity has a quality all its own”

- Most often attributed to Lenin, Former Soviet Leader



Keys to affordability

- ➔ Cost as a “requirement”
- ➔ Control cost (e.g. regarding “changes”)
- ➔ Reduce System life cycle costs
- ➔ Reduce overhead

Control “Changes”





Cost as a requirement

- ➔ Converts cost as a consideration to a cost KPP
 - Can be single cost value or threshold
 - This becomes an engineering challenge, not an accounting or auditing problem
 - Requires greater authority to make cost/performance trades, since unit cost controls quantity
 - Competition at key decision points helps greatly
- ➔ Best results experienced with the following conditions:
 1. Firm Establishment of a unit cost ceiling
 2. Accurate and viable independent cost estimate
 3. Vibrant and Healthy Industrial Base
 4. Explicit incentives for achieving a cost KPP

“The last 10% of performance generates one-third of the cost and two-thirds of the problems”



Life-Cycle Costs must also be considered

- ➔ Reducing some performance requirements (e.g. reliability) to reach a cost KPP can result in a higher LCC
 - Defeats the affordability benefit of a military cost requirement
- ➔ Additionally, LCC drivers, such as fuel use and manning levels of ships, must also be considered, and reduced as much as is practical.
- ➔ These may seem like conflicting requirements, but the commercial sector has demonstrated that it can be done (after using advanced technology and/or non-traditional approaches to achieve higher performance at lower costs)



Reduce Overhead (Government and Industry)

➔ Dual Use

➔ COTS

➔ Reduce unnecessary infrastructure

JDAM Program - - a Success Story

- ➔ The JDAM System is a tail kit for converting gravity guided munitions to GPS or computer guided munitions
- ➔ A key pilot program in DoD's push for using commercial acquisition strategies – granted expedited waiver status (25 in total)
- ➔ Program cost figures:
 - Historical system cost estimate: \$68,000
 - **Cost requirement**: \$ 40,000
 - Realized system cost: \$18,000





JDAM

- ➔ Cost requirement derived from a cost goal. At insistence of Air Force Chief of Staff, it was made a firm requirement.
- ➔ The following strategies were key to the program's success:
 - Government/Contractor Integrated Product Teams (IPTs)
 - Performance based, head-to-head competition
 - Rolling down-select during competition
 - Allowing the contractor control over the technical data package
 - Requiring a contractor-supplied warranty
 - Minimal paperwork and limited, streamlined oversight
 - Negotiations based on supplier price, not cost
 - Primary award criteria based on past performance and best value
 - Allowing trade-offs of price for performance criteria
 - Use of commercial products
 - Firm, fixed price production contracts



Challenges

Implementation of a military cost requirement faces a **paradigm shift** from **performance** as a top priority, to **cost** with militarily-acceptable performance

- Slow FAR/DFAR waiver process (JDAM program required 33 waivers)
- Requirements Creep
 - Cultural resistance to accepting the “80% solution”
- Lack of cost control incentives
 - Lower system cost results in a smaller contract profit
 - Government personnel are incentivized to grow their programs (larger budget, more personnel etc.) and they receive no benefit from saving money
 - Formal program consequences (Nunn-McCurdy) are rarely invoked or enforced
 - Industry doesn't avoid re-competition even if it lowers costs
- Subcomponent sourcing methods (e.g. Make or Buy)
- Producing accurate and viable independent cost estimates



Recommendations - Systemic

- ➔ JROC should change cost from a “consideration” to a “requirement” (based on the military requirement for quantity; within resource constraints)
- ➔ Requirements should, if possible be established by means of thresholds to encourage trade space
 - Minimally acceptable to highly desired
- ➔ Systems should be evaluated based on performance and cost
- ➔ Unit costs should be considered in conjunction with total ownership costs
 - Sacrificing reliability to lower unit cost will increase support costs
- ➔ USD-AT&L should designate a series of pilot programs by which to implement a cost requirement
 - “Cost as a requirement” pilots should supplement *Should Cost/Will Cost* for cost control reform
- ➔ Institute temporary expedited process for FAR/DFAR waivers

Affordability AND Effectiveness
CAN be achieved!