Effective ("Smart") and Ineffective ("Dumb") Competition in Defense Acquisition

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The Message

Competition, for its own sake, or of the wrong form, is expensive and ineffective - - so arbitrarily mandating it is wrong; but "smart competition" (where properly applied - - including even the "credible threat" of applying it) will have huge payoffs (from the incentives created) in higher quality, better performance, and reduced costs - - so it must be fully utilized.

The Environment

- Declining Defense Appropriations (Budget plus Supplemental)
  - But with costs rising (equipment, services, government labor [military and civilian], health, energy, etc.)
  - Declining force structure in Iraq and Afghanistan will help; but equipment is worn out
  - And trends in U.S. demographics and debt payments adverse to needs
- A rapidly-changing world: Technologically, economically, geopolitically, and (particularly) in security
- Broad spectrum of security concerns: pirates; terrorists; cyber "attacks"; chemical/bio/nuclear; IEDs; regional instabilities (that draw us in); widespread proliferation; "loose nukes"; pandemics; struggles for scarce resources (energy, water, raw materials); violent religious extremism; and, on up to the threat of nuclear Armageddon -- with much uncertainty as to "what's next."
- Perhaps the biggest national security concern is the U.S. economy (Adm. Mullen: "America's #1 national security threat is the deficit.")

The Keys to "Doing More for Less" are Innovation and Incentives

- **"Innovation"** is a driver of significant change, for gains in effectiveness and/or efficiency - - could be in technology, or in process, but (most important) in thinking (i.e. a "culture change")

- For a **"culture change"** two things are required:
  1. Widespread recognition of the **need for change**
  2. **Leadership - -** with a vision, a strategy, and a set of actions

- For DoD acquisition, the **recognition of the need for change** is coming from: **the declining budget**; and the realization that **superior performance at lower cost** is being demonstrated every day in the competitive commercial world.

Incentives are Required to get Government and Industry to Utilize New Technology to Simultaneously Improve Performance and to Lower Costs

- It's a design and "culture" Challenge (not an accounting issue)
- Must use technology (in both the product area and the process area) to get higher performance at lower costs
- This is a significant R&D challenge (often requiring "disruptive" technology)

The most effective, and proven technique is <u>continuous competition</u> (for achieving higher and higher performance at lower and lower costs)

Initial low bid is likely be Illusory(even if fixed price)

Various Forms of Competition

For Differentiated Goods or Services

- For an R&D award
- Between Prototypes
- During Production
- During Support

For Undifferentiated Goods or Services

- "Low Price, Technically Acceptable"
- Build to Print

But even in the "undifferentiated" cases, quality still matters ("cheap" is unacceptable - - both for mission achievement and life-cycle cost reductions)

It is Important to Recognize that the Defense Market is "Different"

- One large buyer (monopsony); usually, differentiated products being offered; a few, large, high-tech awards for goods or services (a "lumpy" business); large, expensive proposals required; high "barriers to entry"

- In this unique market, a few, highly-qualified firms bidding against each other creates far more effective competition than large numbers of bidders* (i.e. the "second best" solution is "limited competition" among highly qualified firms - - which was the original intent of the IDIQ contracts)

- The contrast here is to a "commodity market" (undifferentiated, simple goods or services; or to a "rug auction", where the more bidders the better the competition)

**ref. Scherer "Weapons Acquisition Process" Harvard Press, 1964, Pg. 48; also, "Report of the Commission on Government Procurement:, G.P.O., Dec. 72*

Some Observations

- In many cases, the subsystems (subcontracts) make up a very large share of the costs (e.g. on A/C and Missiles = 70 to 80%) and are often the high risk areas - - so competition here is critical
- Unfortunately, legislative and regulatory barriers exist, and are growing, to limit DoD access to commercial and international competitive suppliers (thus greatly reducing competition)
- "Past Performance" is critical for evaluating risk (of quality, delivery, and performance) but the DoD data tracking system here is poor
- Many in the government's acquisition workforce do not understand industry operations and incentives - - and this problem has gotten worse with the growing acquisition workforce problems

See below for discussion of <u>current</u> <u>trends</u> demonstrating <u>misuse</u> of <u>effective</u> <u>competition</u>

Some Emperical Results* of Effective Use of Competition

- JDAM
- Production competitions
- "Great Engine War"
- Performance Based Logistics
- Public/Private Competitions
- Public Services

**"Competition in Defense Acquisitions"; J.S. Gansler, W. Lucyshyn, M. Arendt, Center for Public Policy and Private Enterprise, School of Public Policy, University of Maryland, Feb, 2004

Joint Direct Attack Munitions (JDAM) Program

- The JDAM System is a tail kit for converting gravity guided munitions to GPS or computer-guided munitions (i.e. converting "dumb" bombs to "smart" bombs)

- 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 price estimate: $68,000 (i.e. "ICA")
  - **Price requirement**: $ 40,000
  - Realized system price: $18,000

(continued)

Joint Direct Attack Munitions (JDAM) Program

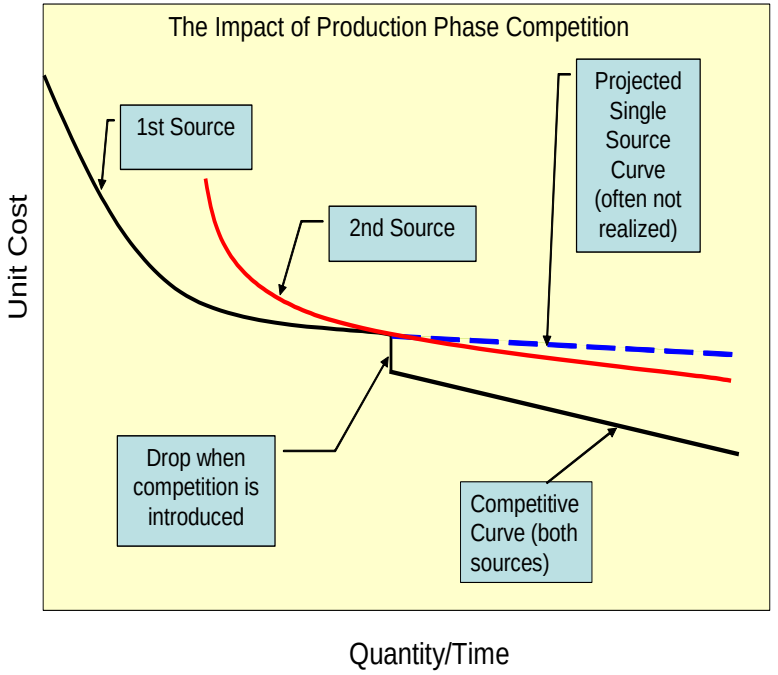
- Cost requirement derived from a cost goal (to allow the purchase of adequate quantities). At the insistence of the Air Force Chief of Staff, it was made a "firm requirement"
- The following strategies were key to the program's success:
  - Government/Contractor Integrated Product Teams (IPTs)
  - Performance-based, head-to-head continuing 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 and performance
  - Use of commercial products
  - Firm, fixed price production contracts to both suppliers

Competition in Production

- Learning curve **theory** predicts that as a firm becomes more experienced, and increases volume, it becomes more efficient.
- However, most learning curve data has been gathered in a **competitive** environment (based largely on commercial data).
- **Empirically**, competitive pressure increases the steepness of the learning curve; but, in the absence of competition, learning curves are, at best, relatively flat.
- **Allocation** (to a split buy) or **teaming** does **not** provide competitive pressure.

Impact of Production Competition on Learning

Program	Cost Improvement Rate		Percent Difference
	First Source	Second Source	
AIM-7F	0.87	0.84	3.00%
BULLPUP	0.82	0.80	2.00%
TOW	0.98	0.89	9.00%
AIM-9L	0.90	0.83	7.00%
AIM-9M	0.94	0.85	9.00%
HELLFIRE	0.94	0.92	2.00%
TOMAHAWK	0.79	0.71	8.00%



Competition produces counterintuitive result – second source demonstrates steeper learning curve than initial producer; then first source becomes competitive, and both have steeper learning curves.

Source: International Armaments Cooperation in a Era of Coalition Security, Report of the Defense Science Board, August 1996

Benefits Shown in Earlier In-Production Competition Studies

Study Organization	Year	Number of Systems	Observed Net Savings
Scherer	1964	--	25%
McNamara	1965	--	25%
Rand	1968	--	25%
BMI	1969	20	32%
Army Electronics Command	1972	17	50%
LMI	1973	--	15-50%
Joint Economic Committee	1973	20	52%
IDA	1974	20	37%
LMI	1974	1	22%
ARINC	1976	13	47%
APRO	1978	11	12%
IDA	1979	31	31%
TASC	1979	45	30%

Source: International Armaments Cooperation in a Era of Coalition Security, Report of the Defense Science Board, August 1996

Cost Growth in Competitive Dual-Source Programs vs. Sole-Source--from Changes and Technical Problems*

	Dual-Source	Sole-Source
Number of Programs	6	19
Percent EMD Cost Growth	7.4%	29.4%
Percent Procurement Cost Growth	4.1%	15.2%

Dual-Source Programs include:

- AIM-9M
- AMRAAM
- HARM
- Hellfire
- Peacekeeper
- Tomahawk

*** CAIG called these "Mistakes" ; and Defined them as:**

- Production quantity assumptions and estimation changes
- Engineering, test, and development changes
- ILS changes, and spares and support changes not attributable to post-milestone II discretionary decisions
- Schedule slips attributable to technical problems
- Other changes not attributable to discretionary changes

Source: OSD CAIG Cost Growth Study, May 2001

The Great Engine War—Realized Benefits
(Pitted P&W against G.E to supply different engines for F-15s and F-16s)

- Improved Reliability
  - Shop visit rate per 1000 engine flight hours is half the pre-competition engines
  - Scheduled depot return increased from 900 cycle to 4000 cycles
- Improved contractor responsiveness, as well as investments to improve efficiency, upgrade manufacturing capability, and other capital investments and engineering investments to reduce costs, improve quality, and improve performance
- Lower-cost warranties--significant savings gained from the original, sole-source P&W warranty cost
- Dual lower-tier suppliers utilized and hence operational flexibility and an enlarged industrial base
- Considerable protection from production disruption
- Estimated $2 – 3 billion in net savings (then-year dollars) over the 20 year lifecycle of the aircraft

Both new engines proved to be more capable, durable, and supportable, and at lower costs than the current engine

Competition During Production: JSF Engines – GAO Analysis

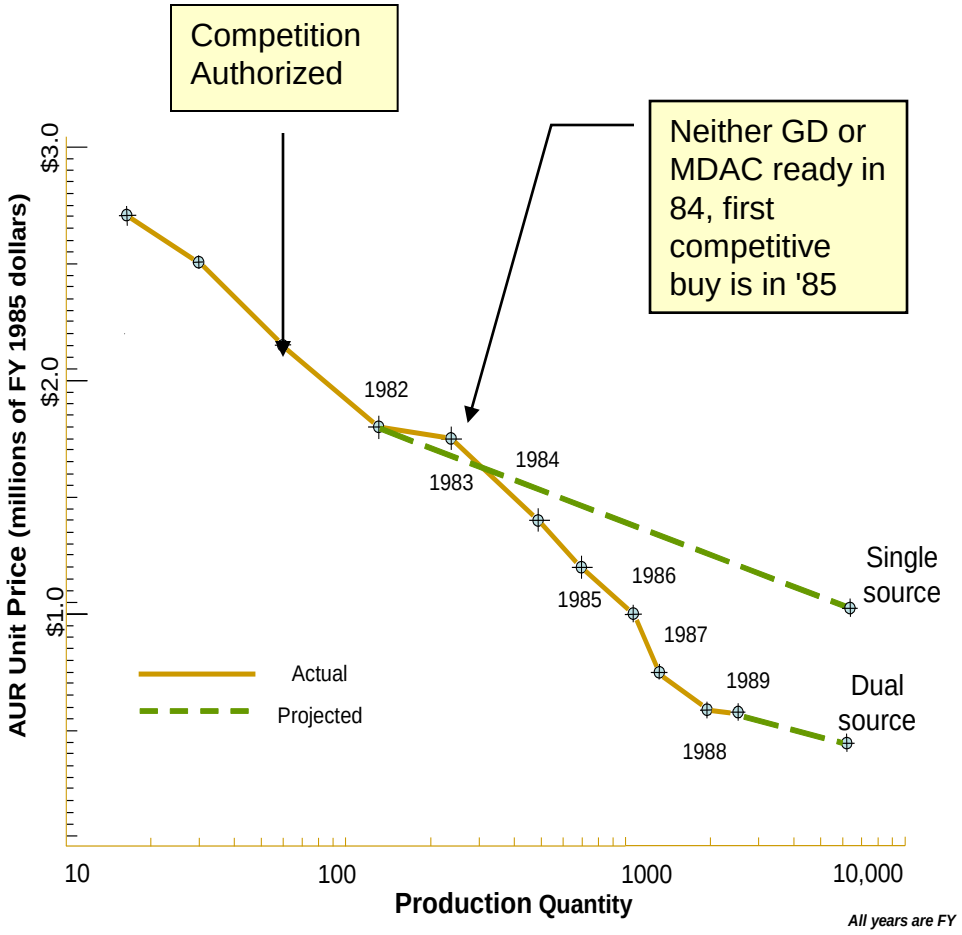
- "The cost analysis we [the GAO] performed suggests that a savings of 10.3 to 12.3 percent would recoup that investment, and actual experience from past engine competitions suggests that it is reasonable to assume that competition on the JSF engine program could yield savings of **at least** that much."
- "In addition, DOD-commissioned reports and other officials have said that **nonfinancial benefits in terms of better engine performance and reliability, improved industrial base stability, and more responsive contractors** are more likely outcomes under a competitive environment than under a sole-source strategy."
- "DOD experience with other aircraft engine programs, including the F-16 fighter in the 1980s, has shown competitive pressures **can generate financial benefits of up to 20 percent during the life cycle of an engine program and/or improved quality and other benefits."**

The GAO concluded that with a 70/30 award, and a 20 % savings, the competitive engine program would have produced at least $2.6B in net savings.

Source: GAO-07-656T, Analysis of Costs for the Joint Strike Fighter Engine Program, March 22, 2007

The Tomahawk Experience — Realized Benefits

- G.D. would not assume responsibility for missile reliability so Gov. introduced second source
- System Reliability improved from approx. 80% to 97%
  - This increase attributed to P.M. initiated corrective action as well as competitive pressure
- P.M, GD/C, and PA&E studies all concluded that dual-sourcing saved the government money, while improving performance



Sources: Birkler and Large, Dual-Source Procurement in the Tomahawk Program, RAND, 1990, John Birkler et al, Assessing Competitive Strategies for the Joint Strike Fighter, RAND Corp., 2001

Summary of Commercial Aircraft Produced in a Competitive Environment

- Of these programs, all showed a **decrease** between 2% and 27%
- Overall simple average was 16% **decrease** over program life

Aircraft	Net Cost "Growth*"
B737-400	0.76
B757-200ER	0.80
A310-300	0.98
A320	0.92
A330-300	0.86
DC10-30	0.83
MD-11	0.73
Average	0.84

*Cost Growth Factor is based on actual cost incurred (less than 1.0 is a cost reduction)

Source: "Historical Lease Rates/Values 1971-2000" http://www.aircraft-values.co.uk/,

Cost-Growth Factors* for DoD Aircraft Programs with no Production Competition

- Of these programs most showed an **increase** between 25% and 104%
- Two programs showed a very modest decrease
- Overall simple average was a 46% **increase**

*Cost Growth Factor is based on actual cost incurred vs. program baseline

Aircraft	Cost-growth Factors
A-6E/F	0.96
B-1B	0.98
C-17	1.70
EF-111A	1.62
F/A-18 A-D	1.54
F-14A	1.25
F-15A-D	1.47
F-16A-D	1.29
JSTARS	2.04
T-45	1.74
Average	1.459

Source: John Birkler et al, Assessing Competitive Strategies for the Joint Strike Fighter, RAND Corp., 2001

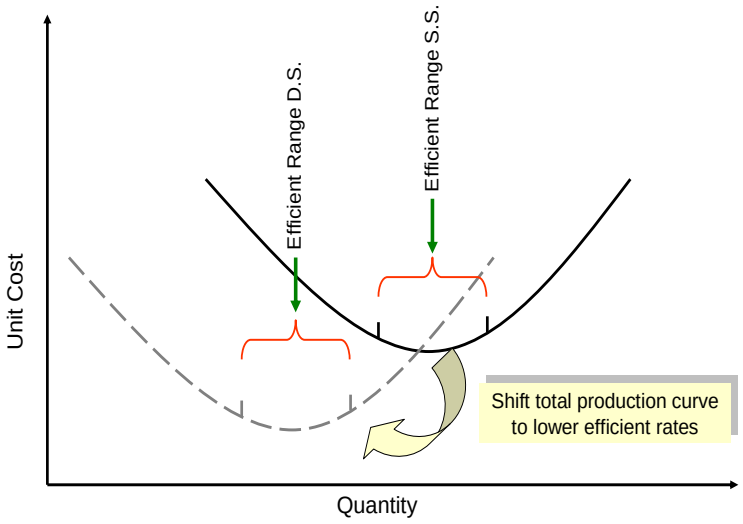
Cost Growth Examples for other Non-Competitive Programs

- Non-Competitive Programs:
  - Increase development times
  - Decrease production efficiency
  - Remove learning curve incentive
  - Discourage innovation
  - Damage industrial base

Program	Cost Growth Factors	
	Development	Procurement
JSTARS	2.20	2.04
Longbow Apache - AFM	1.93	2.19
C-17	1.57	1.70
TOW II	2.85	1.15
Bradley/IFV/MICV	2.55	2.29
M-1 (Abrams)	1.83	1.59

Production Efficiency

- The theoretical argument usually given against competitive dual-sourcing is that the two firms cannot achieve "economically efficient production rates."
- The counter to this is a "shifting of the total production curve" to lower efficient rates.
- Lockheed-Martin reduced their Trident D5 missile production rate from **60/year** to **12/year** and **<u>lowered the unit cost</u>** by changing their production curve.



Yet, in two recent cases (the second engine for the F-35, and the Tanker acquisition of a commercial aircraft) the Air Force has chosen a sole-source (down-select) vs. dual-source (continuous competition)—thus giving up higher performance at net lower cost for sole-source "promises."

Competitive Sourcing/(public/private competition via A-76)

- Work is not inherently governmental
- Work can be performed by the private sector
- Allows for public sector to compete with private sector for work
- Benefits:
  - Government very often wins (but benefits realized no matter who wins)
  - Better performance at lower cost
  - Forcing factor (incentive) for "learning" with the existing process
  - Creates competition in environments that are not normally exposed to market forces

Results of Public/Private Competitions (A-76) Cost Comparisons: 1978 – 1994*

	Competitions Completed		Average Annual Savings ($M)		Percent Savings
Army	510		$470		27%
Air Force	733		$560		36%
Marine Corps	39		$23		34%
Navy	806		$411		30%
Defense Agencies	50		$13		28%
Total	2,138		$1,478		31%

**Defense Reform Initiative Report, Nov. 1997*

DoD "Competitive Sourcing" (A-76) Demonstrated Results 1994 – 2003***

Winning Bidder	Number of Competitions Won	Civilian Positions Competed (Excluding Direct Conversions)	MEO FTEs* (Excluding Direct Conversions)	% Decrease from Civilian Authorizations to Government MEO FTEs
In-House	525 (44%)	41,793	23,253	44%
Contractor	667 (56%)	23,364	16,848	28%**
Total	1,192	65,157	40,101	38%

***MEO= Most Efficient Organization (as proposed by government workers)**
**** Even for the competitions won by the contractor, the MEOs proposed decreases of 28% in the FTE headcount**

****Competitive Sourcing: What Happens to Federal Employees?* Jacques S. Gansler and William Lucyshyn, October 2004

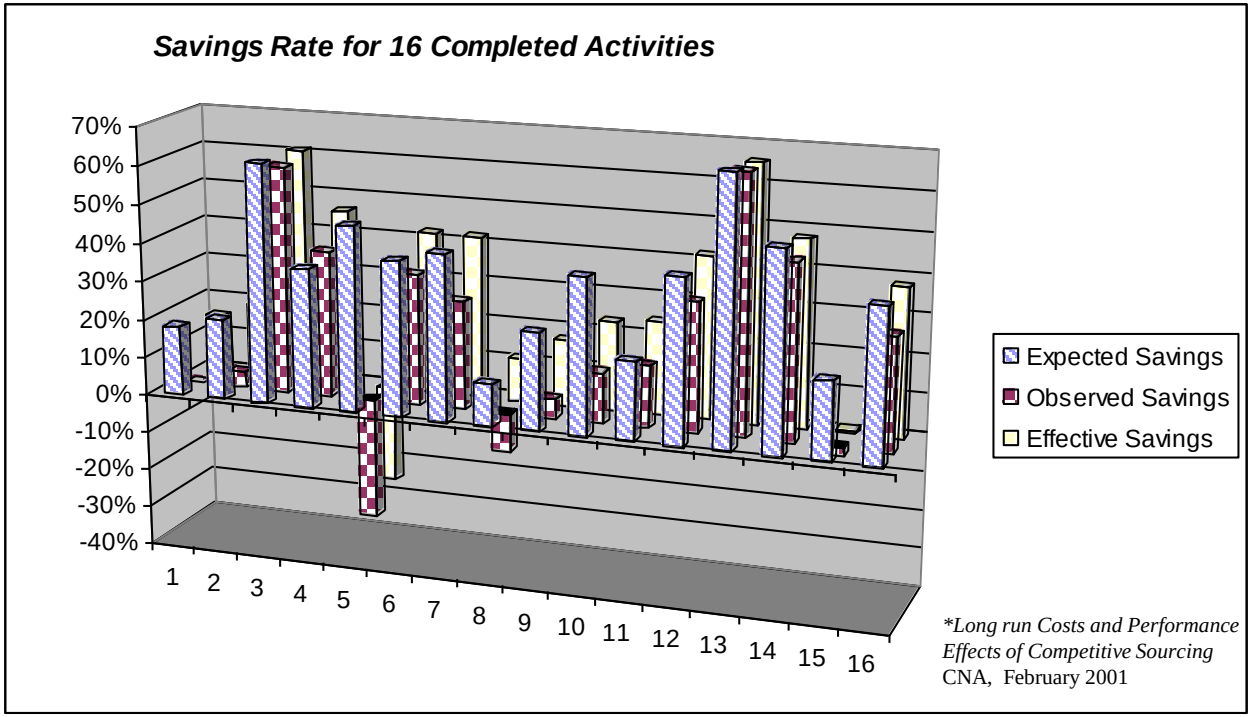
Competitive Sourcing 2004 IRS Results

	Number of FTEs Competed	Winner	FTEs Proposed	Reduction*
Area Distribution Centers	400	MEO	160	60%
Campus Center Operations and Support	278	MEO	60	78%

The government employee MEO won both competitions with dramatic proposed savings

*The source selection results were released in Aug 2004

Competitive Sourcing Long-term Demonstrated Results*



*Long run Costs and Performance Effects of Competitive Sourcing
CNA, February 2001

Weighted Averages

- Expected Savings (as bid by winner – government or private) **35%**
- Observed Savings (realized results, including scope & quantity changes) **24%**
- Effective Savings (realized results on same scope & quantity) **34%**

Competitively-awarded Performance-Based Logistics—Availability and Response Time Comparisons

Navy Program	Material Availability* Pre-PBL	Material Availability* Post-PBL	Logistics Response Time** Pre-PBL	Logistics Response Time** Post-PBL
F-14 LANTIRN 	73%	90%	56.9 Days	5 Days
H-60 Avionics 	71%	85%	52.7 Days	8 Days
F/A-18 Stores Mgmt System 	65%	98%	42.6 Days	2 Days CONUS 7 Days OCONUS
 Tires	81%	98%	28.9 Days	2 Days CONUS 4 Days OCONUS
 APU	65%	90%	35 Days	6.5 Days

Note: "Pre-PBL" is sole-source government and "Post-PBL is competitively awarded (either to private sector or to a public/private partnership

*Klevan, Paul, NAVICP, UID Program Manager Workshop Briefing, 5 May 2005
*Kratz, Lou, OSD, Status Report, NDIA Logistics Conference Briefing, 2 Mar 2004

Competition for Services—NASA Desktop Services

- NASA' approach had been to use NASA employees to maintain desktop assets
  - No way to track costs, no standardization, not tracking service quality
- NASA's Outsourcing Desktop Initiative (ODIN) transferred the responsibility for providing and managing the vast majority of NASA's desktop, server, and intra-Center communication assets to the private sector.
- ODIN Goals
  - Cut desktop computing costs
  - Increase service quality
  - Achieve interoperability and standardization
  - Focus NASA IT employees on core mission

- Performance (by winning contractor)
  - Exceeded required service levels
    - Service Delivery 98%
    - Availability 98%
    - Customer Satisfaction – ranges from 90-95%
  - Hardware/software were standardized at each center
  - Interoperability and security were much improved
- Cost— from no adequate way to allocate IT costs to firm fixed price
  - Over 3,500 users
  - 4 to 1 Network Collapse (unclassified)
  - 5 to 1 Network Collapse (classified)
  - **Estimated cost savings 40%**

Public vs. Private Competition for Services: Performance Improvements 1st – Then Cost Savings

Competitive Sourcing of Public Transportation—Transportation authorities award contracts to the lowest responsible and responsive provider—public or private.

City	Year	Performance Improvement
Denver	88-95	Service levels increased 26%
San Diego	79-96	Service levels increased 47%
Indianapolis	94-96	Service levels increased 38%
Las Vegas	93-94	Service levels increased 243%
Los Angeles	80-96	Service reliability increased 300%, complaints reduced by 75%

Cost savings have ranged from 20% to 60% compared to the costs of non-competitive services that were replaced

Ref. Emanual S. Savan "Privatization and Public – Private Partnership", New York; Chatham House, 2000

Conclusions

- The available evidence supports that effective competition will:
  - Encourage innovation and higher quality
  - Reduce production cost significantly
  - Reduce life cycle costs significantly
  - Reduce cost growth throughout the program
  - Strengthen the industrial base
  - Improve the quality of services

Competition is the stated law, and is common in most speeches; it should be the common practice (but applied effectively)

Current Trends are in the Wrong Direction

- Greatly increased use of "Low Price, Technically Acceptable (LPTA)" awards (even on "mission critical" goods and high-knowledge-content services - - is actually more expensive and higher risk, in the long run (vs. "best value" buying), especially when used for acquiring professional services
- Large numbers of "winners" on IDIQ contracts, to take part in bidding on tasks (vs. 2 or 3 firms) is very expensive and ineffective – as in requiring all winners to bid on every task
- Requirement (in "Better Buying Power") to "compete all services after three years" - - regardless of performance and cost trends - - is a big disincentive to industry (vs. a follow-on reward for higher performance and lower costs)

(continued)

Current Trends are in the Wrong Direction

continued

- And, where big savings are possible (like 2nd engine on F-35) government refuses to have competition [in spite of "lessons learned" on "the Great Engine War"]
- Recent proposals for government to be the integrator, and split out subsystems for them to compete and manage, is a very high risk (vs. assuring the prime competes the critical subsystems)
- Taking unsolicited proposals and putting them up for competition – greatly discourages innovation
- Demand for data packages (so they can be put out for "build to print" competition)[not a commercial practice]
- Shift to "open architectures" sometimes results in effective lower-tier competition; but often locks-in old, sub-optimized architectures (vs. a more integrated, lower-cost, more effective, new functional architecture)

Current Trends are in the Wrong Direction

continued

- Poor Data on "Past Performance" of firms on similar ("relevant") work (goods or services) - - a factor which should be an important consideration in most awards (especially the larger ones)
- Due to "vertical integration" by large prime contractors, there is more "make" than "competitive buy" of subsystems (which are often the high risk areas and a large share of the costs)
- DoD is rewarding primes (with higher profit) if they "make" more of the lower tier parts (vs. competitively "buying" them) -- a perverse incentive to efficiency

Some Examples of Multiple-Award, IDIQ Contracts *

- Seaport E - $5.6 Billion in FY10; 2200 “winners” -- some (e.g. Aegis Tech Group) won a seat in 2008, but no $ yet

- Army STOC II – has 136 “winners”; 23 received awards in either 2009 or 2010

Many IDIQ contracts require all “holders” to bid on every task (with “Bid and Proposal Costs” charged to the government - - so, higher overhead)

*Nick Taborek, Wash. Post, Dec. 18, 2011 “Multi-award contracts soar as U.S. lines up pools of suppliers”

SUMMARY: The Environment

- Declining Defense Appropriations (Budgets plus Supplementals)
  - Costs are rising (equip., services, labor, health, energy, etc.)
  - Declining force structures (after Iraq & Afghanistan), but much equipment is 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

- Over 50% of acquisition dollars go to buying services, but all the rules, policies, and practices are based on buying goods

- Rapid Changes occurring (in technology, geopolitics, economics, globalization, and security)

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 and services selection; design; force structure, etc.)
  - Changes to resource allocations and structures (dollars; people; organizations; industry; globalization; education and training; etc.)
  - Flexibility and responsiveness
  - Staying ahead

"Smart Competition" - - effectively applied - - can provide the required higher performance, lower costs, higher quality, flexibility, and responsiveness for 21st Century Security needs

The Keys to "Doing More for Less" are Innovation and Incentives

- **"Innovation"** is a driver of significant change, for gains in effectiveness and/or efficiency - - could be in technology, or in process; but, most important, in thinking (i.e. a "culture change")

- For a **"culture change"** two things are required:
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  2. **Leadership - -** with a vision, a strategy, and a set of actions

- For DoD acquisition, the **recognition of the need for change** is coming from: the declining budget; and the realization that **superior performance at lower cost** is being demonstrated every day in the **competitive** commercial world.

The Message

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