Competition in Defense Acquisitions

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Competition in DoD Acquisitions

- Competition is a driving force in the US economy
  - It forces organizations to improve quality, innovate, reduce costs, and focus on customer needs
  - There are many differences between the commercial and defense markets
  - However, as a general rule, competition has the same effects in defense acquisitions
- None-the-less, introducing competition into DoD acquisitions is not always straightforward
- Barriers include: industry consolidation (horizontally and vertically); increased resistance to globalization ("Buy American"); product specialization; often increased up-front costs; and reluctance to change suppliers (even if they are not performing)

Eight Potential Forms of Competition and Results Usually Found

1. Compete **for** Development—winner "buys in" (with performance, schedule, and cost "optimism")
   - later results in lower performance, schedule slips, and costs growths ("optimize the changes clause")
2. Competition **during** Development—introduces innovation to meet performance, schedule, and costs targets; and reduce risks
   - especially effective if given a production cost target and flexibility to do systems engineering and to use proven technology for block I
3. Compete **for** Production—forces extreme "optimism" on prices bid (since win or lose all)
   - proposed learning curves not achieved (curves often even go up)
   - sole-source pricing of all changes; and an incentive to create them

Initial low bid is likely be Illusory

Eight Potential Forms of Competition and Results Usually Found (cont)

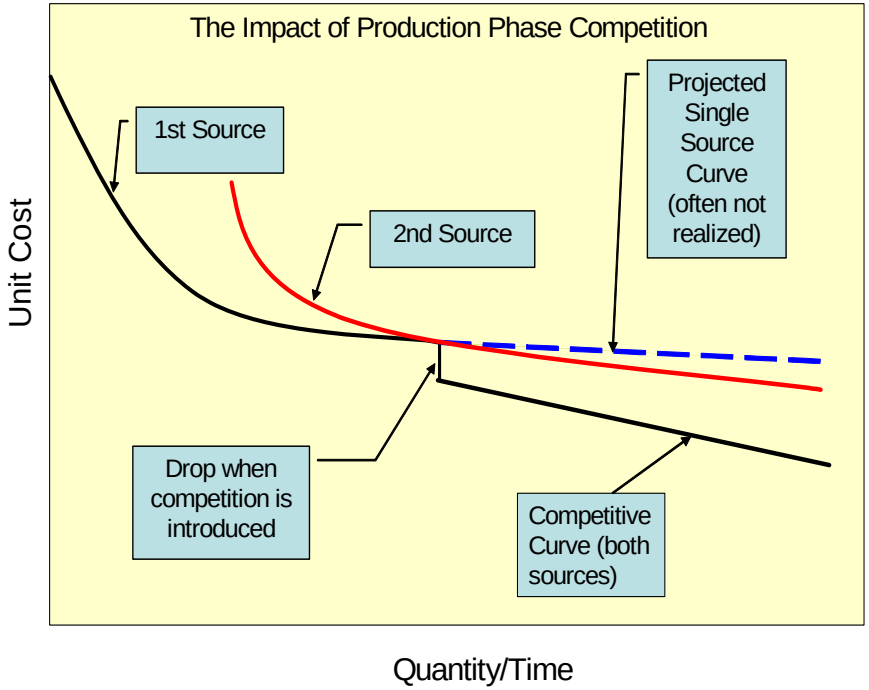
4. Competition **during** Production—forces continuous process and product innovation, resulting in:
   - Higher performance at lower costs
   - Steeper learning curves achieved by both suppliers
5. Compete **during Sustainment** — Support usually is a sole-source follow-on—but if reliability is poor and/or support costs are high—introducing competition can have big impacts.
6. Competition **for Services**
   - Services should not be about the lowest hourly rate (but, they often are); quality matters (i.e. "best value") but harder to predict and to measure
7. Competition **during Services**
   - Best to award multiple service providers and compare cost and results (services now 60% of DoD acquisitions)
8. "Competitive Sourcing" (Public/Private Competitions) e.g. via A-76 — Results are generally higher performance, and an average of over 30% savings (no matter who wins)

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 steepness of 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 Changes Cost Growth	7.4%	29.4%
Percent Procurement Changes Cost Growth	4.1%	15.2%

Dual-Source Programs include:

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

*** CAIG called these "Mistakes" and Defined 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

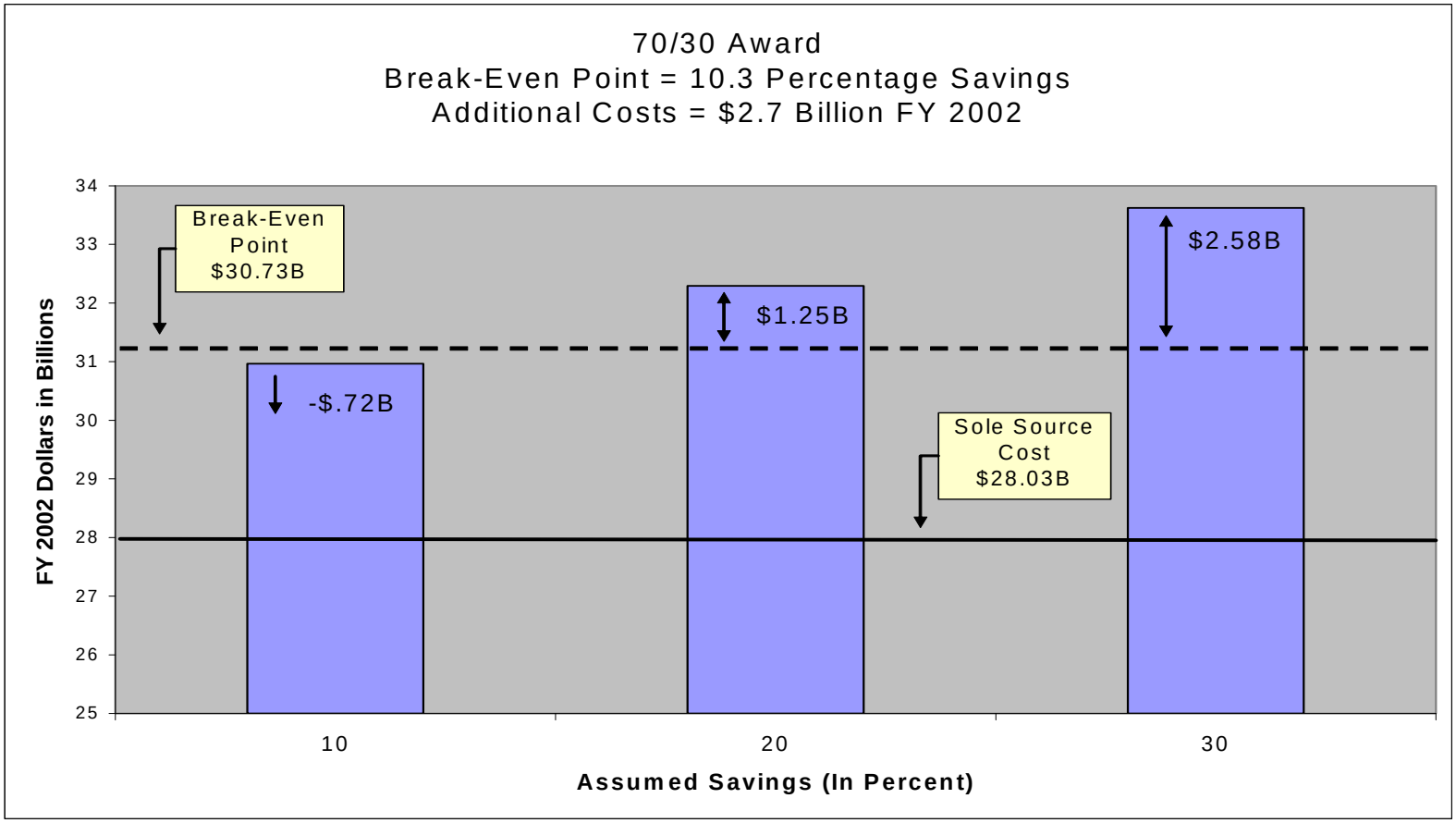
The Great Engine War—Realized benefits

(Pitted P&W and 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 to reduce costs and improve quality
- Lower cost warranties--significant savings gained from the original P&W warranty cost
- Dual lower-tier suppliers 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

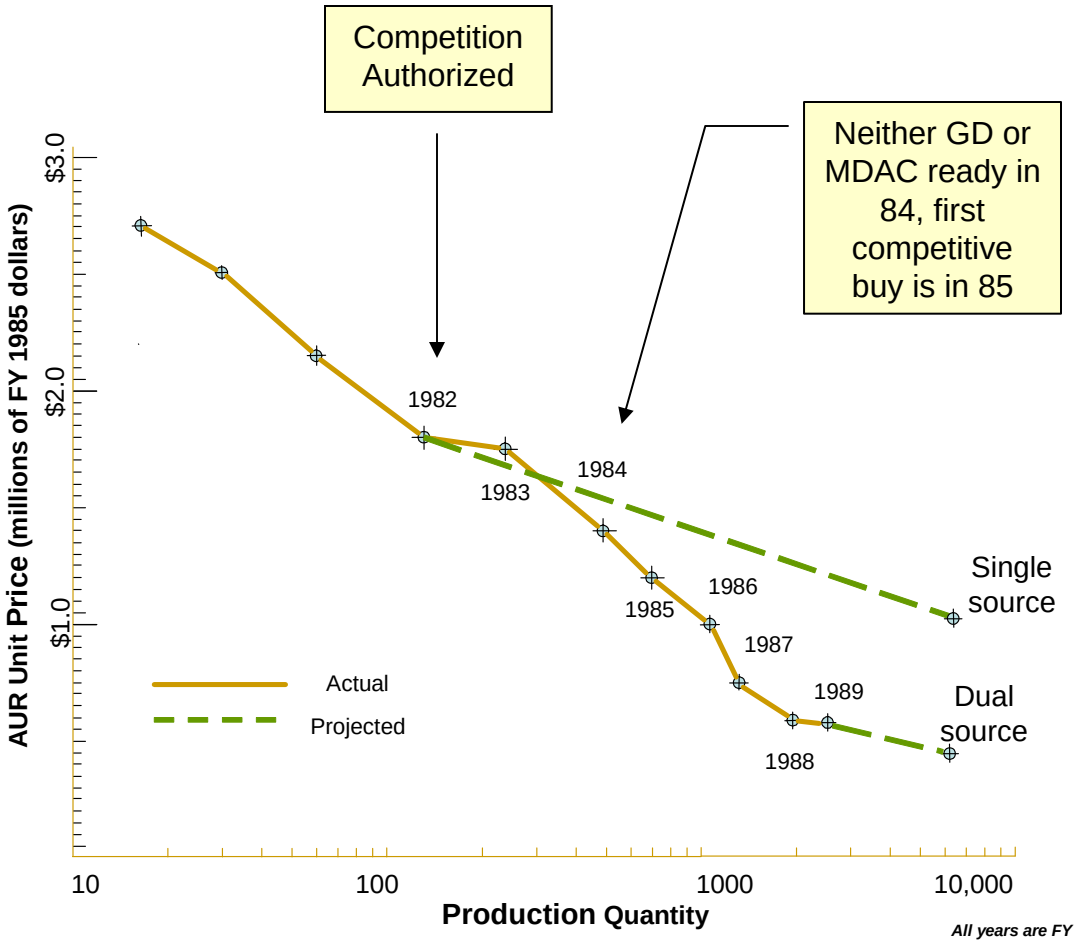
Competition During Production: JSF Engines NPV Break-Even Analysis



Source: Testimony of Michael Sullivan before the House Armed Services Committee, Subcommittees on Air and Land Forces, and Seapower and Expeditionary Forces, 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

*Cost Growth Factor is based on actual cost incurred

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

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**

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

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

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

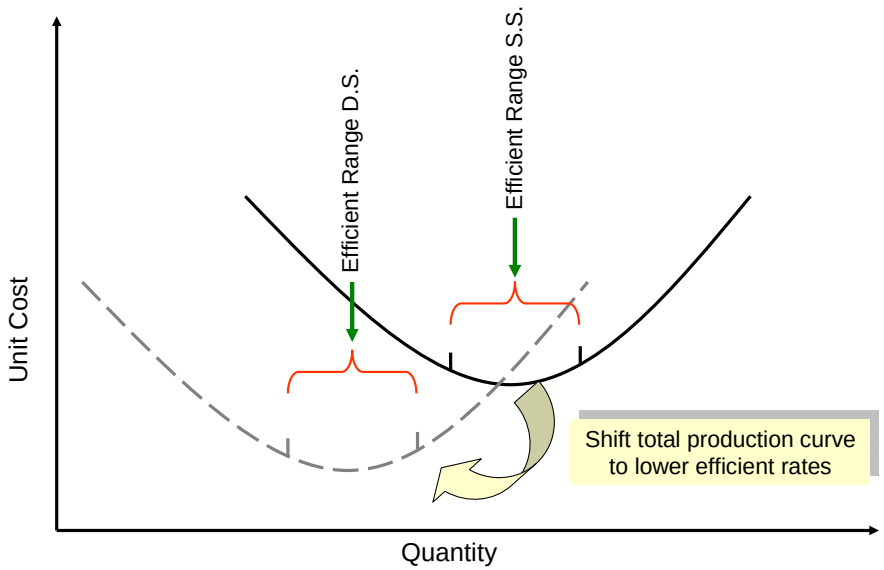
Cost Growth Examples for other Non-Competitive Programs

- 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."

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

*Klevan, Paul, NAVICP, UID Program Manager Workshop Briefing, 5 May 2005

**Kratz, Lou, OSD, Status Report, NDIA Logistics Conference Briefing, 2 Mar 2004

Competitive Sourcing/A-76

- Work is not inherently governmental
- Work can be performed better, faster, cheaper 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 for “leaning” 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" 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

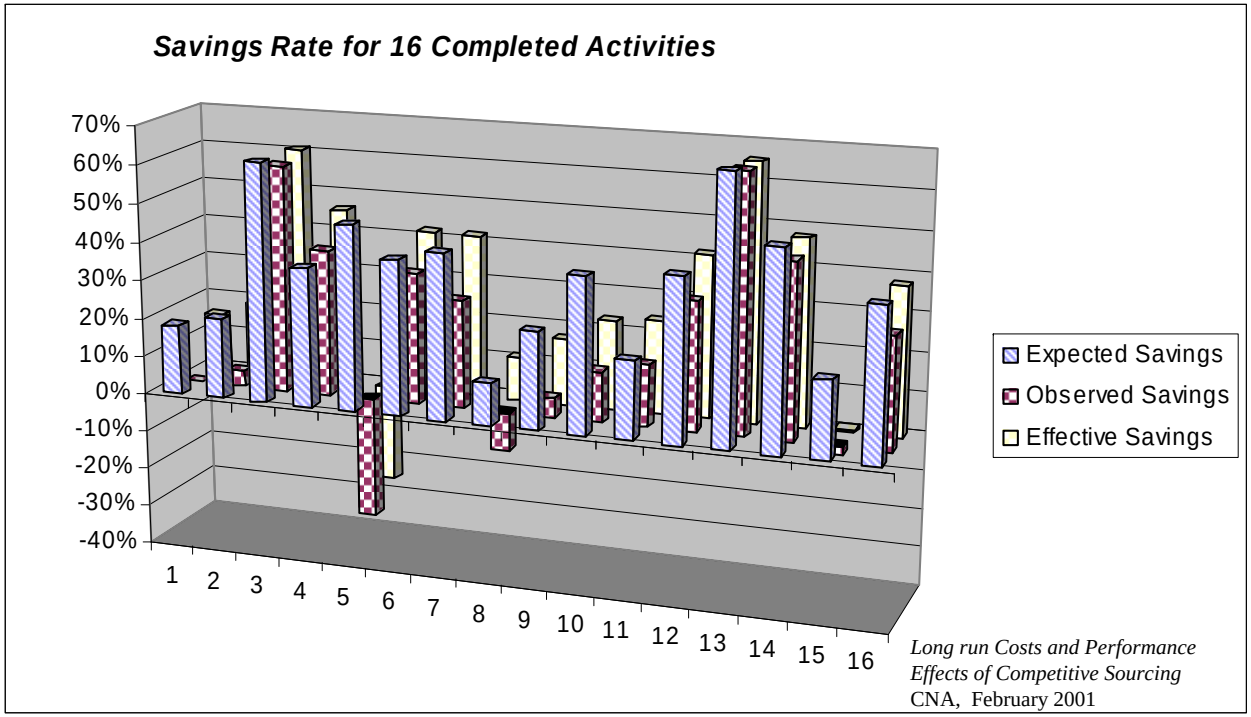
Competitive Sourcing 2004 IRS Results

	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%**

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

Conclusions

- The available evidence supports that 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

Recommendations to Increase Competition

- Utilize Competition During All Phases
  - Or provide the potential for cost control
- Take Advantage of Globalization
  - Transatlantic competitive/cooperative R&D/production
- Expand Small Business Innovation Research (SBIR) Program
- Expand Defense Industrial Base
  - Incentivize firms to enter defense business
  - Reduce horizontal and vertical integration

BACKUP SLIDES

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

Why does Government use its Monopsony Power so Sparingly

- DoD Is not a unitary decision maker—acquisition spread among services, elements of services, program offices (and even some help from Congress)
  - All compete for annual budget share, resources, national security turf
  - Single supplier can exploit differences
- Long-term government relationships with contractor
- Information asymmetry favors contractors
- "Promises" that this time the sole-source learning curves will be realized; which the government wants to believe
- Perception of costing more for two sources
- Many contradictory (and competing) government objectives
  - Buying for lowest cost or best value
  - For competition
  - To protect "industrial base"—including jobs
  - For innovation
  - To act fairly
- Often it is small "Savings" taken up-front, at the expense of large cost savings later

Analysis of Government and Defense Industry – Monopsony and Oligopoly Power Struggle

- The Barriers to Entry are High
- Suppliers Have Moderately Intense Rivalry
  - 2-3 players of the same size
  - "Lumpy" Procurements
  - Usually all or nothing
  - Uncertain Market Growth Rate
- There is a low threat of product substitution
- As a result, the government only has medium power

As long as there are at least two perceived viable competitors the Government can hold its own--but it takes determined leadership