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Staffing Cyber Operations (Presentation)

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Staffing Cyber Operations

**Western Economics Association
International**

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IDA | Briefing Outline

- **Background**
- **Methodology**
- **Direct Participation in Cyberspace Hostilities**
- **Analysis of Staffing Plans**
 - **Assessment of Inherently Governmental (IG), Commercial Activity, and Military Essentiality**
 - **Costing**
- **Conclusions**

IDA | Background

- U.S. Cyber Command asked the Services to create a Cyber Mission Force (CMF): >6100 personnel in 133 teams
- Five types of teams in all four Services:
 - National Mission (NMT)
 - National Support (NST)
 - Combat Mission (CMT)
 - Combat Support (CST)
 - Cyber Protection (CPT)
- Service staffing paradigms differ – include about 80% military personnel on average
- It is not obvious how many of the positions are really military-essential

IDA | Objective

- Explore alternative staffing strategies that would accomplish the cyberspace operations-related functions in a cost-effective fashion

IDA | Project Methodology

Assumed the Role of a Manpower Planner

- Analysis/study of DoDI 1100.22 *Policy and Procedures for Determining Workforce Mix*
 - Reviewed current statutory, policy-based, and administrative law provisions, definitions, and declarations of inherently governmental functions in federal law and guidance
- Understanding of the Mission Requirement of the Cyber Mission Force
 - Doctrine: JP 3-12 Cyberspace Operations
 - U.S. Cyber Command's Cyber Force Concept of Operations and employment interviews with the four Services and representatives from CYBERCOM's J8
- Developed criteria for determining direct participation in cyber hostilities
- Evaluated every billet in CMF; built alternative staffing structures
- Estimated the annual cost of each CMF Staffing Plan
 - Followed DoDI 7041.04 on Manpower Costing
 - Used CAPE's Full Cost of Manpower (FCoM) Costing Tool with modifications
 - Only USAF provided requested Service training costing data

IDA | Summary of Service Interviews – How Did We Get to Where We Are?

- These are military teams conducting Title 10 missions
- No time to build this requirement in the POM – Requirement approved in FY13; first teams required in same FY; must complete requirement by FY16
- No temporary end strength increase or additional funding for civilian personnel to build this force
- No consensus on which positions constitute Direct Participation in Cyberspace Hostilities (DPH) = Cyberspace Combatant
- Still a fair amount of uncertainty on the team composition and locations
 - USCYBERCOM: we will make changes to team designs as we learn from use
 - Concept of Operations and employment still requires development
- Civilians may not be able to help meet surge requirements
- Service staffing decisions based primarily on fielding what they believe is the most flexible force mix

IDA | Policy for Determining Workforce Mix

- DODI 1100.22 provides a decision framework

A	Direction and Control of Combat and Crisis Situations	
B	Exemption of Combat Support and Combat Service Support due to Operational Risk	
D	Exemption of Manpower Dual-Tasked For Wartime Assignments	
E	DoD Civilian Authority Direction & Control	F Military-Unique Knowledge & Skills
G	Exemption for Esprit de Corps	
H	Exemption for Continuity of Infrastructure Operations	I Military Augmentation of the Infrastructure During War
J	Exemption for Civilian & Military Rotation	K Exemption for Civilian & Military Career Development
L	Exemption by Law, Executive Order, Treaty or International Agreement	
M	Exempted by DoD Management Decision	
P	Pending Restructuring of Commercial Activities	
R	Subject to Review for Public-Private Competition	
W	Non-Packagable Commercial Activity	
X	Alternative to Public-Private Competition	

- These are the justifications for using government personnel
- We started with Category A – leadership – as military-essential
- Added criterion of being DPH, but international law and practice are not well-defined
- Chose least expensive performer if criteria do not require a single source

IDA | Possible Litmus Test for Determining “Direct Participation in Cyberspace Hostilities (DPH)”

Must Satisfy Three Criteria

- **Threshold of Harm:** The act must be likely to adversely affect the military operations of a party to an armed conflict or, alternatively, to inflict death, injury, or destruction on persons or objects protected against direct attack
- **Direct Causation:** There must be a direct causal link between the act and the harm likely to result either from that act, or from a coordinated military operation of which that act constitutes an integral part
- **Belligerent Nexus:** The act must be specifically designed to directly cause the required threshold of harm in support of a party to the conflict to the detriment of another (issue of intent)

IDA | Illustrative Application of DPH Criteria

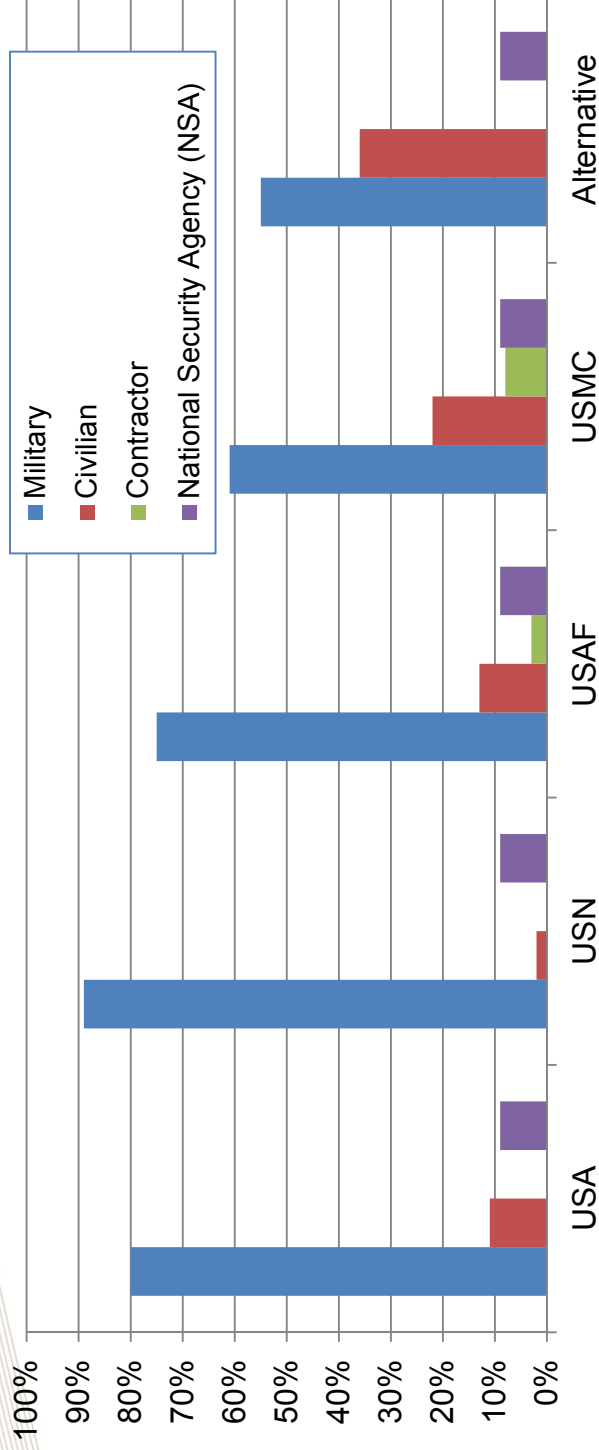
Cyber Activity	Threshold of Harm	Direct Causation	Belligerent Nexus	DPH
Exploitation of vulnerabilities on a target state system by introduction of a hostile agent that damages it directly	Yes. Introduction of the hostile agent is what causes the harm	Yes. There is no intermediary between introduction of the agent and its activation	Yes. Intention is clearly hostile	Yes
Dictation or written provision, to a combatant, of the precise set of commands needed to activate the hostile agent	Yes. Harm would not occur but for provision of the commands	Yes. Activation is caused directly by the input of the commands	Yes. Intention is clearly hostile	Yes
Design/writing of a specific cyber program	Yes. If the program is designed to cause the harm specified	No. Any eventual harm that might result is too remote	Yes. Potentially, if research takes place with a specific future target or conflict in mind	No
Provision of regular/routine operational maintenance for the cyber warfare equipment	No. Any harm is too remote from mere maintenance	No. Routine maintenance does not itself cause any direct harm	No. System would require routine maintenance irrespective of its use in conflict	No

IDA | Comparing IDA and Service Work Role Assignments

- Almost complete agreement on military performers in the following work role categories
 - Team leadership roles
 - Team military planner roles – DPH
 - Interactive Operators and Endpoint Exploitation Analyst – Cyberspace Combatants (leaders also qualify as combatants) – DPH
- Analyst work roles on the teams, especially on the support teams (NST and CST)
 - IDA assessment – positions IG but not DPH; do not justify a military performer
 - USCYBERCOM staffing guidance concurs – IG but no need for military performer
 - Services predominantly manning with military performers, often all military
 - Software Engineers/Tool Developers
 - Not DPH. IG or Commercial function?
 - Staffing plans vary from all military performers, to military and civilian performers, to civilian and contractor performers
 - Not an existing military occupation in the Services, nor one commonly employed by the Services
 - IDA selected government civilians as least expensive

IDA | National Mission Teams (NMT)

National Mission Team Force Mix

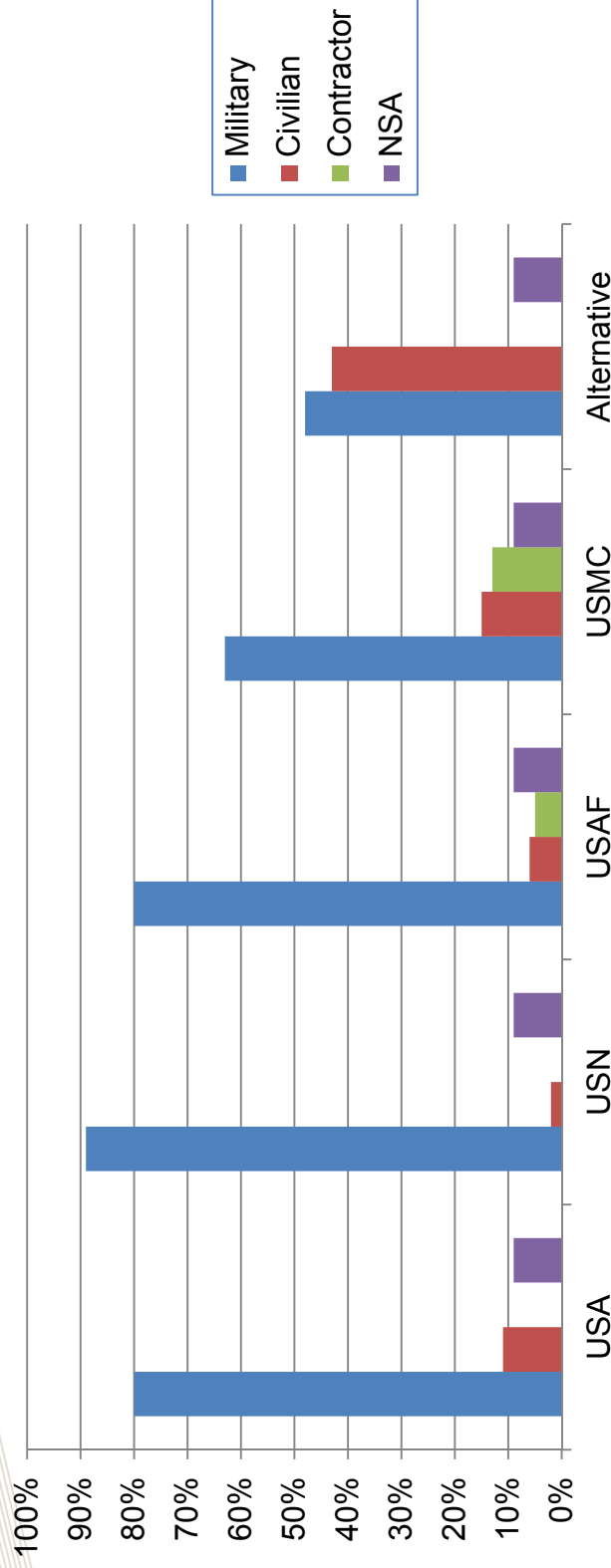


Cost Estimates – All Cost Estimates are Cost to the Government

	Per Team	Per Person	% Saved
USA NMT	\$ 8,449,731	\$ 145,685	14%
USN NMT	\$ 8,588,139	\$ 148,071	15%
USAF NMT	\$ 8,181,285	\$ 141,056	11%
USMC NMT	\$ 8,844,553	\$ 152,492	17%
Alternative NMT	\$ 7,302,170	\$ 125,899	

IDA | Combat Mission Teams (CMT)

Combat Mission Team Force Mix

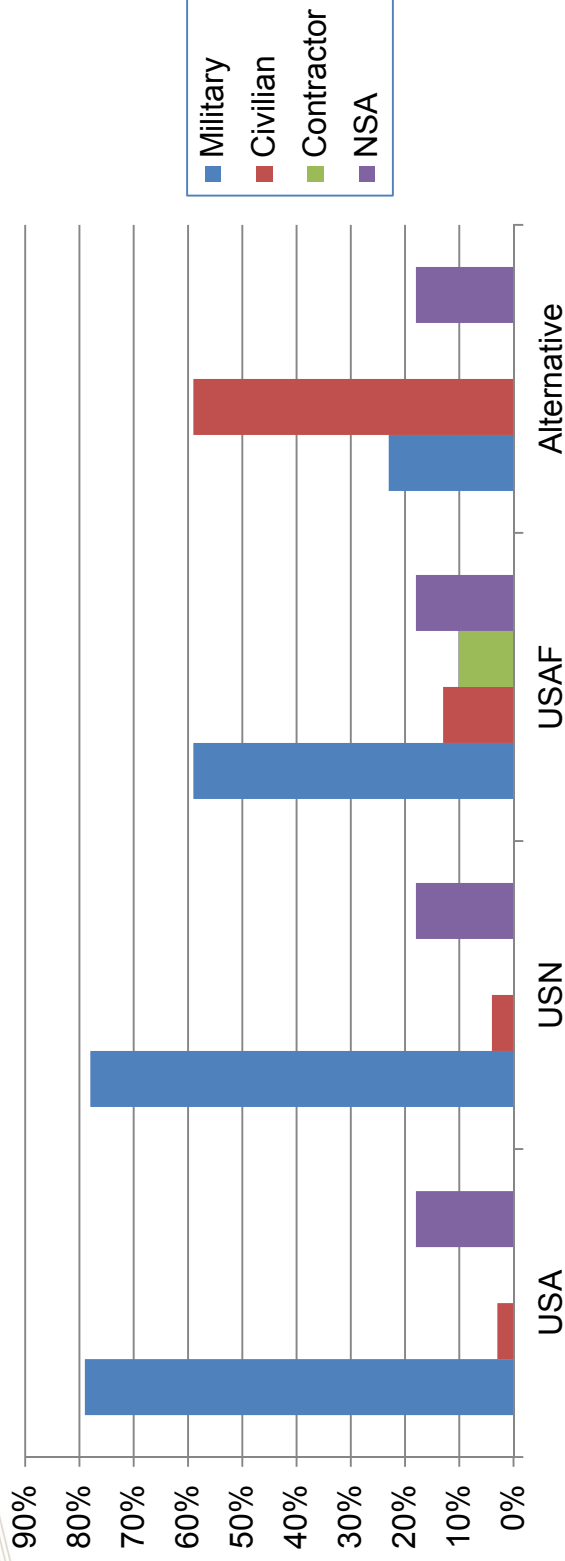


Cost Estimate

	Per Team	Per Person	% Saved
USA CMT	\$ 8,365,541	\$ 144,233	17%
USN CMT	\$ 8,638,604	\$ 148,941	20%
USAF CMT	\$ 8,627,591	\$ 148,751	20%
USMC CMT	\$ 9,052,540	\$ 156,078	24%
Alternative CMT	\$ 6,915,816	\$ 119,238	

IDA | National Support Teams (NST)

National Support Team Force Mix



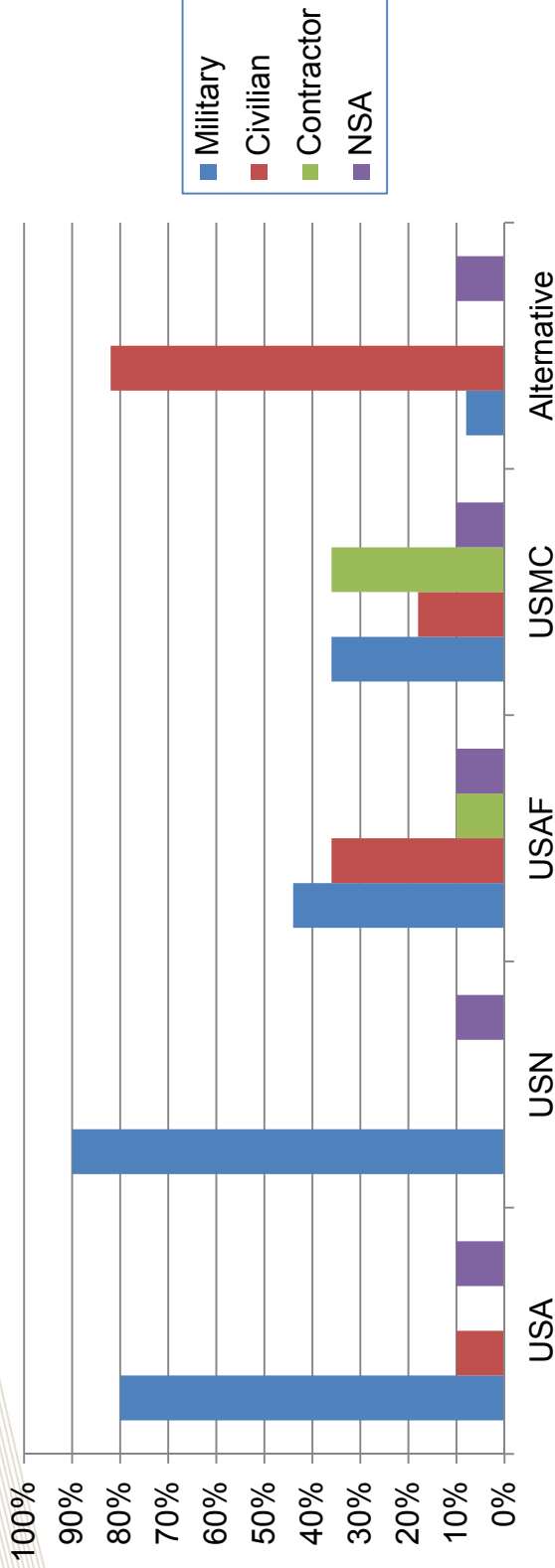
USMC is not required to build a NST

Cost Estimate

	Per Team	Per Person	% Saved
USA NST	\$ 5,185,898	\$ 162,059	27%
USN NST	\$ 4,922,250	\$ 153,820	23%
USAF NST	\$ 4,300,848	\$ 134,401	12%
Alternative NST	\$ 3,780,101	\$ 118,128	

IDA | Combat Support Teams (CST)

Combat Support Team Force Mix

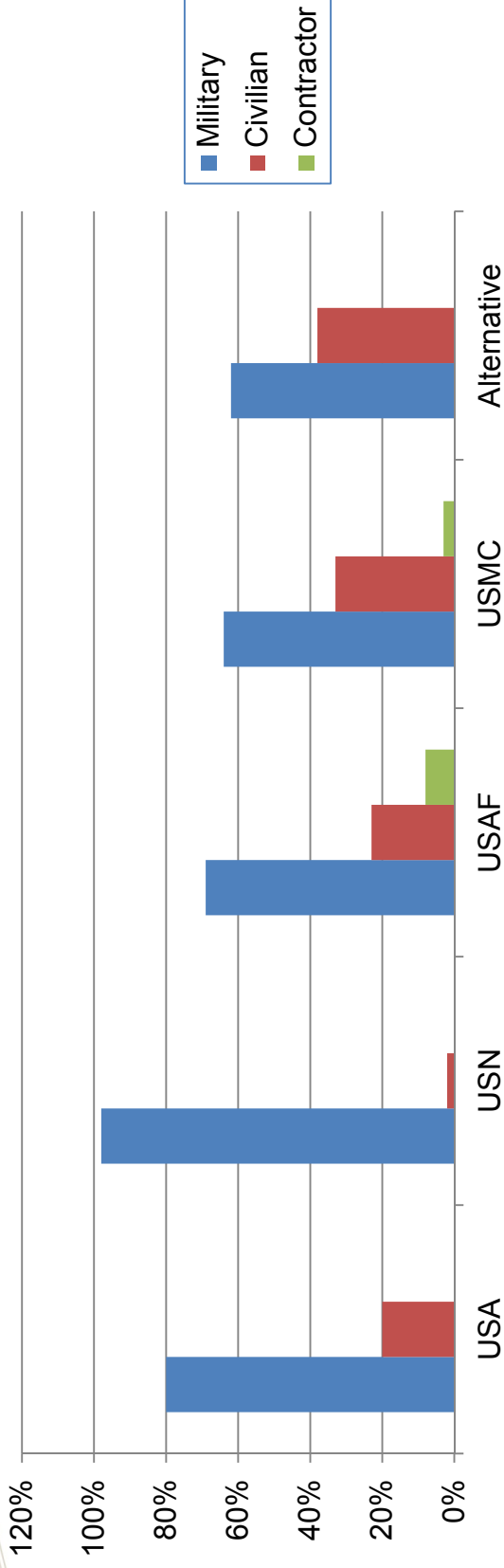


Cost Estimate

	Per Team	Per Person	% Saved
USA CST	\$ 5,002,729	\$ 142,935	35%
USN CST	\$ 5,367,682	\$ 153,362	39%
USAF CST	\$ 4,302,765	\$ 122,936	24%
USMC CST	\$ 5,740,090	\$ 164,002	43%
Alternative CST	\$ 3,273,497	\$ 93,528	

IDA | Cyber Protection Teams (CPT)

Cyber Protection Team Force Mix



Cost Estimate

	Per Team	Per Person	% Saved
USA CPT	\$ 6,322,581	\$ 162,117	16%
USN CPT	\$ 5,705,727	\$ 146,300	7%
USAF CPT	\$ 5,332,282	\$ 136,725	1%
USMC CPT	\$ 5,736,964	\$ 147,101	8%
Alternative CPT	\$ 5,280,461	\$ 135,396	

IDA | Summary of Staffing Alternatives

Workforce Category	Army	Navy	Air Force	Marine Corps	Total of All 4 Services	Alternative
Military	1428	1703	1271	373	4775	3047
Civilian	354	44	329	155	882	2776
Contractor	0	0	115	51	166	0
DoD Total	1782	1747	1715	579	5823	5823
NSA Augmentation	117	113	106	28	364	364
Grand Total	1899	1860	1821	607	6187	6187

- The alternative replaces 36% of CMF military personnel and all the contractors with civilians
- Raises civilians from 15% to 48% of DoD employees

IDA | Cost Per Person by Personnel Category

Cost to DoD	Services	Alternative
Military - Officer	\$ 168,703	\$ 167,594
Military - Enlisted	\$ 105,202	\$ 110,654
Civilian	\$ 101,109	\$ 80,315
Contractor	\$ 200,306	N/A

Full Cost to Government	Services	Alternative
Military - Officer	\$ 220,613	\$ 219,009
Military - Enlisted	\$ 140,395	\$ 146,740
Civilian	\$ 107,863	\$ 85,672
Contractor	\$ 200,306	N/A

- Followed DoD Instruction 7041.04 on Manpower Costing
- Used CAPE FCoM Tool; adjusted some factors
- Substituted training cost estimate from USAF cyber community
- IDA alternative largely substitutes civilians for enlisted personnel and contractors
- Military are more expensive to DoD because of Base Allowance for Housing (BAH), retirement, and training costs
- Additional costs to the government are largely the tax advantage of benefits and veterans' benefits

IDA | Summary of Potential Cost Savings

Annual Cost under Service Staffing			
Army		\$	272,748,940
Navy		\$	259,181,088
Air Force		\$	238,507,029
Marine Corps		\$	87,637,975
	Total Force Cost	\$	858,075,032
Annual Cost under IDA Staffing Alternative			
Team Type	Requirement	Cost per Team	Team Type Total Cost
National Mission Teams	13	\$7,302,170	\$ 94,928,210
Combat Mission Teams	27	\$6,915,816	\$ 186,727,032
National Support Teams	8	\$3,780,101	\$ 30,240,808
Combat Support Teams	17	\$3,273,497	\$ 55,649,449
Cyber Protection Teams	68	\$5,280,461	\$ 359,071,348
	Total Force Cost	\$	726,616,847

% Saved = 15% Savings to DoD = \$76M

= \$131M

IDA | Conclusions – Costs

\$131M in potential savings (\$76M to DoD) are available from increased civilianization consistent with DoDI 1100.22

IDA | Conclusions – Further Analysis

- Need information on team performance or mission success
 - US Cyber Command or the Services should measure the performance and effectiveness of the teams so potential changes to the teams, including the workforce mix, can be assessed.
- Need to better understand how to support military and civilian career development
 - Can the civilians on the teams be managed as part of a larger workforce rather than four Service civilian workforces?
 - The NSA workforce would provide a useful point of comparison
- Need to understand whether the compensation systems for military personnel and government civilians attract and retain enough high-quality cyber warriors

BACK-UPS

IDA | Average Military and Civilian Grades

	Army	Navy	Air Force	Marine Corps	IDA
Officer	O3/W2	O3	O3	O3	O3
Enlisted	E5	E5	E5	E5/E6	E5
Civilian	GS-12	GS-14	GS-10	GS-13	GS-11
Contractor	N/A	N/A	N/A	N/A	N/A

IDA | Comparison of Army and Alternative Costs

		Army		
Team Type	Requirement	Cost per Team	Team Type Total Cost	
NMT	4	\$8,449,731	\$ 33,798,924	
CMT	8	\$8,365,541	\$ 66,924,328	
NST	3	\$5,185,898	\$ 15,557,694	
CST	6	\$5,002,729	\$ 30,016,374	
CPT	20	\$6,322,581	\$ 126,451,620	
		Total Force Cost	\$ 272,748,940	
		Alternative		
Team Type	Requirement	Cost per Team	Team Type Total Cost	
NMT	4	\$7,302,170	\$ 29,208,680	
CMT	8	\$6,915,816	\$ 55,326,528	
NST	3	\$3,780,101	\$ 11,340,303	
CST	6	\$3,273,497	\$ 19,640,982	
CPT	20	\$5,280,461	\$ 105,609,220	

% Saved = 19%

IDA | Comparison of Navy and Alternative Costs

		Navy			
Team Type	Requirement	Cost per Team	Team Type Total Cost		
NMT	4	\$8,588,139	\$	34,352,556	
CMT	8	\$8,638,604	\$	69,108,832	
NST	3	\$4,922,250	\$	14,766,750	
CST	5	\$5,367,682	\$	26,838,410	
CPT	20	\$5,705,727	\$	114,114,540	
		Total Force Cost	\$	259,181,088	
		Alternative			
Team Type	Requirement	Cost per Team	Team Type Total Cost		
NMT	4	\$7,302,170	\$	29,208,680	
CMT	8	\$6,915,816	\$	55,326,528	
NST	3	\$3,780,101	\$	11,340,303	
CST	5	\$3,273,497	\$	16,367,485	
CPT	20	\$5,280,461	\$	105,609,220	

% Saved = 16%

IDA | Comparison of USAF and Alternative Costs

			Air Force		
Team Type	Requirement		Cost per Team	Team Type Total Cost	
NMT	4		\$8,181,285	\$	32,725,140
CMT	8		\$8,627,591	\$	69,020,728
NST	2		\$4,300,848	\$	8,601,696
CST	5		\$4,302,765	\$	21,513,825
CPT	20		\$5,332,282	\$	106,645,640
			Total Force Cost	\$	238,507,029
			Alternative		
Team Type	Requirement		Cost per Team	Team Type Total Cost	
NMT	4		\$7,302,170	\$	29,208,680
CMT	8		\$6,915,816	\$	55,326,528
NST	2		\$3,780,101	\$	7,560,202
CST	5		\$3,273,497	\$	16,367,485
CPT	20		\$5,280,461	\$	105,609,220

% Saved = 10%

IDA | Comparison of USMC and Alternative Costs

			Marine Corps	
Team Type	Requirement		Cost per Team	Team Type Total Cost
NMT	1		\$8,844,553	\$ 8,844,553
CMT	3		\$9,052,540	\$ 27,157,620
NST	0		\$0	\$ -
CST	1		\$5,740,090	\$ 5,740,090
CPT	8		\$5,736,964	\$ 45,895,712
			Total Force Cost	\$ 87,637,975
			Alternative	
Team Type	Requirement		Cost per Team	Team Type Total Cost
NMT	1		\$7,302,170	\$ 7,302,170
CMT	3		\$6,915,816	\$ 20,747,448
NST	0		\$3,780,101	\$ -
CST	1		\$3,273,497	\$ 3,273,497
CPT	8		\$5,280,461	\$ 42,243,688

% Saved = 16%

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