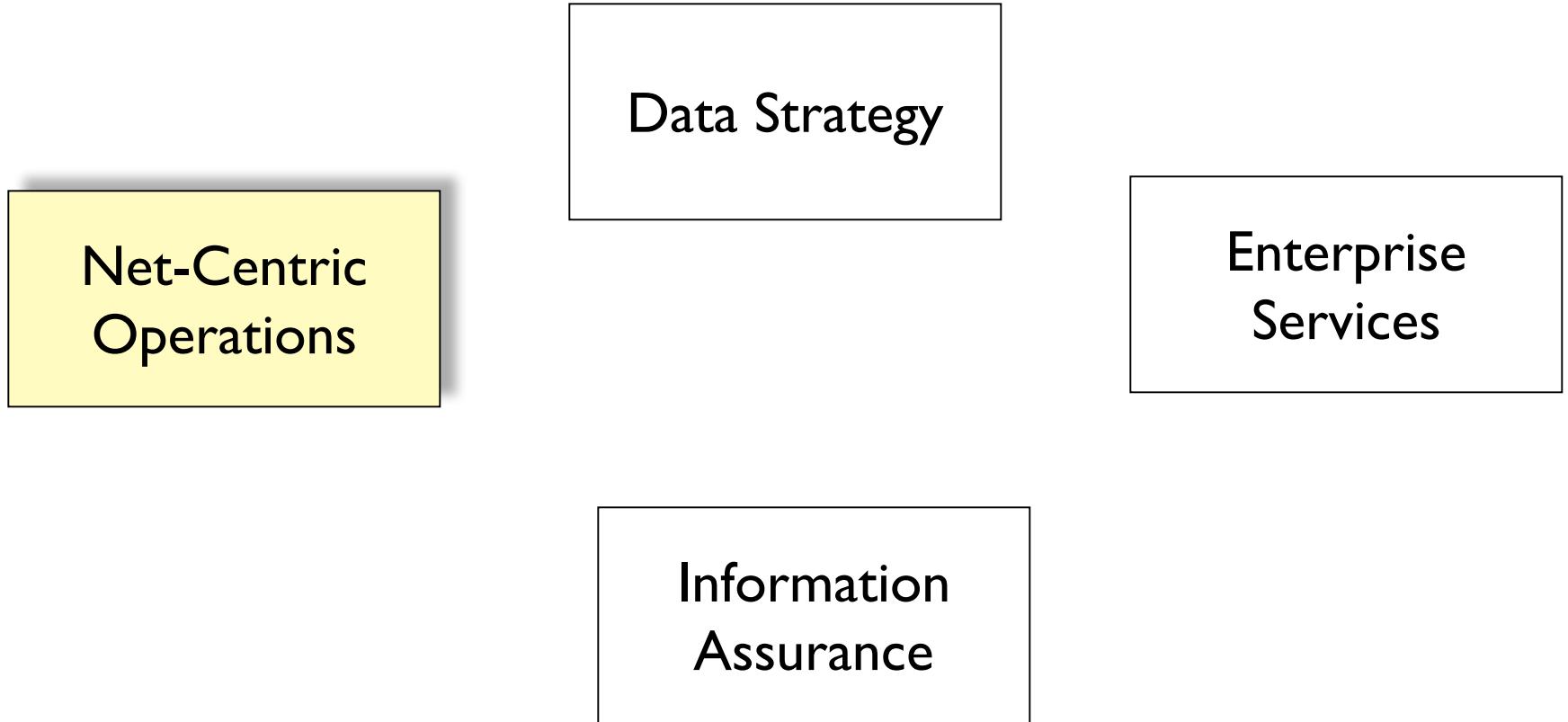


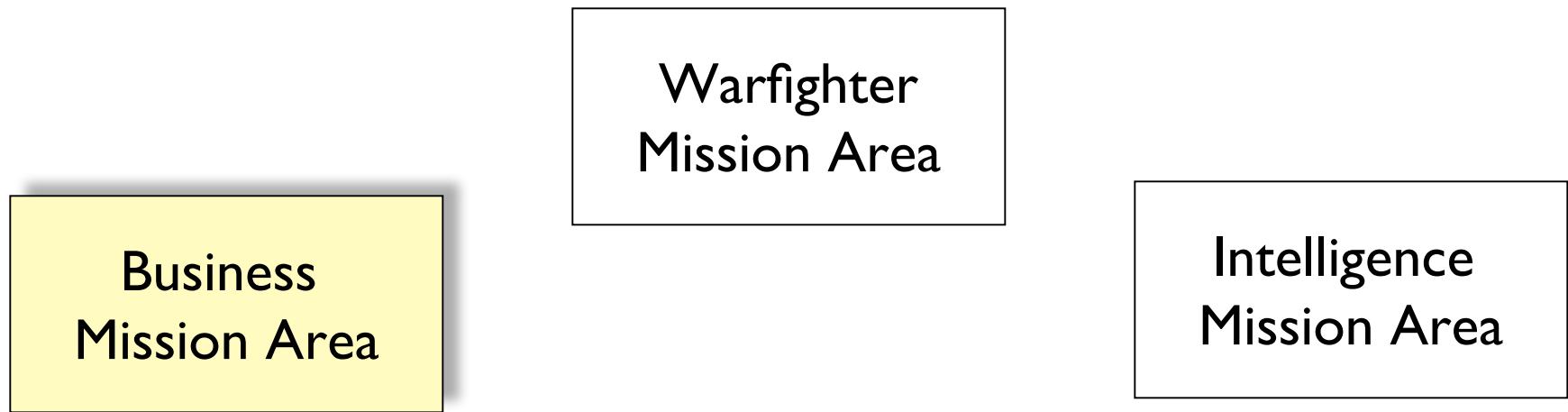
Net-Centric Strategy for Defense Transformation

Prof. Paul A. Strassmann
George Mason University, November 20, 2006

Components of Transformation in DoD



Organization for Transformation in DoD



Case Study of Transformation - IBM

IBM 2004 Program

Current I.T. Budget - \$3.9B

Cost Reduction - 18%

How to Save \$20 Billion through Transformation

	IBM in 1990	IBM in 2004
Purchase Order Process Time	One month	One day
Procurement Sources	300	3
Electronic Purchases	<20%	95%
E-Enabled Suppliers	<500	35,000
Electronic Catalogs	0	280

Indicators of Transformation Potential

	IBM - 2004	Navy - 2004
Revenue	\$ 96.3 Billion	\$ 103.7 Billion
Personnel	319,000	550,000
Management Layers	6	27
Total Number of Networks	1	850
IT Applications	4,100	23,755
Financial Management Applications	406	1,083
HR Applications	300	708

Case Study of Transformed Operations - VISA

Global Operations of VISA

The VISA Case

- >1.3 billion Visa cards in circulation;
- Accepted at >24 million input sources, >160 countries;
- >50,000 decision rules for interoperability;
- Interoperability in >50 languages;
- Cash access at >one million ATMs;
- Capable of processing >6,200 transactions a second;
- Global response time <0.25 seconds;
- Interoperable with >21,000 financial institutions;
- Global Systems Integration Staff of 200;

Technologies Applied by VISA

- Massive parallel computing;
- Only valid data may enter further processing;
- Code assembled from shared components;
- Services assembled as co-operating applications;
- Limited applications.

Case Study of Transformation - HP

Hewlett-Packard 2004-2008 Program

Current I.T. Budget - \$3.5B

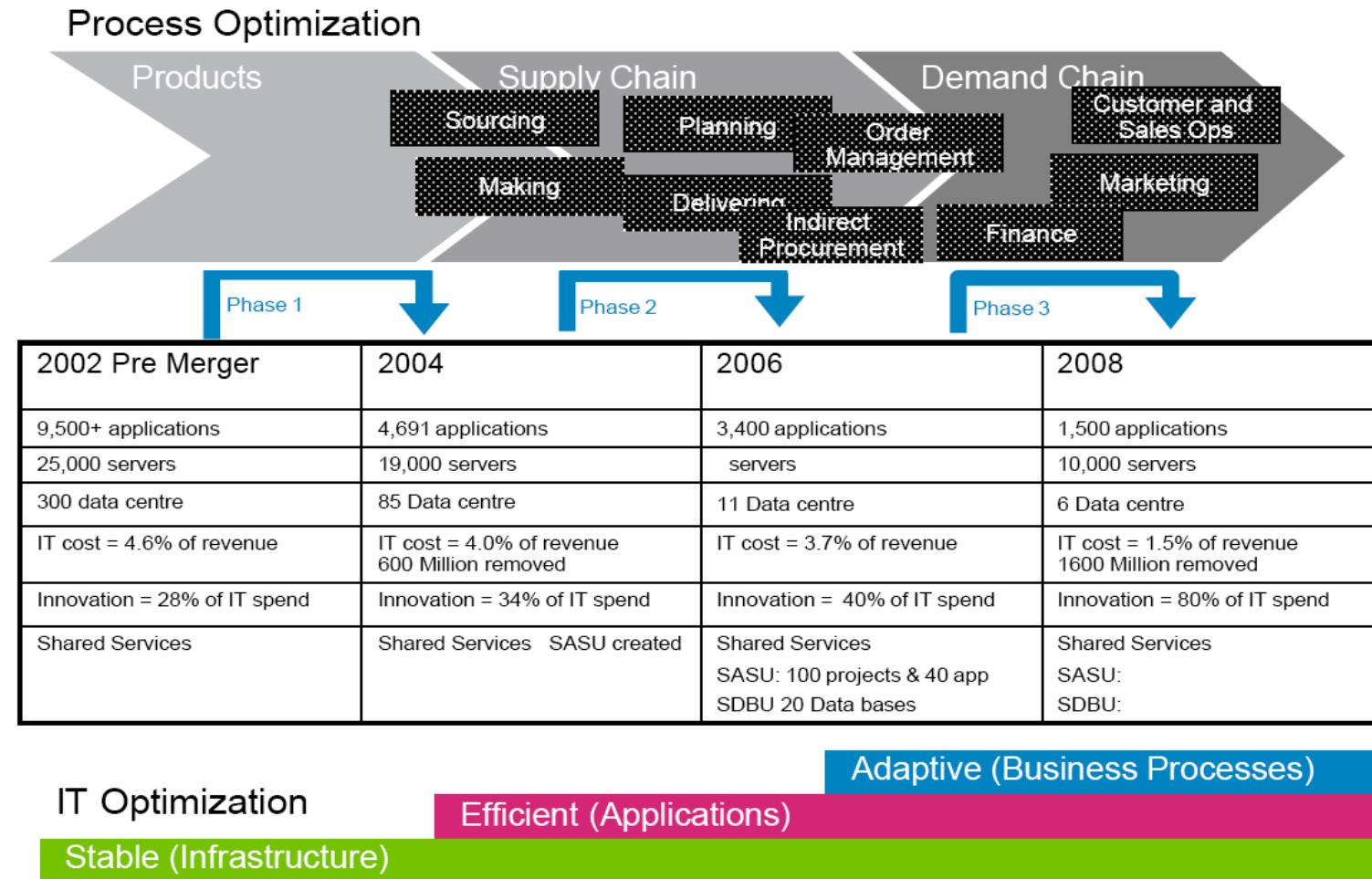
Cost Reduction - 21%

Current I.T. Cost Reduction/Performance Improvement Program

1. Reduce number of applications from 5,000 to 1,500.
2. Reduce the number of servers from 19,000 to 10,000.
3. Increase server utilization from 20% to 80%.
4. Consolidate 100 world sites for IT development to 29.
5. Consolidate 85 data centers to six.
6. Build a 300 terabyte database to be SOA accessible.
7. Reduce I.T. workforce from 19,000 to 8,000.
8. 80% of staff on new projects, 20% on maintenance.

Current HP Cost Reduction Program

The HP IT Cost Reduction results



Projected Savings

\$1 billion + annual cost savings machine



(\$M)	First year	Second year	Annual target '05-'07
Direct material leverage*	459	420	300 – 400
Indirect procurement	309	215	200 – 250
Product redesign	339	293	300 – 350
Subtotal procurement	1,107	928	800 – 1,000
Supply Chain	329	380	200 – 250
Sales Operations	115	117	60 – 80
Subtotal Operations	444	497	260 – 330
Grand total Operations	1,551	1,425	1,060 – 1,330

HP Approach to Centralized Data Center Management

Changing the way we build and operate our data centers



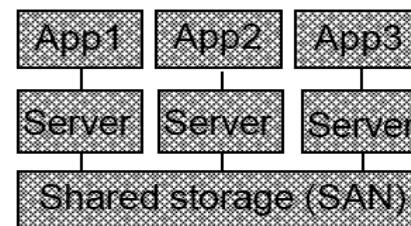
Traditional Data Center

Monolithic computing



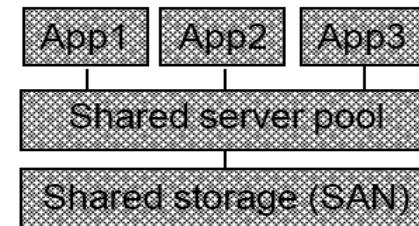
Today's Data Center

Silo'd Infrastructure



Next Generation Data Center

Shared infrastructure



- Proprietary, mainframe based
- Single vendor solution stack (IBM)
- Singular technology and skills requirements
- Limited connectivity/networking
- 'Static' production deployment

- Islands (silos) of technologies (OS/architecture dependent)
- Dedicated server and/or application stacks
- Multi-OS, multi-architecture DC environments
- Cost/complexity improved primarily via IT consolidation, Linux trends

- Modular re-deployable HW (blades)
- Automated administrative tasks
- Reconfiguration and scaling without 'rewiring'
- Run IT as a shared service utility (ex. shared test/dvlp. environment)
- Resource utilization dynamically allocated ('beyond')

Example of Application Reduction

- Consolidate personnel information systems into a single data base to be globally accessible from a portal.
- Retire 84 procurement transaction systems into 5.
- HP portal offers capabilities for user-initiated inquiries.

H-P vs. Navy Comparisons

Distribution of I.T. Spending	H-P (2008)	Navy (2007)
Agility	12%	0%
Application Innovation - RDT&E	38%	9%
Maintenance - O&M	13%	36%
Infrastructure	37%	54%

Navy Case Study

Business Transformation

Scope of Business Management Systems

DoD Investment Review Boards	Air Force	Army	Navy	Agencies	Business Management Systems
Finance	67	161	148	107	483
Personnel	164	320	174	134	792
Logistics	780	730	406	169	2,085
Property	71	122	44	17	254
Other	65	0	26	12	103
Total	1,147	1,333	798	439	3,717

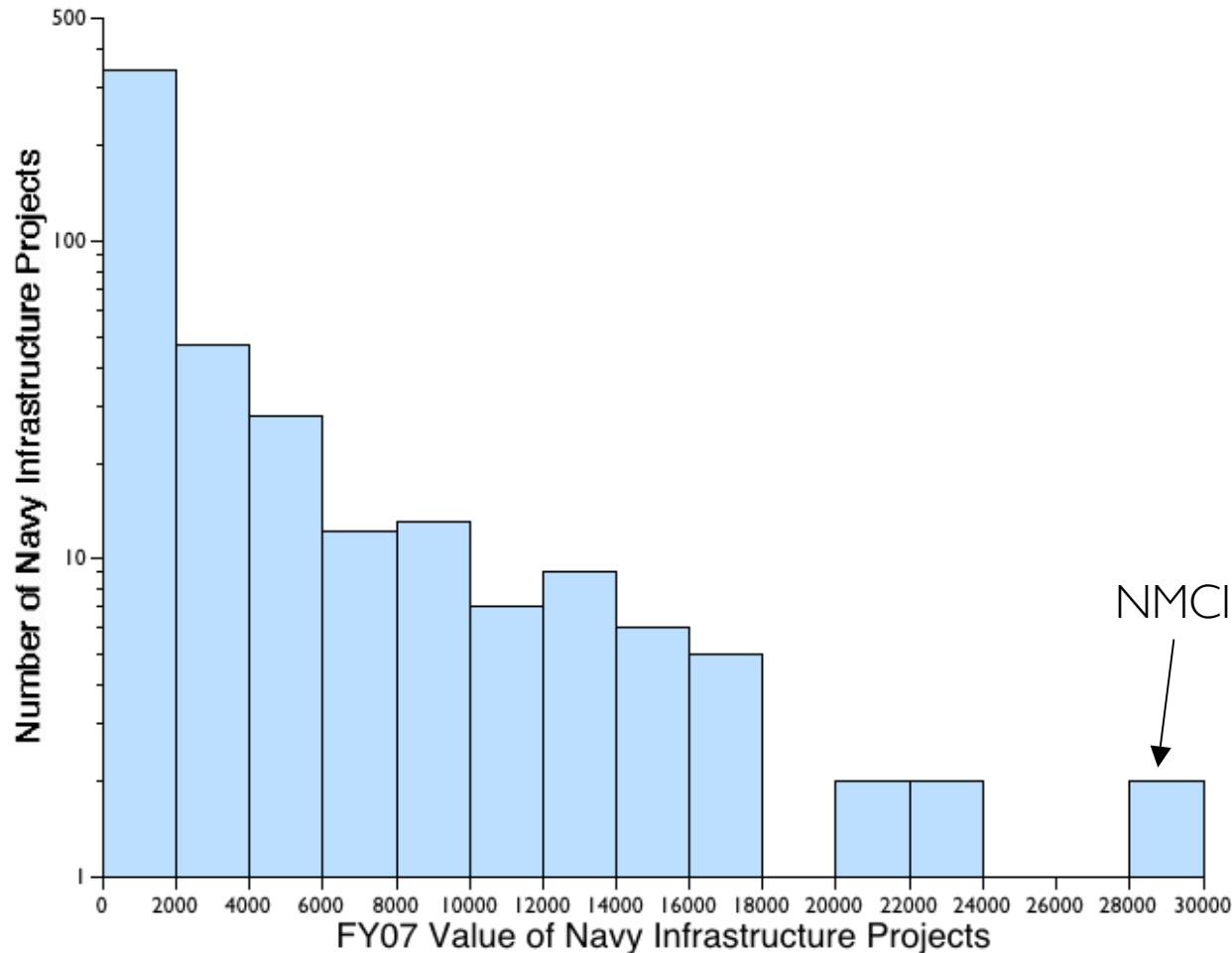
Most of Navy's I.T. Spending is on Infrastructure

Number of Projects	Project Category	FY 07 Budgets - \$M	% of Total
605	Enterprise Information	\$3,419,659	54%
	Warfighter	\$1,813,040	29%
	Logistics	\$547,550	9%
	Human Resource Management	\$241,639	4%
	Other	\$83,386	1%
	Installations and Environment	\$71,915	1%
	Acquisition	\$53,264	1%
	Finance and Accounting	\$52,986	1%
	Strategic Planning and Budgeting	\$6,231	0.1%
	Total Navy I.T. Spending	\$6,289,670	100%

NOTE: Total "unofficial spending" = ??

19

Small Infrastructure Projects Cause of Costly Operations



NOTE: “Unofficial Projects” add applications

20

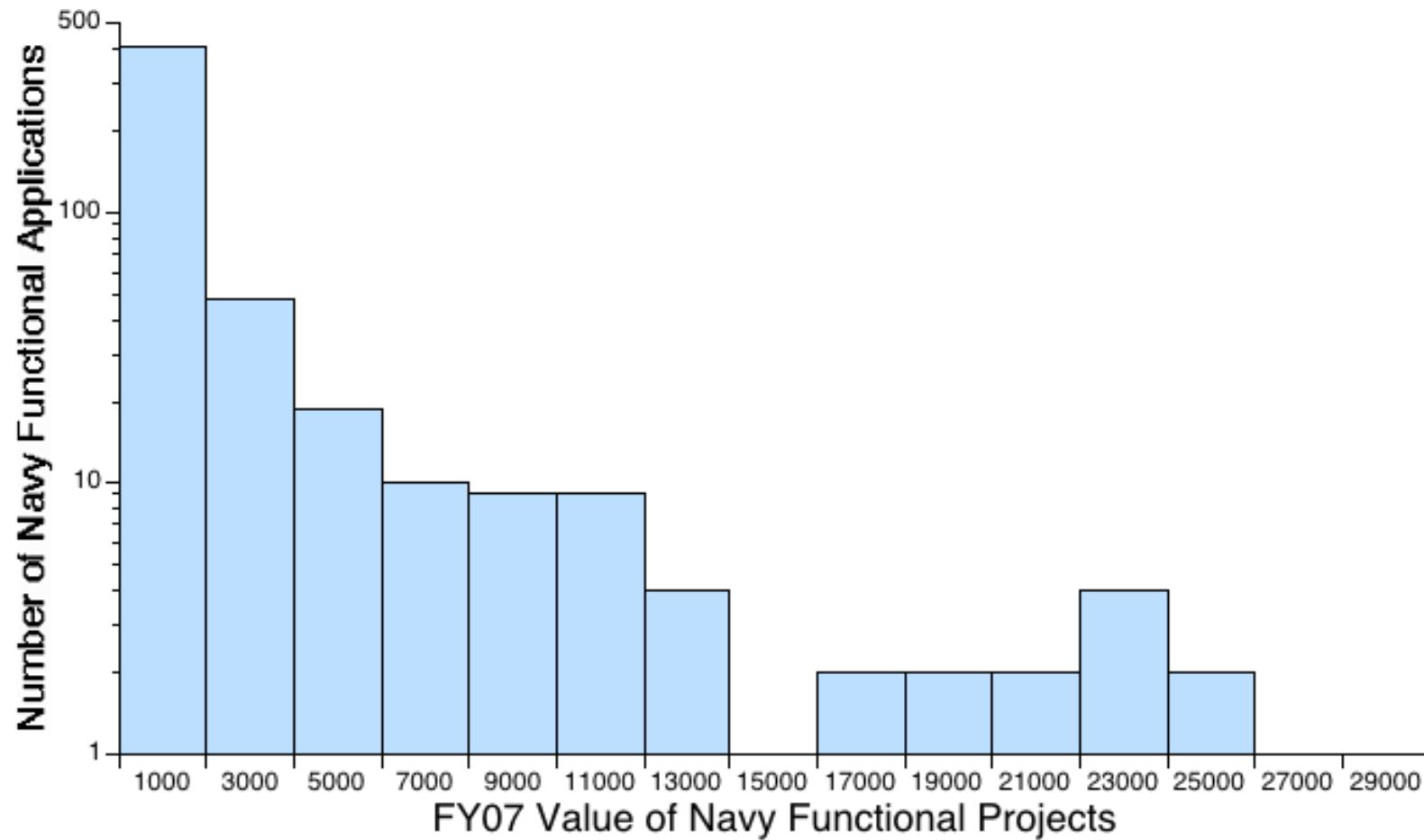
NMCI Accounts for About Half of Navy's Infrastructure Spending

Number of Projects	Project Category	FY 07 Budgets - \$M	% of Total
34	NMCI	\$1,620,780	47%
571	All other Enterprise Information Environment	\$1,798,879	53%
605	Enterprise Information Environment Projects	\$3,419,659	100%

Example: 45 Out of 470 Infrastructure Applications (excludes NMCI)

INITIATIVE NAME	ACRONYM	FY 2007
PROTECT INFORMATION - CRYPTOGRAPHIC MODERNIZATION	IA G1 CM	\$ 87,572
ALL OTHER NAVY/USMC COMPUTING INFRASTRUCTURE	AO-Comp	\$ 73,055
NAVY/USMC LONG-HAUL COMMUNICATIONS	LONG-HAUL	\$ 60,641
MARINE CORPS COMMON HARDWARE SUITE	MCCHS	\$ 57,152
PAYMENTS TO DISA FOR DISN TIER-1	DISN TIER	\$ 56,634
NAVY/USMC BASE-LEVEL COMMUNICATIONS	NBASE-LEVE	\$ 54,188
SHIPBOARD MANAGEMENT INFORMATION SYSTEM	SMIS-X60	\$ 49,430
NAVY/USMC LONG-HAUL COMMUNICATIONS	LONG-HAUL	\$ 49,266
NAVY/USMC OFFICE AUTOMATION	Navy-OFF AUTO	\$ 45,318
NAVY/USMC BASE-LEVEL COMMUNICATIONS	NBASE-LEVE	\$ 44,667
OTHER INFORMATION MANAGEMENT	AO-IM	\$ 42,497
OTHER INFORMATION MANAGEMENT	AO-IM	\$ 39,138
ALL OTHER NAVY/USMC COMMUNICATIONS INFRASTRUCTURE	AO Comm	\$ 35,207
TRANSITION SWITCH MODULES	TSM	\$ 34,005
NAVY/USMC BASE-LEVEL COMMUNICATIONS	NBASE-LEVE	\$ 31,325
PROTECT INFORMATION	IA G1	\$ 29,832
OTHER INFORMATION MANAGEMENT	AO-IM	\$ 28,249
ALL OTHER IT RESOURCES	AOIT	\$ 26,988
NAVY/USMC BASE-LEVEL COMMUNICATIONS	NBASE-LEVE	\$ 24,801
DEFENSE MESSAGE SYSTEM	DMS	\$ 23,421
ALL OTHER NAVY/USMC COMPUTING INFRASTRUCTURE	AO-Comp	\$ 21,215
DEFEND SYSTEMS & NETWORKS - COMPUTER NETWORK DEFENSE	IA G2 CND	\$ 20,987
DOD TELEPORT	Teleport	\$ 18,846
PROTECT INFORMATION	IA G1	\$ 17,391
ALL OTHER NAVY/USMC COMPUTING INFRASTRUCTURE	AO-Comp	\$ 17,109
OTHER INFORMATION MANAGEMENT	AO-IM	\$ 16,744
DEFEND SYSTEMS & NETWORKS - COMPUTER NETWORK DEFENSE	IA G2 CND	\$ 16,561
NAVY/USMC BASE-LEVEL COMMUNICATIONS	NBASE-LEVE	\$ 16,062
NAVY DISTANCE LEARNING SYSTEM	NDLS	\$ 15,855
ALL OTHER NAVY/USMC COMMUNICATIONS INFRASTRUCTURE	AO Comm	\$ 15,620
OTHER INFORMATION MANAGEMENT	AO-IM	\$ 15,053
DEFENSE MESSAGE SYSTEM	DMS	\$ 14,872
ALL OTHER IT RESOURCES	AOIT	\$ 14,077
NAVY/USMC LONG-HAUL COMMUNICATIONS	LONG-HAUL	\$ 13,531
DEFEND SYSTEMS & NETWORKS - COMPUTER NETWORK DEFENSE	IA G2 CND	\$ 13,205
MARINE INFORMATION TECHNOLOGY NETWORK OPERATIONS CENTER	MITNOC	\$ 13,000
ALL OTHER RELATED TECHNICAL ACTIVITIES	AO RTA	\$ 12,844
NAVY/USMC LONG-HAUL COMMUNICATIONS	LONG-HAUL	\$ 12,817
IA GENERAL SUPPORT	IA GS	\$ 12,464
NAVY COMP. INFRASTRUCTURE	AO-Comp	\$ 12,191
NAVY/USMC LONG-HAUL COMMUNICATIONS	LONG-HAUL	\$ 12,075
ALL OTHER IT RESOURCES	AOIT	\$ 11,917
ALL OTHER NAVY/USMC COMPUTING INFRASTRUCTURE	AO-Comp	\$ 10,791
PROTECT INFORMATION - PUBLIC KEY INFRASTRUCTURE	IA G1 PKI	\$ 10,659
ALL OTHER NAVY/USMC COMMUNICATIONS INFRASTRUCTURE	AO Comm	\$ 10,169

Small Functional Projects Cause of Costly Operations



Example: 45 Out of 110 Personnel Applications

INITIATIVE NAME	ACRONYM	FY 2007
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 25,083
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 13,582
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 11,014
ELECTRONIC MILITARY PERSONNEL RECORDS SYSTEM	EMPRS	\$ 10,747
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 10,699
CORPORATE ENTERPRISE TRAINING ACTIVITY RESOURCE SYS	CeTARS	\$ 10,674
ALL OTHER RESERVE AFFAIRS	AO RA	\$ 9,388
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 8,273
STANDARD LABOR DATA COLLECTION AND DISTRIBUTION	SLDCADA	\$ 8,081
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 7,958
MARINE CORPS TOTAL FORCE SYSTEM-PERSONNEL	MCTFS-P	\$ 7,707
NAVY STANDARD INTEGRATED PERSONNEL SYSTEM	NSIPS	\$ 7,643
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 7,574
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 7,442
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 6,816
NAVY MILITARY PERSONNEL DISTRIBUTION SYSTEM	NMPDS	\$ 5,127
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 4,624
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 4,516
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 3,576
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 3,237
MSC AFLOAT PERSONNEL MANAGEMENT CENTER	MSC APMC	\$ 3,000
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 2,753
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 2,671
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 2,546
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 2,414
NAVY RECRUITING AND ACCESSIONS MANAGEMENT SYSTEM	NRAMS	\$ 2,329
DEFENSE CIVILIAN PERSONNEL DATA SYSTEM-SUSTAINMENT	DCPDSS	\$ 2,327
Navy-Marine Corps Mobilization Processing System	NMCMPS	\$ 2,310
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 2,068
CENTER FOR CAREER DEVELOPMENT	CCD	\$ 1,986
NEW ORDER WRITING SYSTEM	NOW	\$ 1,834
NAVY.COM	NAVY.COM	\$ 1,800
RESERVE HEADQUARTERS SUPPORT	RHS-P13	\$ 1,748
MILPERS MGMT & ADMIN/RESOURCE MANAGEMENT	MMARM	\$ 1,748
RESERVE INTEGRATED MANAGEMENT SYSTEM	RIMS	\$ 1,657
MARINE CORPS TOTAL FORCE SYSTEM-PERSONNEL	MCTFS-P	\$ 1,606
ALL OTHER RESERVE AFFAIRS	AO RA	\$ 1,404
PAYMENTS TO DFAS FOR DEFENSE CIVILIAN PAY SYSTEM	PAY TO DCP	\$ 1,385
ALL OTHER RESERVE AFFAIRS	AO RA	\$ 1,315
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 1,276
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 1,161
ALL OTHER NAVY/USMC CIVILIAN PERSONNEL SYSTEMS	AO-CivPers	\$ 1,127
ALL OTHER MILITARY PERSONNEL AND READINESS	AO-MILPERS	\$ 1,064
TOTAL FORCE MANPOWER MANAGEMENT SYSTEM	TFMMS	\$ 1,027

Example: 45 out of 188 Logistics Applications

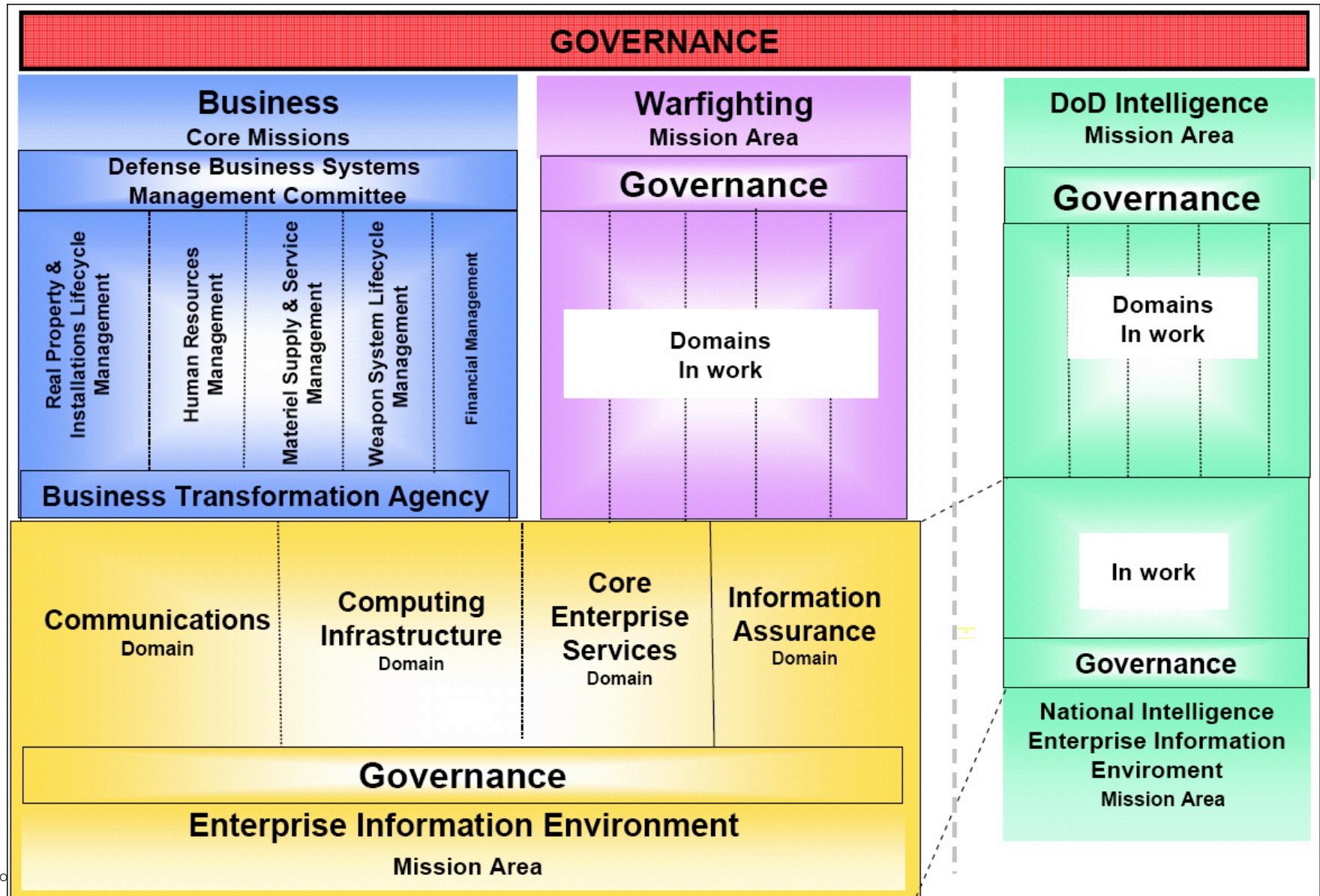
INITIATIVE NAME	ACRONYM	FY 2007
NAVY ENTERPRISE RESOURCE PLANNING (ERP)	NAVY ERP	\$ 72,530
NAVAIR PROGRAM MANAGEMENT- ENTERPRISE RESOURCE	NPM-ERP	\$ 23,779
NAVAIR DEPOT MAINTENANCE SYSTEM	NDMS	\$ 22,871
NAVY/USMC LOGISTICS	LOG	\$ 22,811
Shipyard Management Information Systems - Infrastructure	SYMIS INF	\$ 22,070
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 21,848
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 20,642
NAVY ENTERPRISE RESOURCE PLANNING (ERP)	NAVY ERP	\$ 19,626
NAVY/USMC LOGISTICS	LOG	\$ 19,577
GLOBAL COMBAT SUPPORT SYSTEM - MARINE CORPS	GCSS-	\$ 17,438
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 13,500
AUTOMATED IDENTIFICATION TECHNOLOGY	AIT	\$ 13,237
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 12,223
GLOBAL COMBAT SUPPORT SYSTEM - MARINE CORPS	GCSS-	\$ 11,708
GLOBAL COMBAT SUPPORT SYSTEM - MARINE CORPS	GCSS-	\$ 11,411
NAVY OTHER TRANSPORTATION	AO-TRANS	\$ 10,846
NAVAIR LOGISTICS DATA ANALYSIS	NALDA	\$ 10,393
NAVY ENTERPRISE RESOURCE PLANNING (ERP)	NAVY ERP	\$ 9,300
NAVY ENTERPRISE RESOURCE PLANNING (ERP)	NAVY ERP	\$ 9,142
NAVY/USMC LOGISTICS	LOG	\$ 8,645
CONVENTIONAL AMMUNITION INTEGRATED MANAGEMENT	CAIMS	\$ 8,257
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 7,219
SPAWAR FINANCIAL MANAGEMENT - ENTERPRISE	SFM-ERP	\$ 6,399
NAVAIR PROGRAM MANAGEMENT- ENTERPRISE RESOURCE	NPM-ERP	\$ 5,877
NAVY/USMC LOGISTICS	LOG	\$ 5,718
NAVSEA NAVY ENTERPRISE MAINTENANCE AUTOMATED	RFM ERP	\$ 5,710
TRIDENT LOGISTICS DATA SYSTEM	TRIDENT	\$ 5,645
NAVY TACTICAL COMMAND SUPPORT SYSTEM	NTCSS	\$ 4,228
NAVAIR DEPOT MAINTENANCE SYSTEM	NDMS	\$ 4,200
NAVY/USMC LOGISTICS	LOG	\$ 4,175
NAVY/USMC LOGISTICS	LOG	\$ 3,914
CONVENTIONAL AMMUNITION INTEGRATED MANAGEMENT	CAIMS	\$ 3,676
Shipyard Management Information Systems - Infrastructure	SYMIS INF	\$ 3,649
NAVY MAINTENANCE DATABASE	SEASUPPS	\$ 3,226
FINANCE AND AIR CLEARANCE TRANSPORTATION SYSTEM	FACTS	\$ 3,147
NAVY/USMC LOGISTICS	LOG	\$ 3,126
NAVY/USMC LOGISTICS	LOG	\$ 2,947
METROLOGY AUTO SYSTEM UNIFORM	MEASURE	\$ 2,888
AUTOMATED IDENTIFICATION TECHNOLOGY	AIT	\$ 2,861
JOINT ENGINEER DATA MGMT INFORMATION CONTROL	JEDMICS	\$ 2,832
ONE TOUCH SUPPLY	OTS	\$ 2,828
NAVAIR PROGRAM MANAGEMENT- ENTERPRISE RESOURCE	NPM-ERP	\$ 2,700
ONE TOUCH SUPPLY	OTS	\$ 2,665
NAVY OTHER TRANSPORTATION	AO-TRANS	\$ 2,570
CONFIGURATION MANAGEMENT INFORMATION SYSTEM	CMIS	\$ 2,464

Layers of Architecture

Capabilities (Local)	Decision Support.
Applications	Business Applications; Workflow Control; Transaction Processing.
Computing (Distributed)	Data Centers; Messaging; Collaboration; Storage; Search; Archiving.
Communications	Backbone Network; Monitoring; Wireless; Radio; Switching; Access Control.
Foundation (Central)	Governance; Policy; Systems Engineering; Standards; Security; Strategy; Metadata.

Infrastructure

Organization for Transformation of DoD - As Defined by NII



Net Enabled Information Environment



CIO Vision and Mission

Deliver the Power of Information

*An agile defense enterprise empowered by
access to and sharing of
timely and trusted information*

Enable Net-Centric Operations

*Lead the Information Age transformation
that enhances the
Department of Defense's efficiency and effectiveness*

Context for Net-Centric Operations

Challenge – UNCERTAINTY

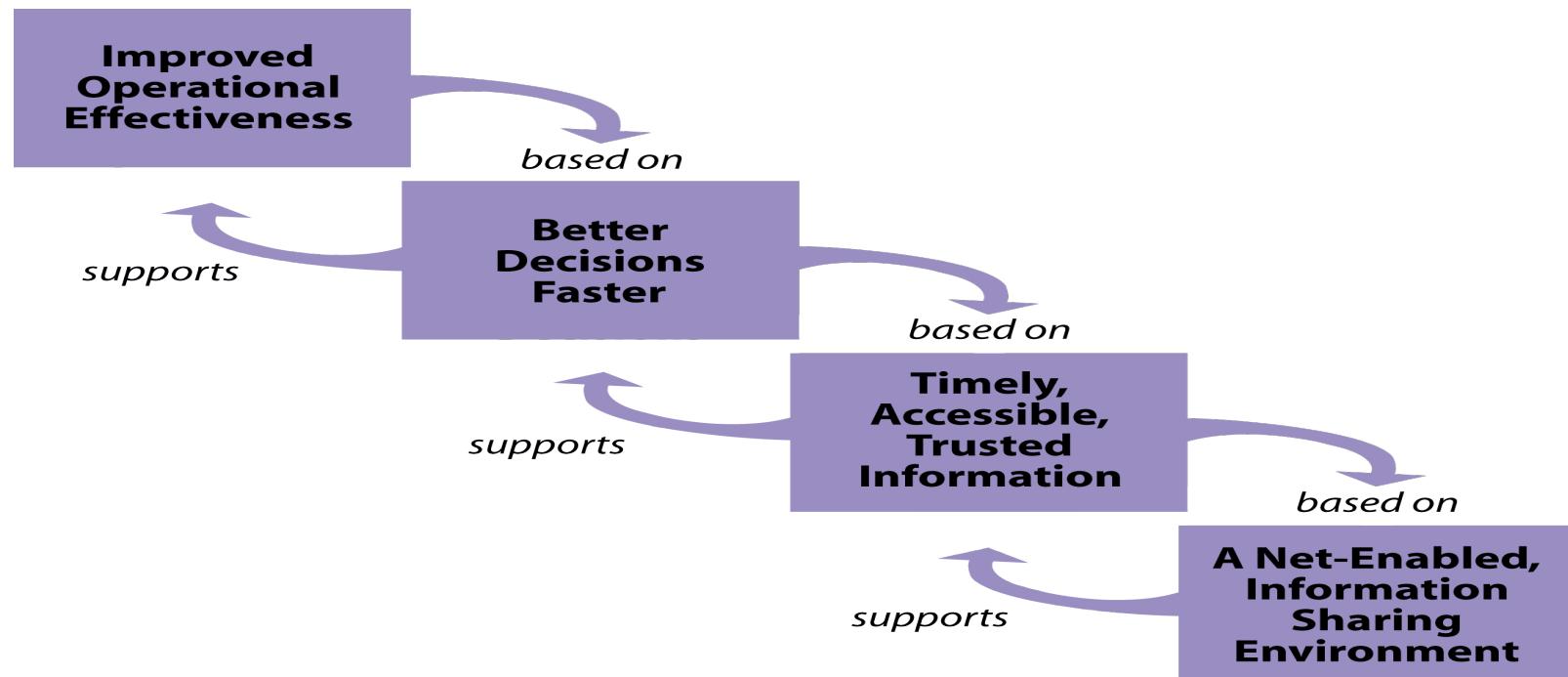
- Leave behind the reasonable predictability of the past
- Adjust to an era of surprise and uncertainty

Response – AGILITY

- Enterprise-wide: Battlefield Applications; Defense Operations; Intelligence Functions; Business Processes
- Capabilities Based: Access, Share, Collaborate
- Fundamental Changes: Process, Policy, Culture
- Emphasis Shift: From moving the user to the data – to moving data to the user

Net-Enabled Information Sharing Environment

Everyone is able to easily discover, access, trust, and use the data/information that supports their mission objectives unconstrained by their location or time of day.



Net-Enabled Information Sharing Environment

Attribute	Description
Internet & World Wide Web Like	Adapting Internet & World Wide Web standards with additions as needed for mobility, surety, and military unique features
Secure & available information transport	Encryption initially for core transport backbone; goal is edge to edge; hardened against denial of service
Information/Data Protection & Surety	Producer/Publisher marks the data/info for classification and handling and provides provisions for assuring authenticity and integrity.
Post in parallel	Information Producer/Publisher make information visible and accessible at the earliest point of usability
Smart pull	Users can find and pull directly, subscribe or use value added services. User Defined Operational Picture v Common Operational Picture
Information/Data centric	Data separate from applications and services
Shared Applications & Services	Users can pull multiple applications to access same data or choose same apps when they need to collaborate. Applications on “desktop”
Trusted & Tailored Access	Access to the information transport, data/information, applications & services tied to user's role and identity
Quality of service	Tailored for information form: voice, still imagery, video/moving imagery, data, and collaboration

The Global Information Grid (GIG)

DOD Directive 8100.1

The GIG is the globally interconnected, end-to end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating, and managing information on demand by warfighters, policy makers and support personnel. It includes National Security Systems.

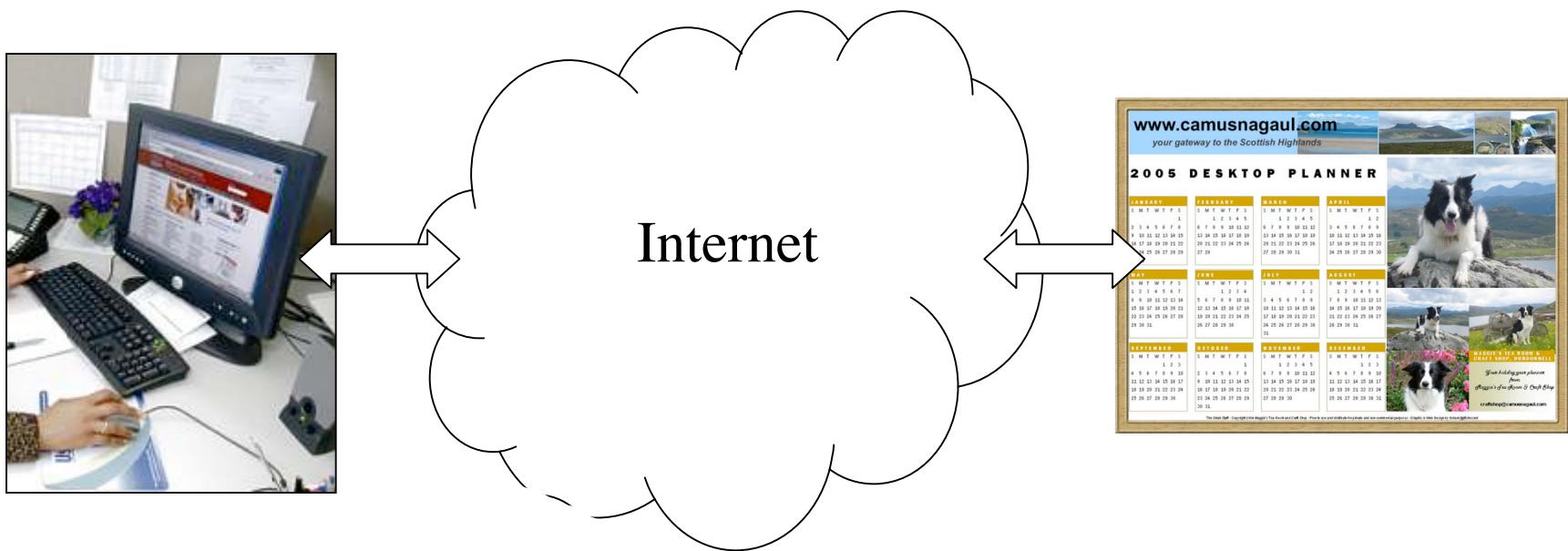
The GIG includes any system, equipment, or service that meets one or more of the following criteria:

- Transmits information to, receives information from, routes information among, or interchanges information with other equipment, software, and services.
- Provides retention, organization, visualization, information assurance, or disposition of data, information and/or knowledge received from or transmitted to other equipment, software and services.
- Processes data or information for use by other equipment, software, or services.

Internet Case Study

Organization of the Grid

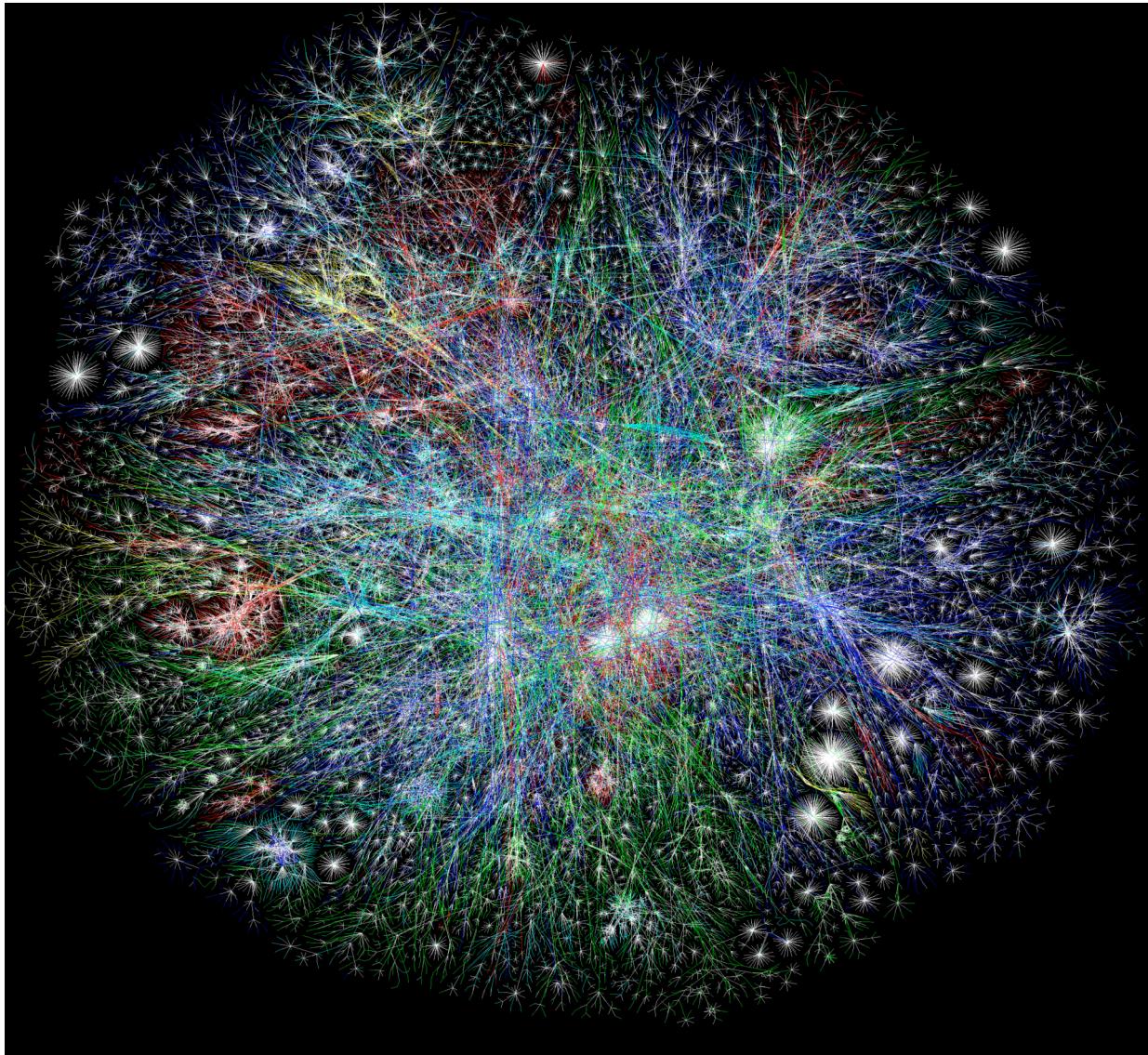
Web Looks Simple to a User



Internet Advantage

- Any properly configured computer can act as a host for a personal web-page.
- Any of several hundred million other computers can view that personal web-page.
- Any of several hundred million other computers can connect to another computer capable of delivering an information processing service.

The Problem: Finding a Path through Many Possible ISPs



Example: “Hops” from Desktop to Server

traceroute (Number of Hops)		
40 byte packets to Akamai.com (80.67.72.1980)		
1	0.0.0.0	13.084
2	dstswrl-vlan2.rh.nrwlcvt.cv.net	12.343
3	r1-ge12-1.mhe.whplny.cv.net	14.528
4	r2-srp3-0.wan.whplny.cv.net	19.735
5	r2-srp0-0.in.nycmny83.cv.net	18.286
6	gige-g0-2.gsr12416.nyc.he.net	24.839
7	pos0-3.gsr12416.ash.he.net	20.012
8	64.71.158.140	20.087
9	84.53.144.195	21.735
10	80.67.72.198	21.097
Total Transaction Latency (in Milliseconds)		185.746

Content Delivery Strategy

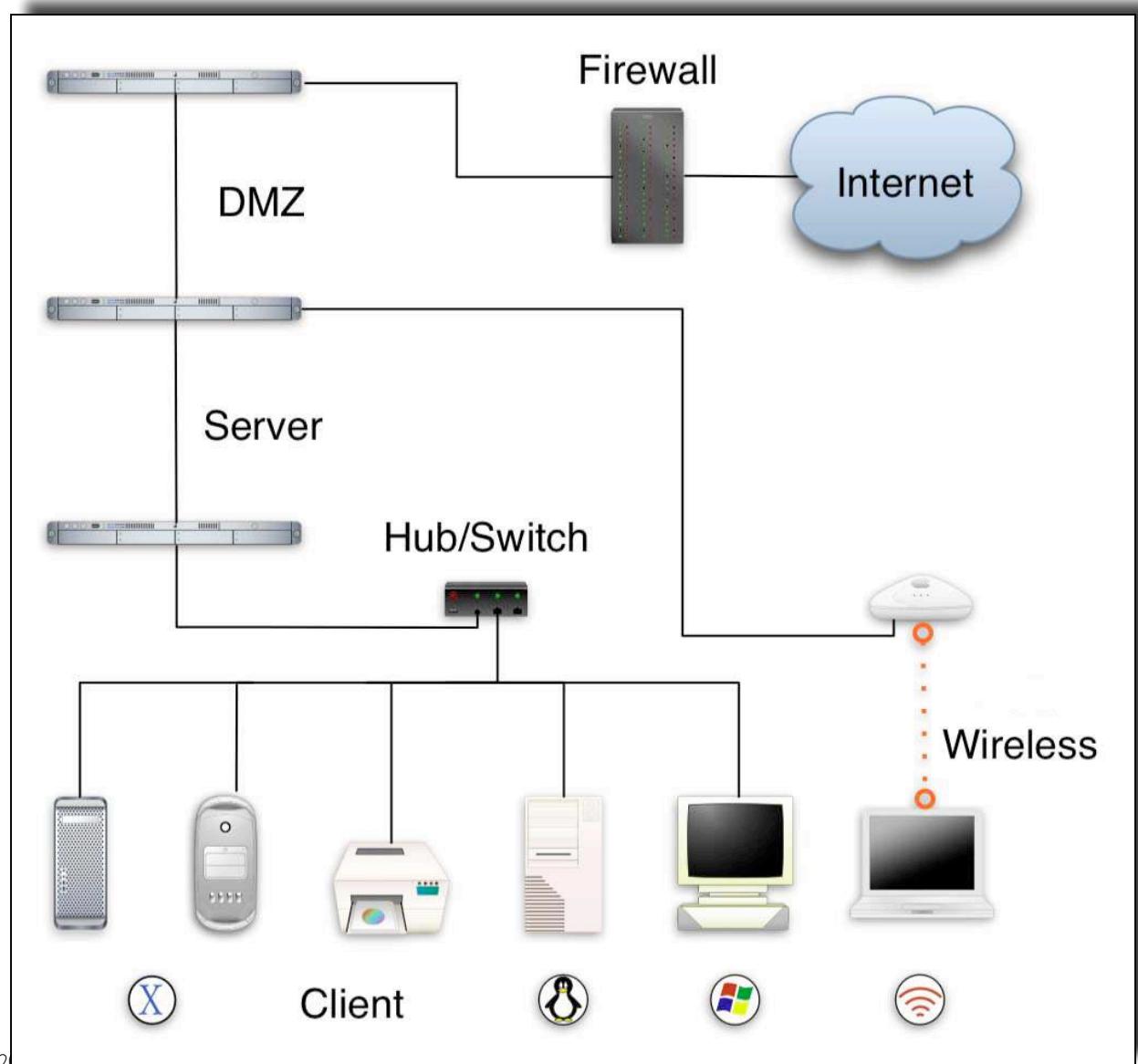


Content hosted
and delivered from
a central location;
Slow and costly



Content originated
from a central
location but cached
and delivered from
many locations that
reside close to the
users; fast and cost
effective

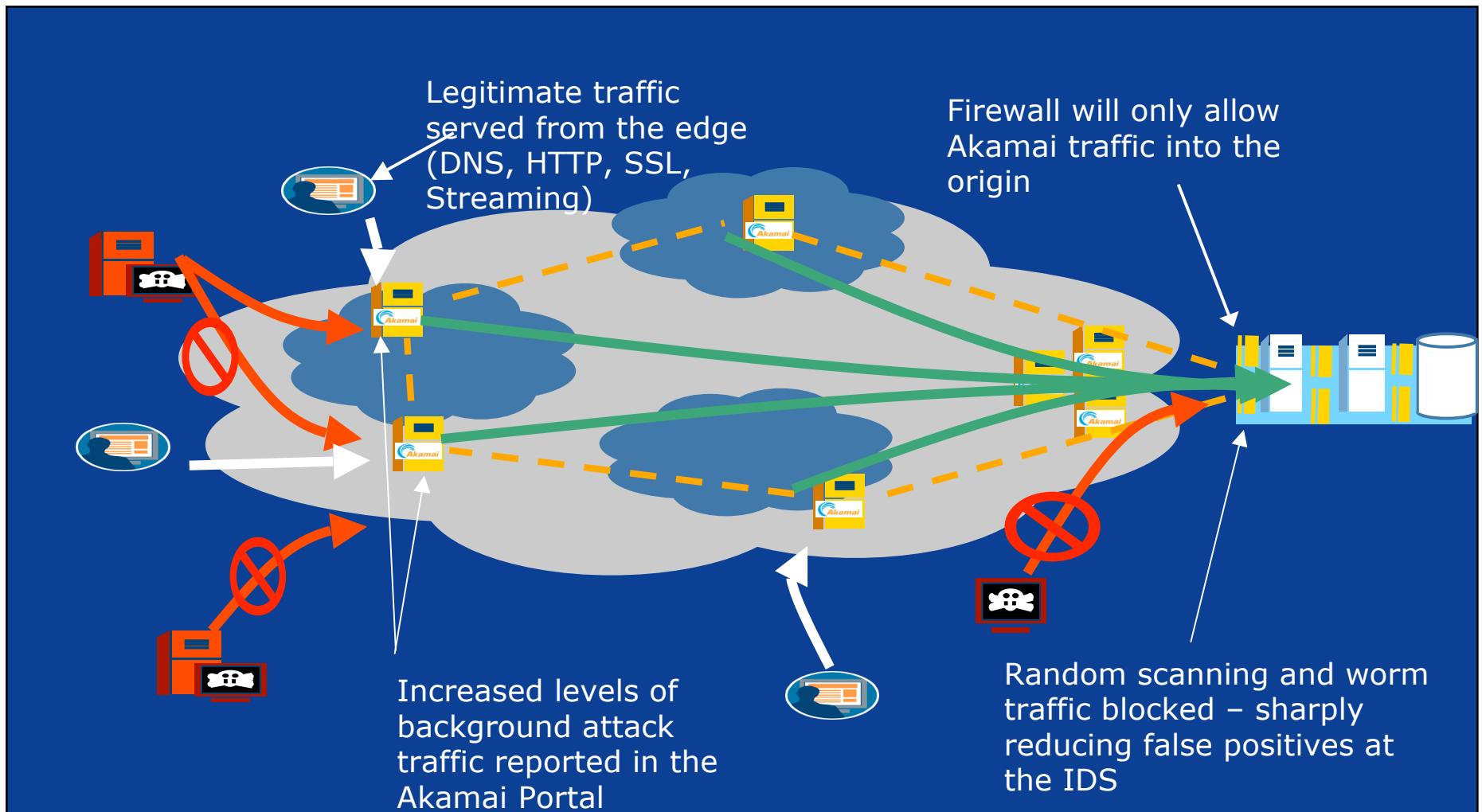
The Controlled Link: Local Area Network (LAN)



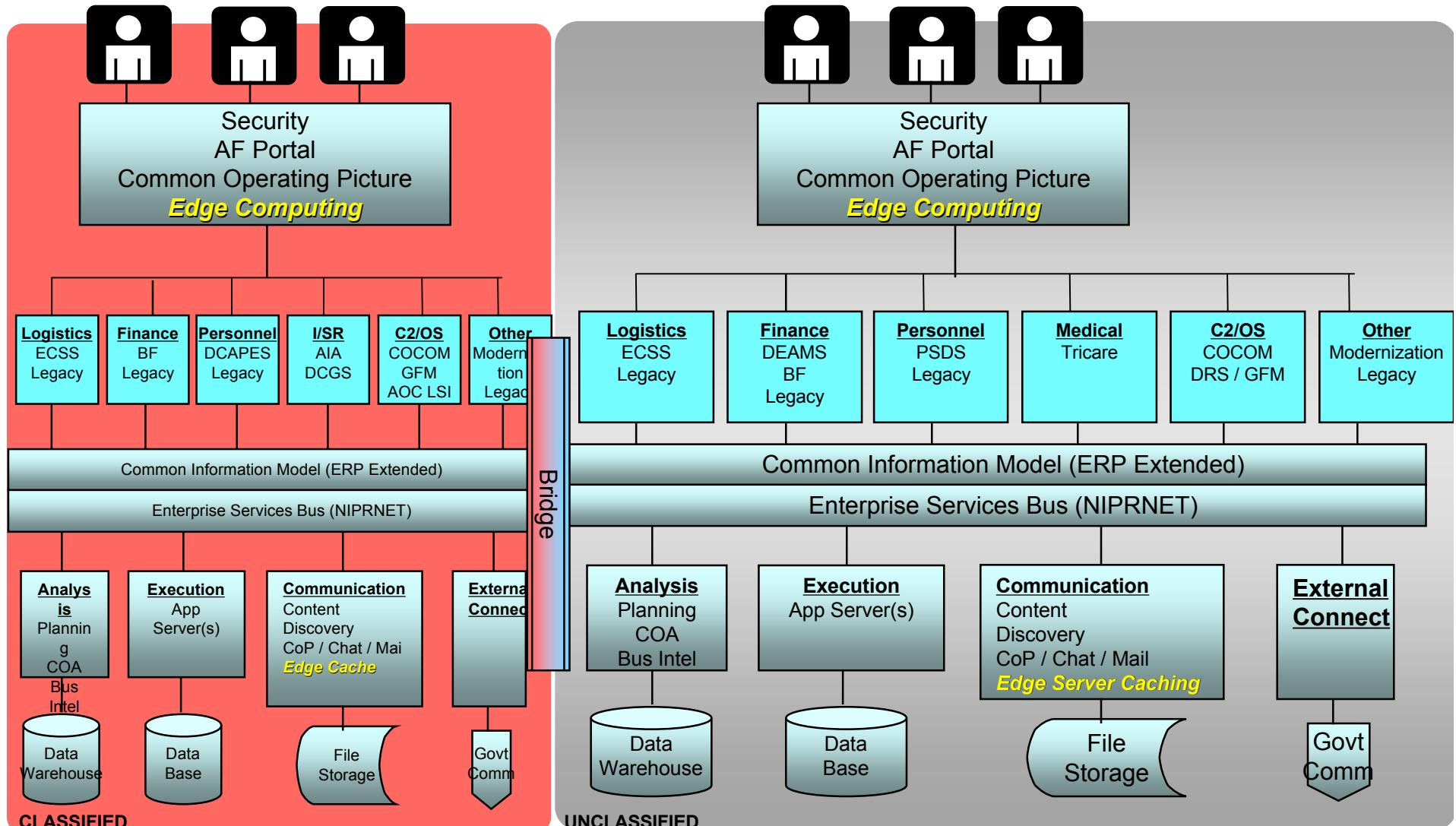
Case Study: AF Uses Akamai as Network Provider

- 18,000 Servers World-Wide
 - Akamai has over 18,000 servers world-wide that support edge caching and computing
 - AF utilizes a secure “slice” of the Akamai network
 - ~1,000 servers
- 1,100+ Networks
 - Situated on the Internet’s 1,100+ top networks and network peering points
 - Transaction delivery latency <0.35 seconds
 - Unique ability to “bridge” ISP back-bones when:
 - Networks go down
 - Network congestion occurs
 - Virus, Worm, Hacker, or other malicious activity is detected

Benefits for Security



GIG Architecture



Summary

- Transformation calls for consolidation of applications and data center operations.
- The Defense GIG (Global Information Grid) is the concept for delivering net-centric capabilities.
- GIG will depend on the availability of a secure and high-responsive Internet.