Emerging Infrastructures and Information Technologies

Sanjeev "Sonny" Bhagowalia
Chief Information Officer, State of Hawai'i

The President's Innovation Agenda* defines the building blocks of innovation
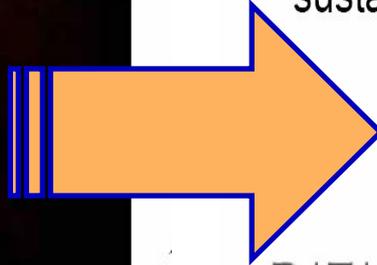

- ## **Open Government**

$+$

- Partnerships

- Entrepreneurship

- Prizes, Challenges, and Grants

- Idea Generation

- Innovative Science & Technology

- Creative Funding Strategies

- Promoting Competitive Markets

* *"A Strategy for American Innovation", published Sept 2009*

Tap the Ingenuity of the American People

- The Federal Government does not have a monopoly on good ideas
- Access to Information unleashes creativity
- Innovation drives sustainability

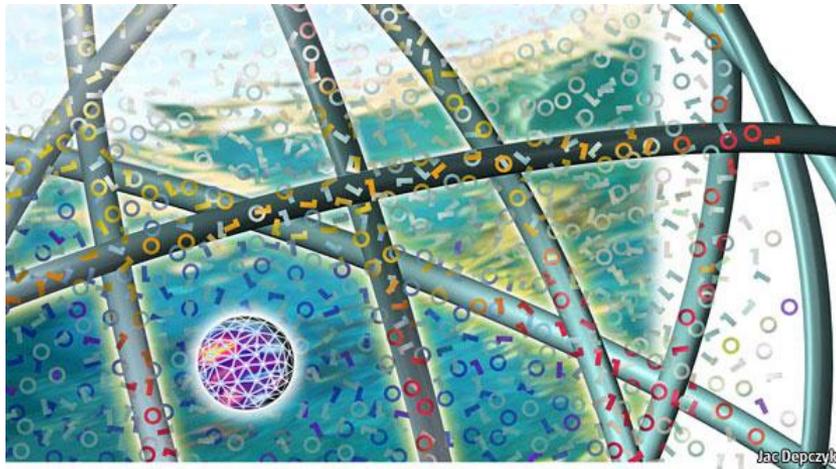**DATA.GOV**
Citizen-Centered, Results Driven Government

We Need You!

Context: The Industrial Revolution of data is here

"Data is the flint for

for the next 25 years."

Ray Ozzie

actual affiliates alternatives application behaviors business common conditions data date decision **design** development etc experience fail failure fast features g00171161 gartner id important improvement inc interaction invest lack measure mistake needs number **organizations** page **process** project proven publication real requirements research reserved rights root scenarios selection solution speed **system** technology tools usability **user** user-centered user-friendly validation view visual **web** website

Volume of digital information

increases tenfold every 5 years

Plus: the data is replicated many times over!
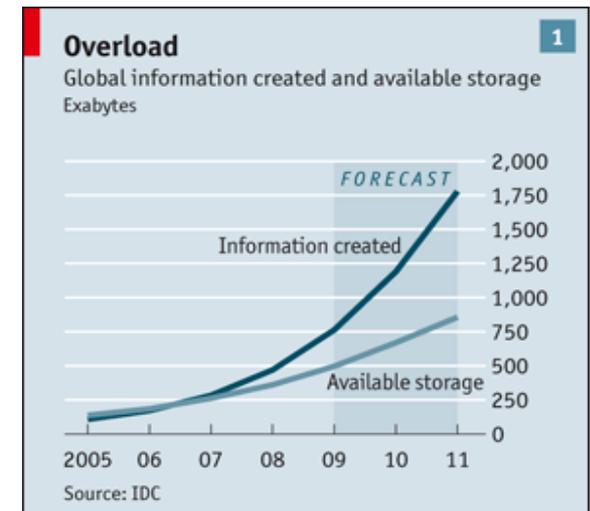
Context: Moving information and knowledge to the user

Agency CFO

corporate performance management"

Program Manager

reports — and I need them now"

IT Operations
need performance and availability reporting"

Strategic Planner
need analytics and predictive models

Customer Relationship Manager
"I need a single constituent view"

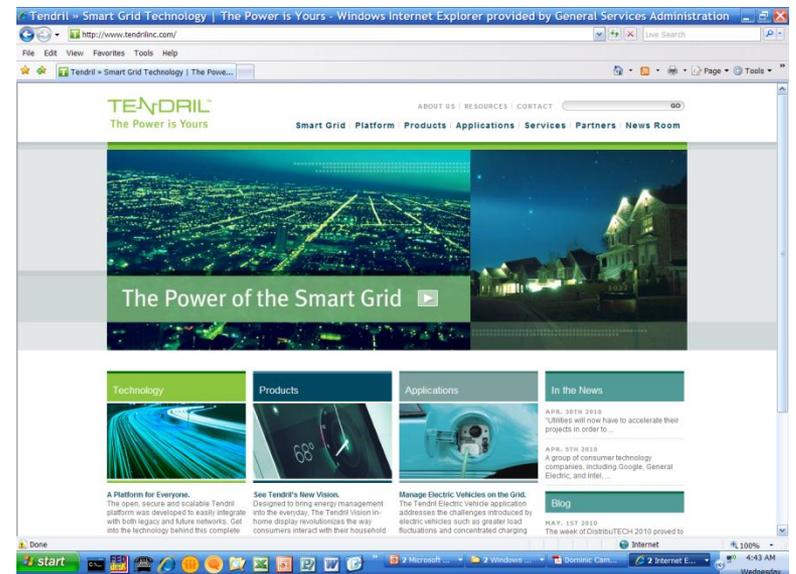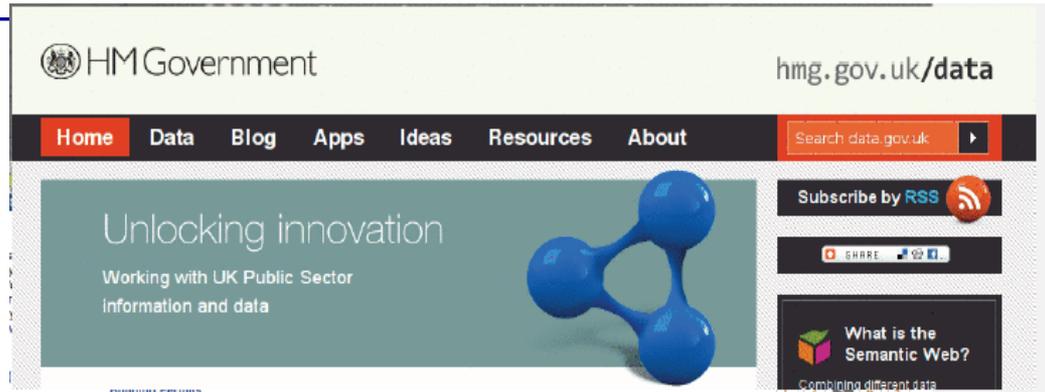**Business Process Analyst**

mining and OLAP"

Elected Officials

to know how our response time has changed"

…. And to the public

Decline of the info producer vs. consumer paradigm

Context: Maximum sharing and flow of information and knowledge

As big an issue *outside* your organization as *within* it

▸ YouTube is now second largest search engine in the world

▸ 1.5 million pieces of content shared daily on Facebook

▸ On-line newspaper readers are up 30%

▸ 250 million visitors each month to Myspace, YouTube, and Facebook (*none were around 6 years ago*)

▸ Mobile devices will be world's primary connection tool to the Internet in 2020

The Open Government Initiative

Transparency promotes accountability

Participation allows people to contribute ideas/expertise; government benefits from broad knowledge sharing

Collaboration encourages cooperation within government and with industry

SAGE
STRATEGIC ADVISORS TO GOVERNMENT EXECUTIVES

FEDERAL
ROADMAP

CIO

PARTNERSHIP FOR PUBLIC SERVICE

Touchstone.

"…we need to embrace new technologies that are going to change the way we serve our constituents and at the same time ensure that the federal government operates in an efficient way."

— Vivek Kundra
U.S. Chief Information Officer

Mission Statement

Leverage the power of technology to drive transformation, increasing agency effectiveness, efficiency and performance.

ADMINISTRATION GOALS FOR AGENCY CIOs

- **Goal 1**
  Effectively Manage IT Investments

- **Goal 2**
  Improve Efficiency and Effectiveness Through Innovation and Information Technology

- **Goal 3**
  Enable Openness, Transparency and Participation

- **Goal 4**
  Advance Information Security Postures

- **Goal 5**
  Develop and Maintain a Skilled Federal IT Workforce

THE CIO'S LEGAL AND POLICY RESPONSIBILITIES

The federal CIO operates under a different environment than their private-sector counterparts and must abide by statutory and regulatory requirements unique to the federal government.

Legal requirements for CIOs address:

- Strategic management;

- Security and privacy; and

- Information policy.

Policy requirements are laid out in public law, Executive Orders, OMB Circulars and other government-wide policy.

PARTNERSHIP FOR PUBLIC SERVICE

1100 New York Avenue NW
Suite 1090 EAST
Washington DC 20005

202 775 9111
202 775 8885 FAX

CFC# 12110

Touchstone.

1920 N Street NW
Suite 600
Washington DC 20036

202 338 2525

Making Government Work:

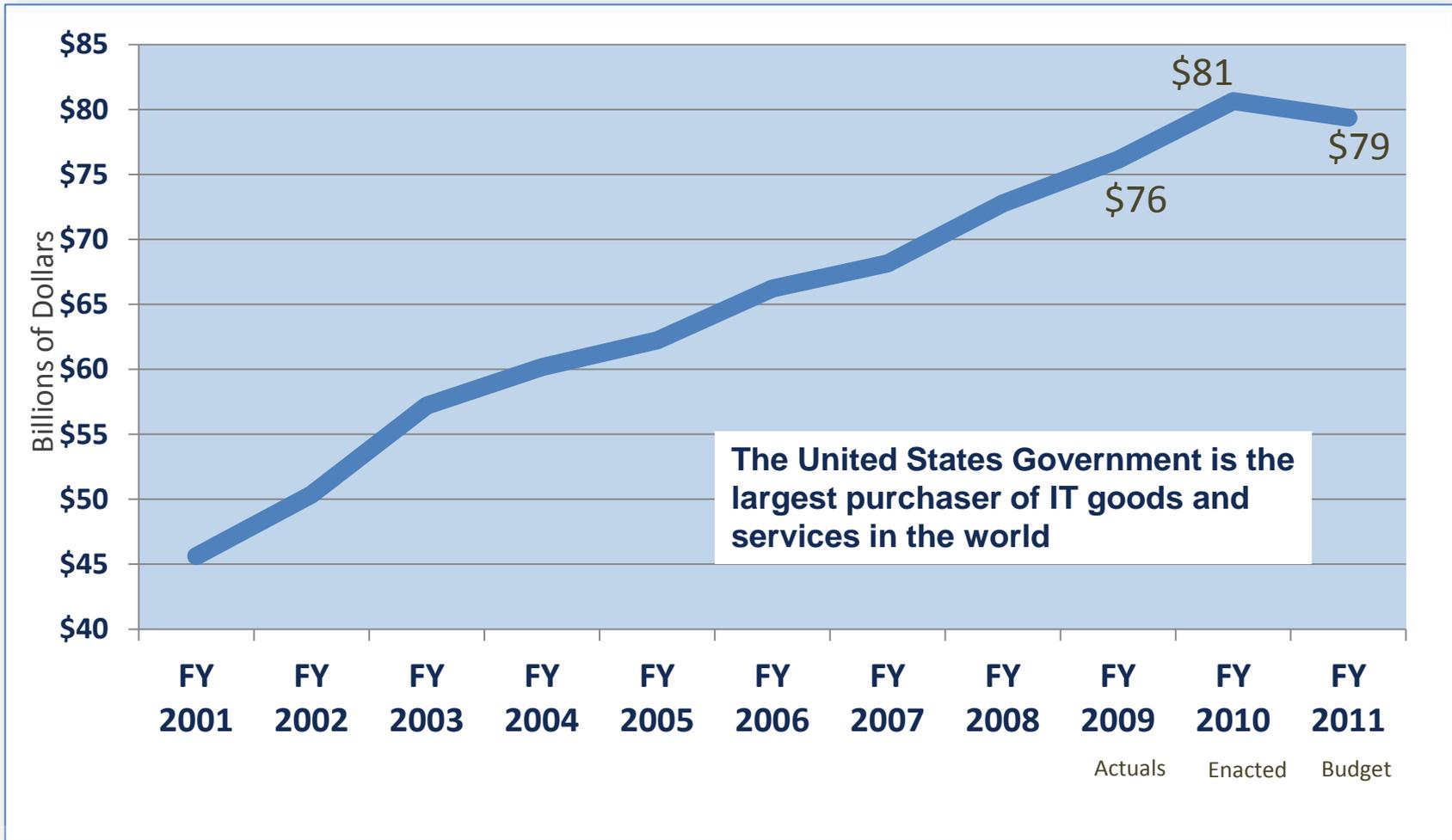Closing the Technology Gap to Deliver for the American People

Vivek Kundra
Federal Chief Information Officer

www.whitehouse.gov

Source: http://www.cio.gov

Government Has Invested Billions in IT

Billions of Dollars

$85
$80 — $81
$79
$75 — $76
$70
$65
$60
$55
$50
$45
$40

FY 2001 · FY 2002 · FY 2003 · FY 2004 · FY 2005 · FY 2006 · FY 2007 · FY 2008 · FY 2009 · FY 2010 · FY 2011

Actuals · Enacted · Budget

The United States Government is the largest purchaser of IT goods and services in the world

Source: http://www.cio.gov

The Technology Agenda

CUT WASTE

IMPROVE PERFORMANCE AND DELIVER BETTER SERVICE

ENABLE AN OPEN, TRANSPARENT & PARTICIPATORY GOVERNMENT

SECURE OUR COMPUTING ENVIRONMENT
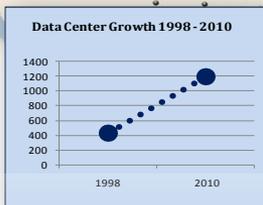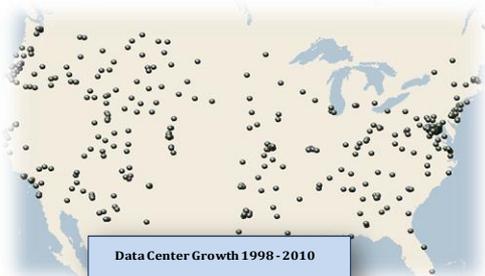
Source: http://www.cio.gov

Improve Performance & Deliver Better Service

RATIONALIZE SERVICE DELIVERY MODELS

- Private sector is consolidating data centers while government data centers are growing
- Government needs to reverse this trend and consolidate

SHIFT SERVICES TO THE CLOUD

- Leverage shared services through the cloud
- Launched Apps.gov to simplify procurement of cloud services

SIMPLIFY ACCESS TO SERVICES

- End-to-end digital service platforms
- New platforms for delivery – e.g., Mobile Computing

Data Center Growth 1998-2010

Source: http://www.cio.gov

Federal Cloud Computing Initiative

Changing the Way Government Leverages Technology....

Cheaper	Faster	Greener

Cheaper

- **Drive Innovation:** Work with private industry encouraging innovation and furthering competition among providers to drive best value solutions for the Government

- **Use Only What's Needed:** Eliminate high upfront costs by aligning costs with actual use or consumption of IT resources

- **Put the Power in the Hands of the End Users:** Move operating complexities to the Cloud, allowing Agencies to focus on core mission objectives

Faster

- **Provide One-Stop Shop:** Simplify acquisition of IT services by making it as simple as buying a book, booking an airline ticket, or making a dinner reservation online

- **Turn Up of IT Quickly:** Services can be provisioned in hours or days versus traditional IT methods which may take months to deploy

- **Scale Rapidly:** Deliver elastic computing, allowing Agencies to rapidly expand or contract IT resources to support unplanned events or spikes in usage

Greener

- **Energy Efficiency:** Create virtualized hardware and software services so Government uses only what's needed, avoiding overbuilding data center and server capacity

- **Reuse Across Agencies:** Provide shared, resource pooling, for greater reuse and ability to leverage underutilized IT resources across Government Agencies

Federal Cloud Computing Initiative
Major Program Activities
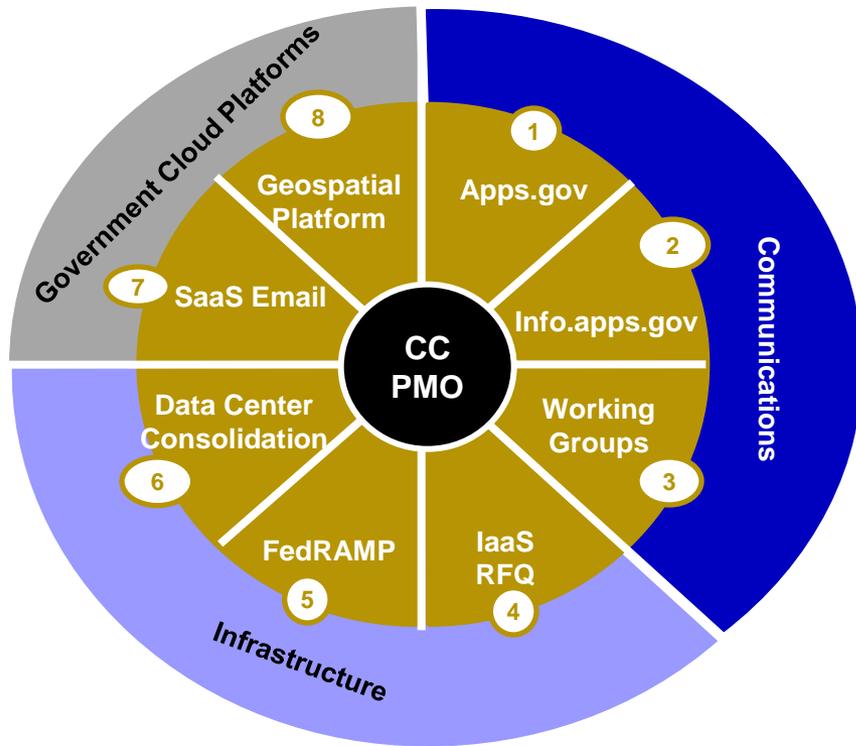
1. **Apps.gov 2.0:**
   Online procurement of SaaS solutions for government.

2. **Info.apps.gov:**
   Informational website to communicate the latest news and information regarding the FCCI.

3. **Federal Working Groups:**
   GSA has established several inter-agency working groups to develop standards, set policies and agree to the overall vision for the FCCI.

4. **IaaS (infrastructure as a service):**
   The GSA has released an RFQ (Request for Quote) for IaaS. This will serve as a foundation for Cloud Computing services within the Government.

5. **FedRAMP:**
   Establish and operate a Government-wide Authorization Program for performing security C&A and continuous monitoring for commercial Cloud Services.

6. **Data Center Consolidation:**
   Managing the Government-wide data center consolidation program including guidance, data collection and assisting agencies develop and implement data center consolidation plans.

7. **SaaS Email:**
   GSA CC PMO is leading the Cloud SaaS Email Working Group to define SaaS Email services for Fed Government.

8. **Geospatial Platform**
   Working with government agencies in developing a geospatial platform for sharing data and developing applications for geospatial purposes.

Federal Cloud Computing Initiative
Apps.gov

Online storefront for Cloud Services

Recently updated, Apps.gov provides government buyers with information and buying tools to complete their procurements.

Government users can identify cloud solutions by category, find pricing and complete purchases online!

Federal Cloud Computing Initiative-
Infrastructure as a Service (IaaS) RFQ

RFQ IaaS Services

Storage
- **Online Web Based Storage**
- **Store Files & Data Objects**

Virtual Machines
- **Online VMs / Computing**
- **Multiple CPU & OS Types**

Server Hosting
- **Online Server Hosting**
- **DNS and CDN Capabilities**

- **Released IaaS RFQ to support Moderate Level Security for Government**

- **Services will be made available through purchase on apps.gov**

On-demand Self Service
Online, self service provisioning capabilities for services

Ubiquitous Network Access
Accessible via the Internet with a sufficiently robust architecture

Location Independent Resource Pooling
Massively scalable services, independent of location of resources

Rapid Elasticity
Scale up or down dynamically based on consumption and/or request

Measured Service
Utilization and consumption GUI dashboard and electronic interfaces

RFQ Required Cloud Computing Characteristics

Federal Cloud Computing Initiative - FedRAMP - Federal Risk and Authorization Management Program

Risk Management (vertical)

Federal Agencies

FedRAMP

Risk Management
-Authorization
-Continuous Monitoring
-Federal Security Requirements

Outsourced Systems

: **Risk management cost savings and increased effectiveness**

: **Interagency vetted approach**

: **Rapid acquisition through consolidated risk management**

: **Consistent application of Federal security requirements**

FedRAMP: Federal Risk and Authorization Management Program

Federal Cloud Computing Initiative
Federal Data Center Consolidation Initiative (FDDCI)

- **GSA is providing support to OMB on the FDCCI in meeting the strategic goals of the program**

- **GSA is assisting agencies on developing long-term consolidation plans which leverage multiple approaches including Cloud Computing / Virtualization technologies.**

- **Four Major Strategic Goals matched with four focus areas as follows:**

	Software Assets	Hardware Assets	Facilities & Energy	Location & Real Estate
Reduce Cost	Identify/Classify Business Application Services			Lower Leasing Costs per Sq Foot
	Move Applications / Infrastructure to Cloud			
	Perform Virtualization of Servers / Storage			
	Consolidate Small Data Centers			
	Optimize Large Data Centers			
Reduce Environmental Impact			Utilize Alternative "Green" Energy Sources	
			Optimize Cooling Methods / Performance	
			Power Supply Improvements	
Increase Efficiency	Improve Security via HW & SW Asset and Configuration Management			
		Improve Performance via Redundancy, Load Balancing, COOP		
Enhance Business Agility	Aggregate Administrative Functions			
	Disseminate Government Best Practices			
	Facilitate Cross-Government Collaboration			
	Create Metrics for Measuring Goals			

FDCCI – Overview of Strategic Goals and Primary Benefits

Federal Data Center Consolidation Initiative (FDCCI) – Federal CIO Vivek Kundra launched FDCCI on February 26, 2010, to address the major IT initiatives of President Obama's FY2011 budget proposal. More than 1,100 data centers will be surveyed for consolidation, leveraging public and private sector best practices, focusing to:

1. Promote the use of Green IT by reducing the overall energy and real estate footprint of government data centers;
2. Reduce the cost of data center hardware, software, and operations;
3. Increase the overall IT security posture of the government; and
4. Shift IT investments to more efficient computing platforms and technologies.

Primary benefits:

- The primary benefit from improved IT equipment utilization is reduced overall energy consumption which leads to significant energy cost savings (up to 90% for virtualized IT equipment)
- Additional benefits from virtualization and data center consolidation:
  - Reduced Facilities Maintenance and Operations costs
  - Reduced Server Maintenance and Operations costs
  - Improved Automation for Server Management and Provisioning

FDCCI – Utilization Improvement Metrics

► Improving IT asset utilization is the key driver for reducing energy consumption per unit of performance. This can be achieved primarily by:

- Server Virtualization (increasing the number of virtual servers per hosts)
- Server Consolidation (decommissioning underutilized physical servers)
- Rack Space Consolidation (relocating underutilized racks)
- Data Center Consolidation (shutting down underutilized facilities)

Utilization Metrics	Typical Results	Target Results
Average Virtualization (%)	0-10%	30-40%
Average Virtual OS per Host (#)	5-10	15-20
Average Server Utilization (%)	7 – 15%	60 – 70% (application dependent)
Average Rack Space Utilization (%)	50 – 60 %	80 – 90%
Average Power Density Usage Equivalent (W/sq.ft.)	50 – 100 W/Sq Ft	150 – 250 W/Sq Ft
Power Usage Efficiency (PUE)	3 – 2	1.6 – 1.3

What's Next?

- **Shared Dataset Hosting**
  - Data extraction
  - Data conversion
  - Geocoding
  - Visualization

- **Data Discovery Services**
  - Available to agencies as a fee-for-service
  - Allow agencies to discover datasets within their entire public space

- **Mobile Applications**

- **APIs** – simplify access for developers and publishers

What's Next?

Geo-Spatial Data is A Key Enabler for "Killer Apps"

GIS FOR THE NATION
Proposed Data Sharing Information Model for Local, State, Tribal, and National Data Themes

- *Geo-data Integration -* Combine capabilities of Geodata.gov and Data.gov

- Enhanced visualization and data-mashing capabilities

- "Human knowledge is expected to be doubling by the year 2012." (Alvin Toffler)

- Geo-aware applications are key.
  How to realize the promise of geospatial information systems (GIS) for the nation?
  - Geo-data "architected and built-in"
  - Lightweight geo-applications and mash-ups for Web 2.0/Gov 2.0
  - Incremental, agile, actionable and affordable delivery

What's Next?

- **Improved Categorization**

  – Metatagging, expanding on published taxonomies; to include Business Reference Model

  – "Folksonomies" that allow the public to create tag clouds or to tag data they find most useful