

CENTERS FOR DISEASE CONTROL AND PREVENTION

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# STATE OF CDC

## INFORMATION TECHNOLOGY

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**MARCH 27, 2009**



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## Introduction

Information Technology (IT) has historically been a rapidly evolving discipline and field with numerous breakthrough advances over the decades since the 1960s. This State of CDC IT summarizes trends leading up to the current state as well as some opportunities for the future, particularly in light of the American Recovery and Reinvestment Act, also commonly referred to as the economic stimulus bill.

The Centers for Disease Control and Prevention (CDC) has been an early adopter of IT since CDC acquired its first mainframe computer in 1964. CDC was an early adopter of office automation in the 1970s, PCs in the 1980s, networking of all PCs in the late 1980s, the Web in 1994, and most recently, Web 2.0. CDC is seen as a leading federal agency in Web 2.0 use. CDC also has a long-standing information resources governance process in place since 1986 involving a broad array of organizational components and external stakeholders.

CDC employs a combined approach to information resources and IT with some functions being consolidated such as IT infrastructure and many business applications, while public health systems and information are largely distributed in CDC programs in a federated approach. In 2003, IT infrastructure services were consolidated into the IT Services Office (ITSO) and in 2005, two new National Centers were created to establish a focus in certain critical functions, namely the National Center for Public Health Informatics (NCPHI) and the National Center for Health Marketing (NCHM).

## Organization Landscape

Beyond CDC's internal IT program, CDC works closely with the Department of Health and Human Services (HHS) through the HHS Chief Information Officers Council, IT Investment Review Board, and the Office of the National Coordinator for Health IT on government and HHS-wide initiatives and common practices. Examples include HHS systems such as UFMS, PMIS, HCAS, as well as, implementation of federal-wide systems such as Grants.gov, Fedbizopps, GovTrip, LMS and other initiatives such as HSPD-12, FDCC, TIC. CDC also plays a leading role in federal health architecture, support of the National Health Information Network, and the move towards health information exchanges and electronic health records.

Moreover, CDC has numerous collaborations and joint efforts with other federal agencies on shared information systems including USDA (NSAR), FDA (VAERS), DHS (ITDS, ePlan, and BioSense).

### Information Resources Governance Council (IRGC)

The IRGC is the fourth generation IT governance body at CDC since the IRM Board was created in 1986 and is a standing governance entity of the CDC Executive Leadership Board. The IRGC, established in 2008, is responsible for providing effective oversight and guidance for the management and use of information and IT services and systems at CDC. The IRGC has cross-discipline membership from all major CDC organizations.

### Office of the Chief Information Officer

CDC's IT program is principally a federated model, where most of the programmatic systems and applications are owned and operated by programs in CDC's National Centers and Divisions. The Office of the Chief Information Officer provides overall coordination, oversight, strategic planning, and other services.

**Capital Planning and Investment Control (CPIC)**

provides a systematic approach to IT investment planning, portfolio management, project management discipline, and monitoring to optimize returns and minimize risks of IT investments.

**Office of the Chief Information Security Officer (OCISO)**

provides information security protections commensurate with the risk and magnitude of harm resulting from the unauthorized access, use, disclosure, disruption, modification, or destruction of CDC information. The information security program's focus is to maximize the confidentiality, integrity and availability of CDC's information and system assets.

**Information Technology Services Office (ITSO)**

implements and manages all CDC's worldwide IT infrastructure including networks, servers, data centers, workstations, and telephones. ITSO operates as the first OMB-approved High Performing Organization (HPO) since 2004 in accordance with rigorous key performance indicators, performance measures and best-in-class unit costs.

**Management Information Systems Office (MISO)**

develops, implements, and supports most of CDC's internally focused enterprise business service systems and provides data management and integration to support CDC administrative lines of business and integration with programmatic functions.

**National Center for Public Health Informatics (NCPHI)**

NCPHI provides leadership in the application of information, computer science, and technology to public health practice, research, and learning. NCPHI develops systems, tools, and standards supporting national Health IT and supports public health informatics science and research development.

**National Center for Health Marketing (NCHM)**

NCHM protects and promotes the public's health through collaborative and innovative health marketing programs, products, and services that are customer-centered, science-based, and high-impact. NCHM has a primary role in externally facing information products for CDC customers including the overall coordination and strategy for CDC's website [www.cdc.gov](http://www.cdc.gov).

**Other National Centers**

CDC's National Centers plan, develop, and operate systems to meet individual scientific research and public health practice needs. They collect data and information, conduct analyses, and create information products for multichannel distribution to various health information consumers to improve and protect health of individuals, communities, and populations.

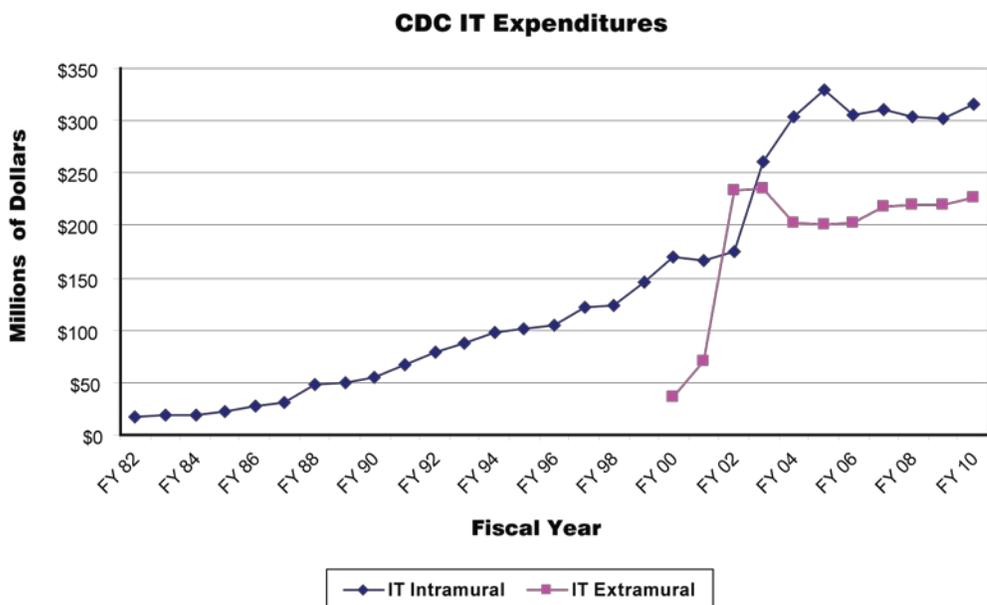
**Office of Enterprise Communication (OEC)**

OEC has primarily responsibility for CDC's internal enterprise communication strategy and channel, CDC Connects, among other responsibilities.

## IT Spending Trends

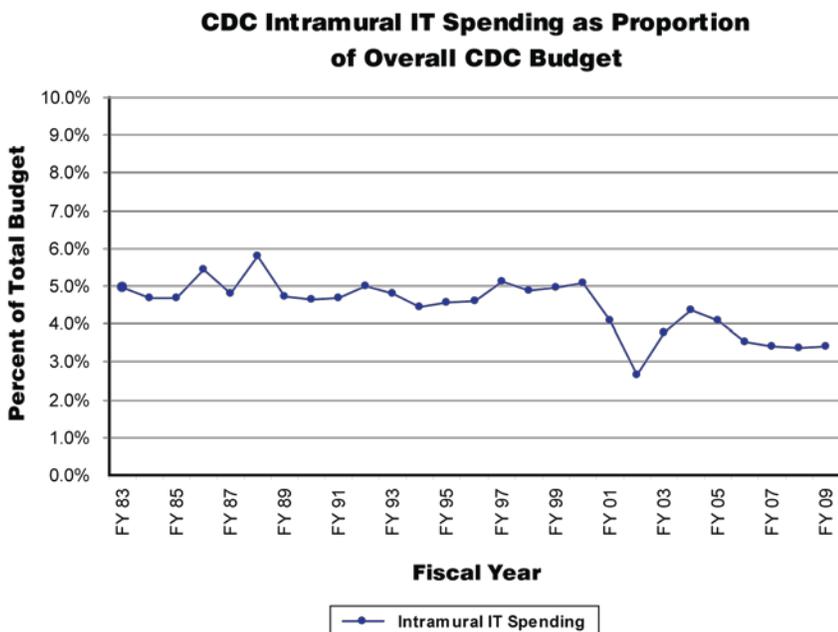
CDC has a long history of IT investing to support and enable CDC’s mission. During the 1980s, investment grew at an 8% compound annual growth rate, followed by 16% in the 1990s and >30% between 2000 and 2005 as a consequence of 9/11. However, the last few years have seen a plateau of both intramural and extramural IT investments (see Figure 1).

**Figure 1**



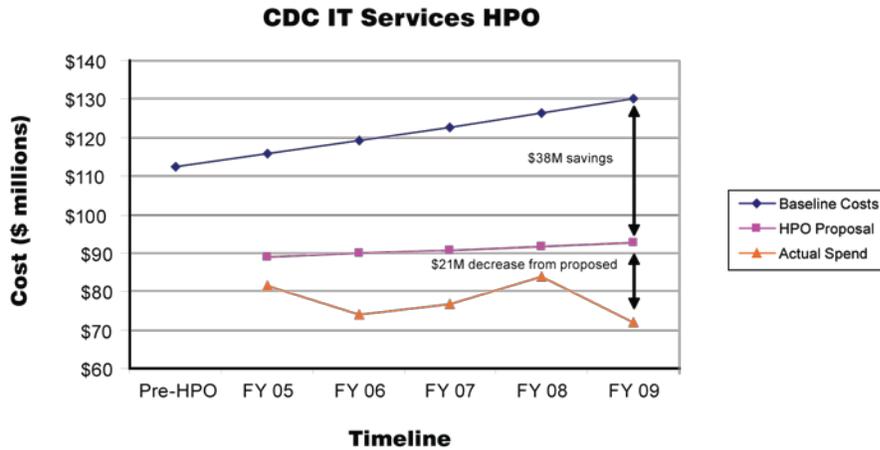
Over the last 25 years, CDC’s IT spending has remained relatively consistent between 5% and 7% of CDC’s overall budget, although it has been decreasing the last 5 years (Figure 2).

**Figure 2**



CDC's restructuring of IT infrastructure services in FY 04 into a high performing organization (HPO) has yielded substantial cumulative cost savings, \$226M (37%) over the past 5 years from baseline costs. However, budget reductions have further reduced resources by an additional \$66M (11%) beyond the HPO proposed level (see Figure 3).

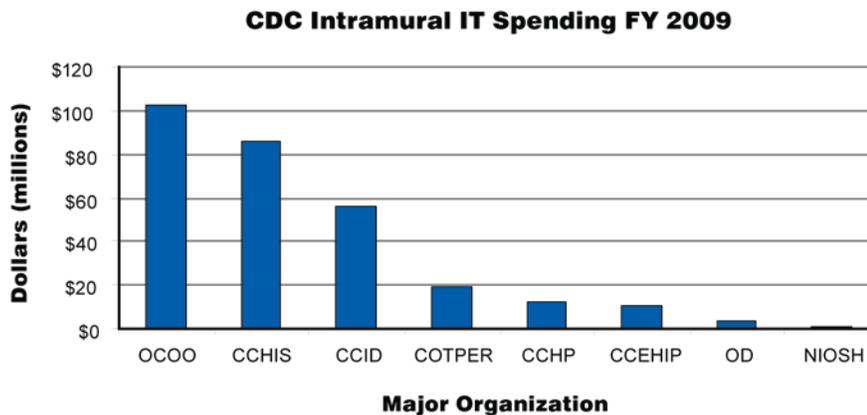
**Figure 3**



CDC's IT investment portfolio is comprised of major (>\$10M), tactical (\$3-10M), and supporting projects (<\$3M), internally as well as IT investments externally, as grants to states which build IT infrastructure, systems, and capabilities supporting public health practice.

FY2009		
Investment Category	Count	Dollars (millions)
Major	8	\$151
Tactical	15	\$ 64
Supporting	82	\$ 76
Extramural	6	\$214
<b>Total</b>	<b>105</b>	<b>\$505</b>

**Figure 4**



## IT Investment Management

CDC has been quite successful in IT investment management. For example, all eight major IT investments requiring a business case (OMB exhibit 300) have continuously received passing scores by HHS and OMB. CDC’s portfolio is typically among the highest rated in HHS. Moreover, 94% of the monthly earned value management project reports, which measures adherence to planned cost and schedule, have been within an acceptable 10% tolerance level. Corrective action plans have been developed for those falling outside of tolerance.

## Federal e-Gov Program

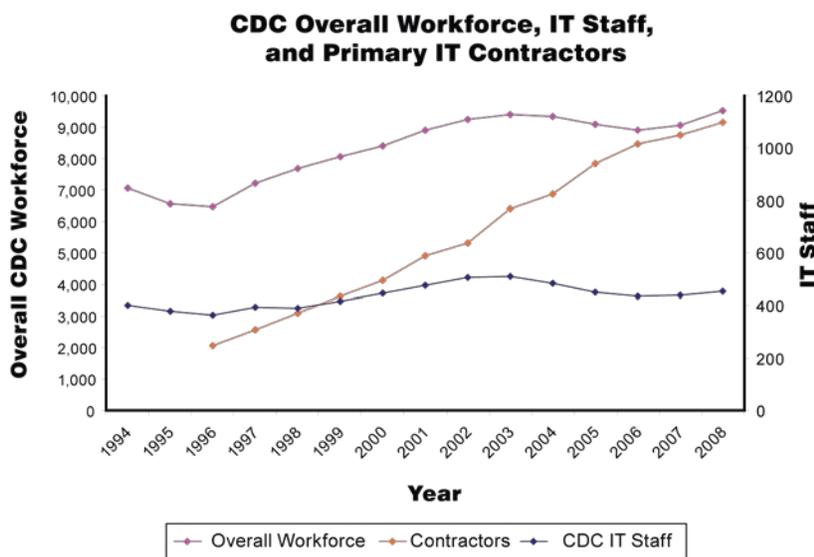
A Status and Progress assessment is conducted each quarter by HHS under the President’s Management Agenda e-Gov program. A wide range of proud-to-be goals and criteria are measured. CDC has consistently achieved a Green rating for Status and Progress in every quarter with one exception in Q2 FY08.

Fiscal Year	Status	Progress
FY 06	●	●
FY 07	●	●
FY 08	●	●

## Workforce

Over the course of the past 20 years, CDC’s mission growth coupled with increasing dependence on IT and limits on increasing federal staff size has resulted in a substantial increase in IT service contractor reliance. Two decades ago, federal staff represented greater than 90% of the CDC IT workforce, while currently federal staff are less than 25% of the total. In just the last decade, contractors working under CDC’s primary contract (CITS) involved in system and analytic support have increased over four fold from 250 to 1,100 staff. There are an additional 500 IT contractors at CDC through other contracts.

Figure 5



## Public Health Informaticians

In the mid 1990s, CDC recognized the growing need for blending the disciplines of public health (PH) practice with IT, to better leverage the ever increasing use and opportunities presented by technology. The field of PH informatics emerged as a parallel to medical informatics in the healthcare environment. Technically defined as “the systematic application of information and computer science and technology to public health practice, research, and learning,” CDC began hiring senior PH informaticians in 1996. Shortly thereafter, CDC established the Public Health Informatics Fellows Program to address the lack of PH informatician supply. Since that time, 71 fellows have entered the program and most have taken PH positions at CDC or elsewhere in public health. CDC’s Office of Workforce and Career Development administers the program and has partnered with other collaborators in the development of PH informatician credentialing, which may lead to a national certification program.

In 2005, CDC established NCPHI, under the Coordinating Center for Health Information and Service to develop and promote the science of PH informatics at CDC. NCPHI supports the necessary research and workforce base for this growing discipline, establishes strong partnerships, and facilitates coordinated activities in informatics while ensuring strong representation for public health in all national Health IT initiatives.

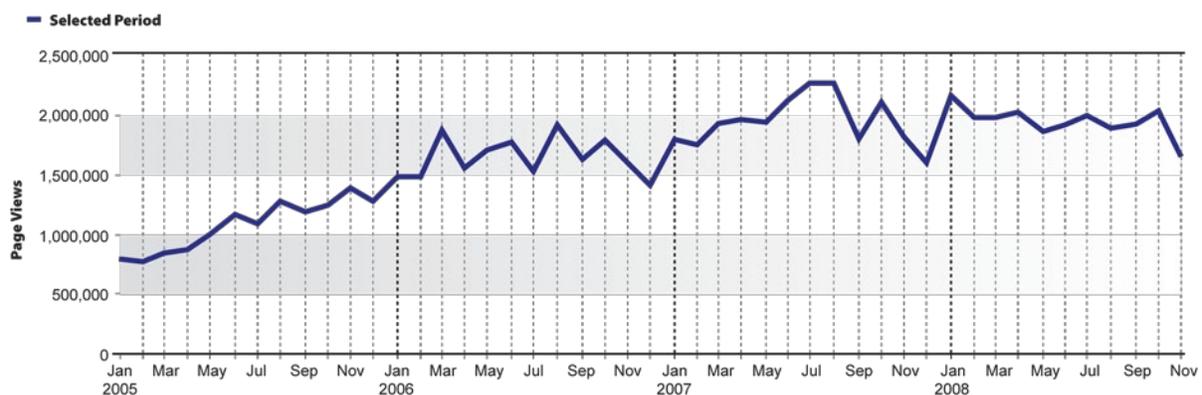
## CDC Employee Communication

Employee communication plays a pivotal role in employee effectiveness and morale. CDC recognized this in launching *CDC Connects*, CDC’s online daily information source.

***CDC Connects* is the cornerstone of CDC’s employee communication program.** It combines the best features of newspapers—fresh content, interesting photos, feature articles—with intranet best practices—most useful tools and resources, alerts, notifications, blogs, and employee connections.

*CDC Connects* has steadily increased its readership.

**Figure 6**



## CDC's Health Information

### Web

CDC's nationally award-winning web presence has been active and evolving since 1994. It currently serves over 100 million visitors each year with very dynamic and interactive health information supporting personal health choices, health research, public policy, and other uses. Several graphics below depict some of CDC's web-based activities.

### Social Media

CDC is also active in social media sites as a means to convey health information where people are frequenting such sites as MySpace and Second Life.

### CDC-INFO

In 2005, CDC began consolidation of its many hotlines and clearinghouses into one source for the calling and e-mailing public who were seeking a broad array of health information. With over 5,000 prepared responses to common questions, CDC-INFO rapidly responds to hundreds of thousands of inquiries a year with very high levels of customer satisfaction.

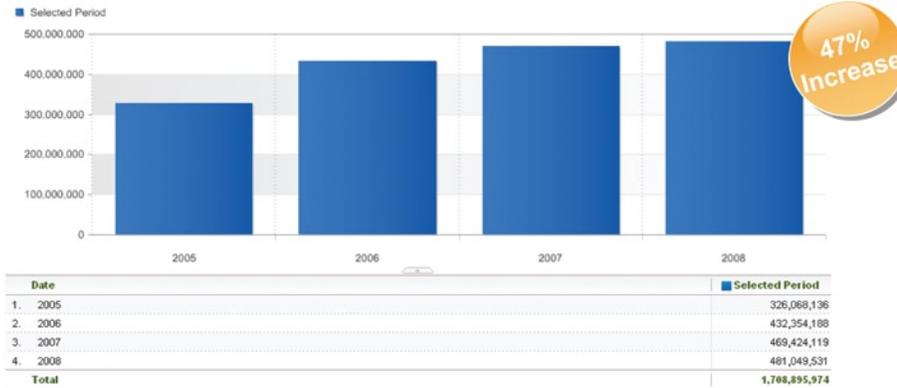
The screenshot shows the CDC website homepage with the following elements:

- Header:** CDC logo, "Centers for Disease Control and Prevention", "Your Online Source for Credible Health Information", and a search bar.
- Navigation:** A-Z Index and a search bar.
- Main Content Area:**
  - H1N1 Flu (Swine Flu):** A large banner with a photo of a woman holding a baby, text "H1N1 Flu (Swine Flu)", "CDC Investigates Human Cases", and a "GO" button.
  - Disability Causes, Stroke Awareness, Nurses Week, Mother's Health, H1N1 Flu:** A vertical list of topics with right-pointing arrows.
  - Health & Safety Topics:** A grid of boxes for:
    - Diseases & Conditions:** ADHD, Birth Defects, Cancer, Diabetes, Fetal Alcohol Syndrome, Flu, Hepatitis, HIV/AIDS, STDs...
    - Healthy Living:** Bone Health, Physical Activity, Immunizations, Genetics, Sexual Health, Smoking Prevention...
    - Emergency Preparedness & Response:** Bioterrorism, Chemical & Radiation Emergencies, Severe Weather...
    - Injury, Violence & Safety:** Brain Injury, Child Abuse, Falls, Fires, Food Safety, Poisoning, Suicide, Youth Violence...
    - Environmental Health:** Air Pollution, Carbon Monoxide, Lead, Mold, Water Quality, Climate Change...
    - Travelers' Health:** Destinations, Outbreaks, Travel Vaccinations, Yellow Book...
    - Life Stages & Populations:** Infant & Child, Men, Minorities, Pregnancy, Seniors, Women...
    - Workplace Safety & Health:** Asbestos, Chemical Safety, Construction, Mining, Office Environments, Respirators...
  - Data & Statistics:** A bar chart titled "Rates for New Cancer Cases and Deaths by Sex" showing New Cases (558.9) and Death (234.4) for All Races, and a smaller bar chart for Male (414.8) and Female (159.9) rates per 100,000.
  - News & Events:** "H1N1 Press Briefings" and "CDC Responds to H1N1 Flu Outbreak Among Humans".
  - Publications:** "Emerging Infectious Diseases (EID)", "Morbidity and Mortality Weekly Report (MMWR)", "Preventing Chronic Disease (PCD)".
  - Public Information:** "About CDC" (Organization, Budget, Funding, Employment), "CDC Health Protection Goals" (Healthy People in Every Stage of Life, Healthy People in Healthy Places, People Prepared for Emerging Health Threats, Healthy People in a Healthy World, About CDC's Goals), "CDC for YOU" (Individuals, Public Health Professionals, Researchers, Media, Healthcare Providers, Students and Educators, Partners, Policy Makers, Businesses).
  - Tools & Resources:** "CDC-TV Watch now" (Joseph Bresee, M.D., Chief, Epidemiology & Prevention Branch, CDC Influenza Division, H1N1 (Swine Flu)), "CDC.gov Top 10" (2009 H1N1 Flu (Swine Flu), Wildfires, School Violence, Flu, Methicillin-resistant Staphylococcus aureus (MRSA), Vaccines and Immunizations).
- Right Sidebar:**
  - Text size: S M L XL
  - Bookmark and share
  - Get email updates
  - Subscribe to RSS
  - Listen to audio/podcast
  - CDC en Español

# CDC.gov Traffic



- Over **1.7 billion page views** since 2005
- **82% increase** in Total Visits to CDC.gov from 2005 to 2008
- **47% increase** in Total Page Views from 2005 to 2008



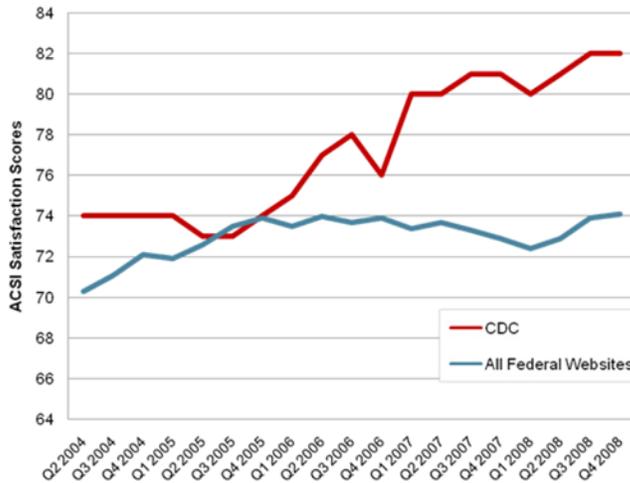
Source: Omniture SiteCatalyst, Total Page Views, 2005 - 2008

CDC.CCHIS:NCHM:DeHM

# Analyze Data to Understand Usage



## Comparison of CDC Satisfaction Score to All Federal ACSI Satisfaction Scores



Source: American Customer Satisfaction Index (ACSI), Q2 2004 – Q4 2008

CDC.gov has the **2<sup>nd</sup> highest satisfaction rating** of all federal portal or department Web sites.

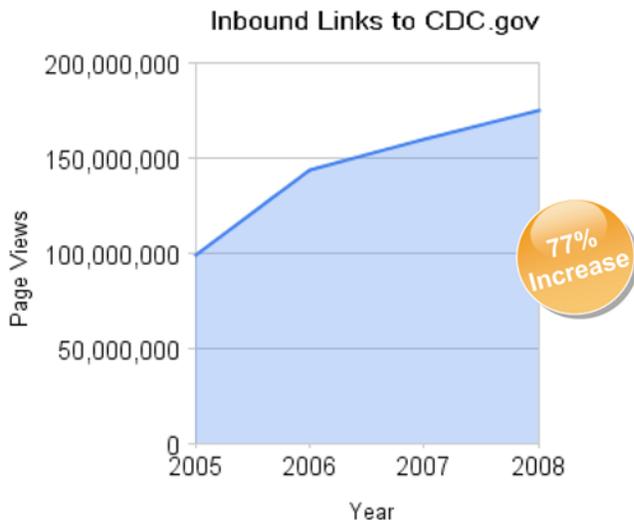
Source: American Customer Satisfaction Index (ACSI), Quarterly e-Gov Report, Feb. 3, 2009.

CDC.CCHIS:NCHM:DeHM

# CDC.gov Referrers



- **77% increase** in Referral Traffic (Inbound Links) from 2005 to 2008
- Over **175 million inbound links** from other sites to CDC.gov in 2008



Source: Omniture SiteCatalyst, Inbound Links to CDC.gov, 2005 - 2008

CDC:CCHIS:NCHM:DeHM

# CDC.gov Functionality



- Email updates
- Podcasts
- RSS
- Widgets
- Content Syndication
- e-Cards
- Social Bookmarking/Tagging
- m.cdc.gov
- Standard Templates
- CDC-TV
- Blogs (coming soon)



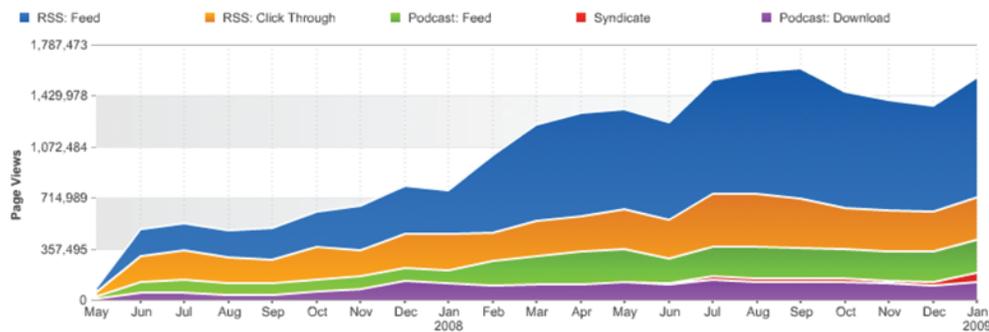
CDC:CCHIS:NCHM:DeHM

## New Media Channels



### Increased growth and upward trends for all new media channels

- **Content Syndication: 208,000 views** since launch
- **CDC-TV: 84,000 views** of online CDC videos
- **E-Cards: 165,000** e-Cards viewed and sent
- **Mobile: 7,700 views** with little promotion
- **Podcasts: 5.1 million** Podcasts downloaded and feeds consumed
- **RSS: 16 million** feeds clicked and consumed



CDC.CCHIS:NCHM:DeHM

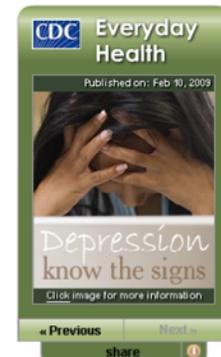
## CDC.gov Widgets



### WIDGETS

*Small applications with real-time CDC content that can be embedded on Web sites, blogs, and other sites.*

- The most recent Peanut Butter Widget was the #1 most viewed page/product on CDC.gov for February 2009
- Received **1.7 million views** for February alone (in 10 days)
- It surpassed the CDC Homepage, Search, and the BMI calculator in popularity
- Accounted for **10% of total CDC.gov page view traffic** in February 2009



CDC.CCHIS:NCHM:DeHM

## Future Directions, Opportunities & Challenges

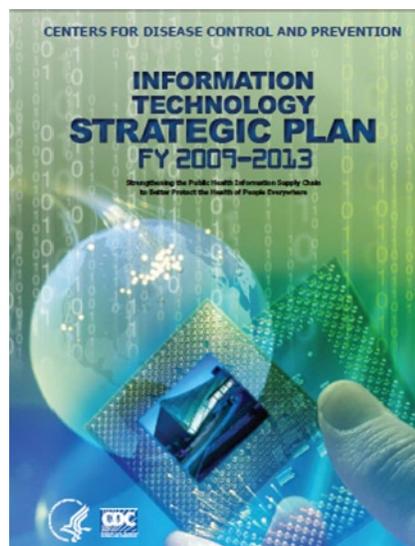
### CDC IT Strategic Plan

CDC's 5-year strategic plan guides the direction, focus, mission alignment, initiatives, investments, and accountability of CDC's IT program.

The plan development was informed by an environmental analysis of key drivers, enablers, and trends that relate to CDC's mission and by engaging a range of public, private, and academic sector participants.

#### The five broad goals contained in this plan cover:

- **Core Mission:** IT solutions supporting the CDC Health Protection Goals
- **Business Services:** Advanced business systems to support effective and efficient business service delivery and management practice
- **Shared Enterprise Practices:** Enterprise resources and processes that foster mission and operations success through information technology
- **IT Foundation:** Robust, reliable, and secure computing and communication products and services that enable CDC's public health mission and business
- **Collaborative Work and Innovation:** Collaborative innovation throughout the public health domain to accelerate public health program implementation and improve program results



### CDC's Global Expansion

CDC's ITSO provides information technology infrastructure support to CDC international programs in 30 different countries. This support includes personal computing, infrastructure directory services, e-mail, infrastructure software, Internet, networking, remote access, satellite and terrestrial communication, and limited VoIP and video conferencing. ITSO has staff located regionally overseas in Kenya (East Africa), Nigeria (West Africa), South Africa (Southern Africa), Thailand (Asia), and Atlanta (Caribbean, Central America) serving in the role of Information Technology Advisors (ITAs). These ITAs interact on a regular basis with each CDC international office. ITSO is in the process of connecting each international office to the CDC Global Network, enabling direct connectivity from international offices to CDC headquarters.

### Cyber Security

Today's threats to government information and networks have become a major issue and challenge as the extent of attacks has substantially increased in sophistication and frequency. Conversely, the need to broaden collaboration, increase government openness and transparency, and become more agile in IT solutions creates an inherent tension with information and critical infrastructure protection.

The scientific, business, and personal information CDC relies on to perform its mission is a potential target of state-sponsored entities, terror organizations, and criminals. These attackers create great risks to our ability to

protect the public. CDC meets the threat by continually identifying and verifying security controls that protect our information and systems from unauthorized disclosure or alteration. However, these controls are continually balanced against CDC's public health mission and the need for maximum functionality of the systems that serve to make CDC effective and efficient. Work is continuously underway to enhance our risk-based protections as well as organic abilities to identify vulnerabilities and attacks.

### **Systemic Funding**

Since the early 1980s until the last 5 years, CDC's IT expenditures have continuously increased strongly and kept pace with CDC's overall budget growth. However, over the last five years, the trend has been a decrease in IT spending in real dollars as well as proportionally to CDC's overall budget. While some of this was mitigated by management and technical efficiencies that CDC achieved, the remaining reduction has caused serious impacts in maintaining technical currency, implementing new solutions and capabilities, and providing advanced solutions for public health programs.

### **System Consolidations**

The move to government-wide and HHS-wide business systems over the last 6 years has been challenging in ensuring CDC's business practices are well supported, access to essential management information is maintained, and integration with other systems and processes can be sustained. This has largely proven to be difficult and CDC has lost some ground and functionality in the short run; however, efforts continue with system owners on improvements.

## **Select CDC Major Program Spotlights**



The Health Information Exchange (HIE) program routinely supports National Health Information Network (NHIN) activities. CDC is working on federal data use agreements and collaborative ventures with other HHS agencies as well as other organizations involved with the NHIN efforts, including the Department of Defense (DoD) and Veterans Administration (VA). This is a key aspect of the economic recovery work and investments. CDC staff are also playing a critical role on the NHIN Product Manager Team and are working towards establishing NHIN Gateways at the CDC and in at least three states by August, 2009.

CDC is supporting NHIN demonstration activities at the HIMSS 2009 Interoperability Showcase working collaboratively with many other organizations supporting NHIN activities, including two CDC funded HIE sites, and will demonstrate latest advancements regarding the biosurveillance use case. For example, current standards will be utilized to demonstrate receipt of critical biosurveillance data elements from clinics, hospitals, and laboratories at HIEs, and subsequent transfer of data from HIEs to state health departments. Critical bidirectional communication developments will also be showcased and the NHIN Gateway capabilities will be displayed as summarized data is sent from state health departments to the CDC.

The Public Health Information Network (PHIN) is CDC's vision for advancing fully capable and interoperable information systems to enhance public health preparedness across federal, state and local government and improve electronic exchange of health data and information between clinical healthcare and all levels of public health. The PHIN investment coordinates with NHIN, a critical portion of the health IT agenda, intended to provide a secure,

nationwide, interoperable health information infrastructure to connect providers, consumers, and others involved in supporting health and healthcare.



**PHIN's programmatic approach includes the following:**

- Supporting the exchange of critical health information between all levels of public health and healthcare
- Developing and promulgating requirements, standards, specifications, and an overall architecture in a collaborative, transparent, and dynamic way
- Monitoring the capability of state and local health departments to exchange information
- Advancing supportive policy
- Providing technical assistance to allow state and local health departments to implement PHIN requirements
- Facilitating communication and information sharing within the PHIN community
- Providing public health agencies with appropriate and timely information to support informed decision making
- Harmonizing PHIN with other federal initiatives
- A core technical component of PHIN is the PHIN Vocabulary Access and Distribution System (VADS), which promotes standards-based vocabulary to support consistent information exchange.



The Vaccine Tracking System (VTrckS) is a critical component of the Vaccine Management Business Improvement Project. VTrckS is an enterprise system that will replace several legacy systems used at CDC and state and local grantees. VTrckS will provide CDC capabilities to manage over \$3 billion of vaccines associated with the Vaccines for Children and Section 317 grantee funded programs. VTrckS enables: (1) Improved program, project, and provider financial accountability; (2) Responsive ordering and delivery of vaccines to >100,000 public and private providers; (3) More effective acquisition and contract management of vaccine manufacturers; (4) Enhanced support of immunization project managers; and (5) Improved visibility into the vaccine distribution pipeline. Initial Go-Live implementation for VTrckS is scheduled for December 2009.

BioSense is a national program to improve the nation's capabilities for disease detection, monitoring, and near real-time health situational awareness. BioSense is a CDC developed and hosted web-based system that accesses existing data from healthcare organizations across the country. BioSense surveillance methods use advanced algorithms for data analysis to address the needs of PH at all levels for identification, tracking, and management of naturally occurring and potential bioterrorism events.



Today, BioSense is a working system that supports over 500 registered users and receives an average of 175,000 real-time messages per day from 530 plus hospitals. Data are also received daily from approximately 1,200 DoD and VA hospitals and healthcare facilities. Microbiology tests and results are received from two of the nation's largest commercial laboratories, LabCorp and Quest Diagnosis. Outpatient retail anti-infective prescription data are received from Per-Se.



National Electronic Disease Surveillance System (NEDSS) is an Internet-based infrastructure for public health surveillance data exchange that uses specific PHIN data standards. NEDSS also relies heavily on industry standards (e.g., LOINC, SNOMED, HL7), and policy-level agreements on data access/ protection of confidentiality.

NEDSS is a system of interoperable subsystems, components and systems modules that include software applications developed and implemented by the CDC, state and local health departments, and those created by commercial services and vendors. When NEDSS began in 2001, no state had integrated public health surveillance systems. However, today over 35 states have implemented surveillance systems based on this vision.

Initially, CDC responded to requests from states seeking assistance to obtain NEDSS software solutions, often based on local and state information technology resource constraints. The CDC NEDSS Base System (NBS) was developed by CDC to meet those needs. Today, 16 states use the NBS.



The National Select Agent Registry (NSAR) is a joint effort with USDA's Animal and Plant Health Inspection Service (APHIS) to implement the 2002 Bioterrorism Preparedness & Response Act that requires entities to register with HHS or USDA if they possess, use, or transfer select biological agents or toxins that could pose a severe threat to public health and safety, animal, plant health, or animal/ plant products.

NSAR provides a single portal to the regulated industry for carrying out all requirements of registering and reporting to CDC and APHIS. It also provides a single data repository for both agencies as well as automated workflow capabilities for conducting necessary regulatory work. NSAR minimizes data collection/entry redundancy, improves information sharing, and reduces an entity's reporting burden when forms are submitted electronically.

### Public Health Grid (PH Grid)

In the NCPHI Research and Development Lab, PH Grid is a paradigm that proposes aggregating geographically distributed, heterogeneously computed storage, and network resources to provide unified, secure, pervasive access to their combined capabilities. The purpose of the PH Grid is ultimately to provide public health with a low-cost, highly flexible, scalable environment, facilitating robust collaboration, seamless and timely exchange of health-related data, information, knowledge, and the transparent sharing of computational and application resources. A national PH Grid would interconnect public health departments, RHIOs, healthcare providers, and local, state and federal agencies, providing full interoperability with the NHIN.



**Centers for Disease Control and Prevention**

**State of CDC  
Information Technology**

March 27, 2009

