

Sharing Knowledge With the Public During a Crisis: NASA's Public Portal

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In addition to capturing and sharing knowledge for a specific project or for future projects, as aerospace researchers, we have a duty to share our findings and knowledge with the world at large. For the National Aeronautics and Space Administration (NASA), the Internet is the place where most people come to find out about what is happening at the space agency. In an effort to revitalize and unite NASA's 4,000,000 public-facing web pages, and to focus on inspiring and informing the public, NASA recently underwent a significant change in their web sites. Moving from a distributed network of very different sites toward an integrated portal for NASA, a new portal was deployed that integrated a content management solution, search technologies, dynamic portals, interactive multimedia, and an "anytime, anywhere, anyone" publishing model that enabled knowledge sharing from all NASA employees.

The portal, brought online on February 1, 2003, was expected to receive ~142,000 hits per day. Within hours of deploying this portal, the Space Shuttle Columbia tragedy occurred and the portal handled 75,000,000 hits the first day, and over 500,000,000 visits the first month. The team dynamically changed the design, information architecture, and publishing capabilities to meet this unexpected need. This case study looks at integrating the web governance policies and procedures, migration to a single content management solution, and integrating best-of-breed technology with high-impact, interactive components. In particular, this case study is interesting in the dynamic scalability of this application to meet the needs of an organization on the front lines during a crisis.

On January 31, 2003, the NASA Portal quietly debuted; 9 hours later the world logged on to www.nasa.gov to learn about the loss of the Space Shuttle Columbia and her crew.

The goal was simple: engage the public, share NASA's knowledge with the world, and inspire the next generation of explorers...as only NASA can. The result was dramatic: a dynamic, engaging, citizen-centered view of the U.S. space agency and its many projects. The NASA Web Portal focuses first and foremost on the citizen: kids, students, educators, media, and the public. Behind the scenes, nearly 100,000 stories, images, and documents provide a breadth of knowledge for people to learn about, understand, and dream of exploring the heavens above and the Earth around us.

Citizens interact with NASA in many ways, but the highest number of people we reach is through the Web. This is essential to understanding how the Portal contributes to the success of our missions. People come to NASA to get timely, accurate, and comprehensible information in order to make decisions about how to treat the environment, to grasp the significance of

investments in America's research and development for our long-term economic growth, and to understand our place in the universe. They also come to be entertained, engaged, and excited about space exploration and to be a part, if only virtually, of the greatest endeavors our world can envision. Sharing this knowledge and this excitement with the public is key to making NASA's missions a success.

There is no better example of how the public and NASA interact than the aftermath of the loss of Columbia. In the first 48 hours after the portal came online, citizens requested 220,000,000 pieces of information and the Portal delivered. What Americans most needed was authoritative information about what had happened to their seven heroes, and that's what the Portal gave them. The media, including hundreds of reporters who had not covered NASA before, came to the site in droves and found a wealth of well-organized breaking news and background material for their use. Teachers and students came to understand what had happened and to discuss it in class. Applicants to the Educator Astronaut program were responding to let us know that they still wanted to fly and be part of the nation's space program. The Portal supported all these efforts without a glitch, enabling the missions to focus on dealing with the issues at hand and communicating with the public.

The Portal has dramatically helped to bring people specific information about each mission and the related science. As we launched the new Portal, we tracked similar content: some within the Portal framework and some still in isolation. Content within the Portal received ten times the amount of traffic that the others content did over the same period of time! For one project (as a typical example), 20,000 people came to understand more about their science instead of the 2,000 that they expected.

In addition to being customer-centered, the Portal is results driven. The management team is reviewing customer surveys, e-mail from the public and statistical data. While protecting the privacy of individuals, NASA is analyzing aggregate data about what components of the site people are visiting, how they're using the site and what they appear to want more of. These analyses will be fed back into the development process to improve the site.

Finally, the NASA Web Portal is a market-driven solution to a government communications problem. The graphic design was created by a firm with extensive commercial experience (including Mercedes Benz, Proctor & Gamble and Nike). Overall implementation of the portal was done by technology firm that handled everything from bringing in the design team to arranging for Web hosting. NASA had long planned to switch from a single Web server on an Agency network to a commercial hosting environment, and doing so ensured that anyone who came looking for NASA information on Feb. 1 was able to get it.

Now that the Portal infrastructure is in place, NASA has a sustainable, expandable framework through which it can continue to reach the public directly. Supported by a federated publishing process that allows anyone in the Agency to become a content creator, the Portal will be integrating content or connecting to all of NASA's distinct public Web sites.

The Way It Was

In 2002, the NASA web reflected the many projects that were underway at the Agency. Sites were focused on describing the project or the NASA Center and, with few exceptions, were not focused on their audience. Navigation was oriented around organizational hierarchies within the Agency, rather than citizen-based needs. With nearly 3,000 distinct public Web sites, more than 4 million Web pages and no integrated search or navigational capability, NASA had a plethora of useful and compelling, but unorganized, content. People had to know the URL for each site they wanted. Internally, NASA people who wanted to share their knowledge had to buy a server, place it in an operational environment, get a web designer and a webmaster, implement appropriate security, and follow a many-stepped process that led them to publishing their content. Times ranged up to three weeks to get content published to some sites. When an event occurred that brought many people to a site (such as a launch or planetary encounter), that site shouldered the entire burden for delivering the content, streaming related video, and providing front-line support to the public.

The Way It Was Meant To Be

The screenshot shows the NASA website interface from 2003. At the top, there is a navigation bar with links for Home, About NASA, News, and Search. Below this is a main header with a large image and a search box. The main content area is divided into several sections:

- NEWS AND EVENTS FEATURES:** This section contains several news items with dates and titles, such as "NASA Sends Science And Math Teachers 'Toch To Orbit'", "New Financial Management Toolkit Hails NASA", "Astronomy Institute Announces New Telescope", "Antarctic Anomaly May Affect SCOR Scientific Data Transmission", "New Space Shuttle Columbia Images Released", and "NASA Biotechnology Ambitions Extending Quality Of Life".
- FEATURED NASA SITES:** This section highlights specific NASA programs and events, including "NASA TV", "NASA TV Schedule", "NASA TV News", "NASA TV Archive", "NASA TV Search", and "NASA TV Feedback".
- MULTIMEDIA FEATURES:** This section includes links to "NASA TV", "NASA TV Schedule", "NASA TV News", "NASA TV Archive", and "NASA TV Search".
- MyNASA:** A section for personalized content, including "MyNASA Home", "MyNASA News", "MyNASA Search", and "MyNASA Feedback".

The bottom of the page features a footer with contact information, a "FIRST GO" logo, and a "NASA" logo.

In 2003, the NASA Portal broke this paradigm, and initiating sweeping changes in the way the public interacts with NASA over the Web. The new approach builds on the work of a series of activities looking at delivering more efficient, citizen-centered services that relieve the NASA workforce of administrivia and focus them on their technical tasks. The convergence of several activities made the Portal a possibility, but it was spurred by a vision by our Administrator, Sean O'Keefe, that NASA was *One NASA*, a single organization that works to understand and protect our home planet, explore the universe and search for life, and inspire the next generation of explorers... as only NASA can. The Office of Public Affairs (which has managed the NASA Home Page since 1994) and the Office of Education provided expertise in communicating NASA's message to broad external audiences. The Knowledge Management Team (under the Chief Information Officer) had benchmarked best practices in knowledge sharing and decision making that led to their successful implementation of internal portals. Mr. O'Keefe called upon these groups to bring the NASA Portal to life—a marriage of the message and the media.

Since the Portal was created using rapid application development (RAD) methods (just 4 weeks from concept approval to launch), customer requirements

were met before they had a chance to evolve. Using these same methods, the Portal team continues to deliver iterative functionality (personalization, enhanced navigation, and deeper content) to meet emerging trends in customer needs. Because of this, the Portal and its infrastructure remain “fresh” and we expect to be able to sustain it more effectively.

Customer Satisfaction Rises

Customer needs and satisfaction are tracked through an online survey, based on the American Consumer Satisfaction Index, which is presented to every 80th viewer. The survey asks users to rate the site's content, functionality and navigability as well as how likely the user is to return to the site or recommend it to someone else. After the portal's deployment, overall customer satisfaction jumped 8 percent.

One of the biggest concerns from the public about our previous site was the navigation and search, which always received the lowest ratings. With the deployment of the new design customer-satisfaction ratings for each of those categories rose by as much as 10 percent, and users specifically commented on the improvements.

Specific user comments on the new design included:

- "easy to navigate, loads fast, full of very informative information. I will be back to this site."
- "The information provided was succinct and written in laymen's terms."
- "The organization and navigation is excellent."
- "quickly able to find the info that interests me"
- "Easy to use format...better than the last site"
- "Presented in terms any layman can understand while losing none of the technical accuracy."

Overall Metrics

Metric	Previous NASA Home Page (July 1998 - Jan 2003)	NASA Portal (February 2003 -
Customer Satisfaction (range of ratings)	73-76	77-80
Usage (daily average / total)		
• Hits	1.9 million / 2.9 billion	6.5 million / 1.141 billion
• Sessions	not tracked	61,000 / NA
• Pages	210,000 / 309 million	476,000 / 758.5 million
Depth of Navigation	Two levels	Two levels initially, with a framework that allows for the creation of subsidiary or parallel divisions
Breadth of Information Architecture	Several dozen, based mainly on NASA's organization and internal needs	Three top-level divisions (site navigation, program elements and audiences), further subdivided into five to 10 subtopics each.
Content Behind the Scenes	less than 10,000 objects	100,000 objects

Section 508 Compliance

Being citizen-centric means not only giving users the information they want, but also recognizing that different citizens require the same information to be published in different ways. We have specifically addressed issues related to those with disabilities and for Section 508 of the Rehabilitation Act of 1998. The use of Flash modules with animation and soundtracks creates some specific issues that must be addressed so that users with assistive technology can access and navigate the site. The portal has worked with the Agency's Section 508 Accessibility team to identify and eliminate those issues.

Focus on Teachers, Students

The future success of our nation depends upon our youth. In support of the Administration's educational goals so that no child be left behind, the NASA Portal provides a way for children to dream of their future and to realize that they, too, can go to the stars. In support of education, we have devoted three of our five audiences to education: kids, students, and educators. The underlying information architecture quickly directs people to the specific area that is of interest to them. Educators can find their way quickly to curricula and other resources, sorted by topic and grade level. Students needing help with their homework can do the same. Children looking to be engaged by "cool stuff" in the Kids section will find themselves learning as well as playing.

Customization: Citizens' Choice

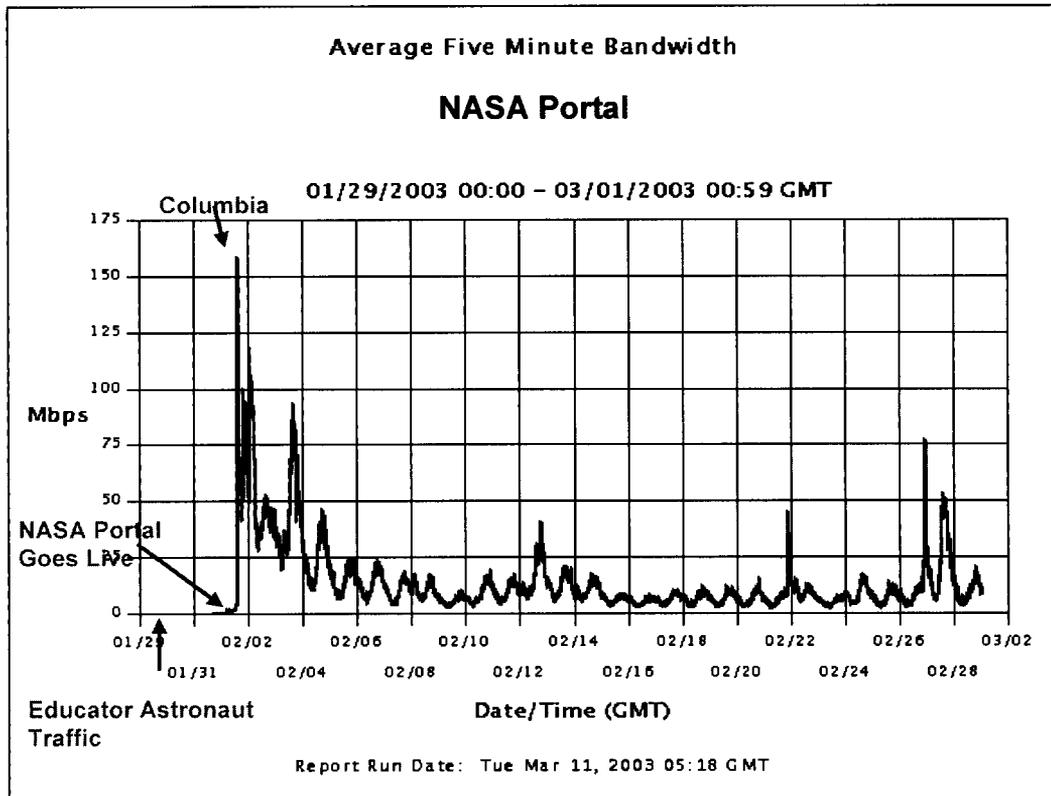
Citizens of any age can choose their own personal view of NASA's Web offerings by going to the customizable "MyNASA" page. They can create their own password-protected profile (no personally identifying information is collected) of the kinds of information in which they are most interested. Focused on those areas that the citizens most care about (ranging from "Looking at Earth" to "NASA in the Lab" to "Our Solar System"), this popular feature lets people with a specific interest get directly to that content.

Federated Publishing: Bringing all of NASA to One Site

Enabling distributed access to publishing, while enforcing centralized standards and policies was a key requirement. As content flows through the Portal, items follow different paths for approval depending upon the type of content, rather than the individual publishing it or the server to which it is published. This environment ensures that quality of information guidelines are met, information is released only when appropriate, and the Editorial Board members can ensure that the most timely and accurate information is published. An author and an editor can now do a process that had involved up to 8 people. Once an item is approved for publication, all affected pages are dynamically generated and propagated throughout the world in less than 10 minutes.

Using the Market: Commercial Hosting

The Portal is changing our Web infrastructure, as well. Designed to be housed in AT&T's data centers and run on their network, the NASA Portal has begun consolidating a variety of services. Costs and capacities associated with bandwidth, caching, streaming, web servers, search, and storage are now being cut as sites are migrated into the Portal. Security is greatly simplified since we have a multiply protected environment at AT&T and security enhancements are done and validated once. What we had done for 3,000 sites, will now need to be done for just one. Because we have outsourced this component, we have successfully delivered content to the public, even during peak times (184 Mbps during the recent Mars launch). One such example is shown in the diagram below on February 1. Such traffic would have saturated the entire NASA network three times over, locking out more than 6,000,000 requests each day.



Knowledge Management: Spreading the News

Transferability of our methodology and approach, down to the technical architecture, continues to be a cornerstone of our plan. Use of open standards, commercially available solutions, and an open architecture has ensured this. We systematically gathered requirements from our customers (citizens and NASA employees and partners) and benchmarked with other organizations before designing the Portal. Specifically, we took a knowledge-management based approach to ensure that best practices in knowledge management, the technology marketplace, and communications would be adapted. As we developed the Portal, we kept in close contact and made site visits with many other Government agencies, contractors, and FFRDCs during this time to share lessons learned. We have worked particularly closely with Homeland Security to share benchmarking, requirements, results of pilot efforts, and usability testing to help as they developed their first portal and ongoing Web efforts. Our lessons learned have been shared extensively, including with the Federal Knowledge Management Working Group, the Government and FFRDC community, and at e-Government events.

Summary

The NASA Portal delivers a sustainable solution for a vibrant, engaging communication vehicle with the public. Designed with best practices in mind, built at lightning speed to citizen

requirements, and utilizing best market solutions, the NASA Portal stood up to the ultimate test in its first hours of deployment—providing key information to the world and critical support to NASA’s mission in a moment of crisis. The existing framework allows for expansion to cover the broad range of NASA's programs and Web content, making the portal a sustainable solution, flexible enough to cover changing missions and handle graphic redesigns without necessarily overhauling the entire site.

Most importantly, the portal makes information easy to find for students and presents it in engaging multimedia that draws them back to the site. That makes the portal a key element of NASA's mission to "inspire the next generation of explorers . . ." as only NASA can.