

# Citizen Auditors— Web-Enabled, Open-Source Government

by Eric Kavanagh

Models that oversee the financial holdings and reporting accuracy of America's corporations can be used to effect transparency in government—right down to where federal relief funds go for Hurricane Katrina victims.

**D**raught beer, designer jeans, and Louis Vuitton handbags all share a common thread: they are line items on the de facto general ledger for federal Katrina assistance. Though remarkably nonsensical, this painful reality paints a stark picture of the inadequacies of government processes, while sounding a clarion call for genuine transparency as the real money starts to flow.

Land of the Mississippi Delta, Louisiana boasts a unique and colorful history. The only state to employ Napoleonic Code, this lush home of Edwin W. Edwards and Huey P. Long knows no boundaries in the smoky realm of the backroom deal—the antithesis of transparency. But chaos presents opportunity, and the quagmire of Pelican State politics now offers a rare prospect for inverting the status quo and paving the way for a new kind of government: Web-enabled, open-source, citizen-audited.

## The Size Factor

Arguably the biggest challenge for disaster relief on such a large scale is just that: the extent of this catastrophe. Katrina laid waste to an area roughly the size of Great Britain. For context, consider the wit of Steven Wright, who once quipped: “It’s a small world, but I wouldn’t want to paint it.” Just imagine the labor hours and materials needed to paint several hundred thousand homes. Where to begin?

The task at hand is, for all intents and purposes, unfathomably massive. It's easily the biggest reconstruction effort in American history. The only comparable examples elsewhere in the last century would be the rebuilding of Germany and Japan after World War II, efforts that commanded millions of laborers and decades of work. On the bright side, the second and third wealthiest nations on earth today, as measured by gross domestic product, are Japan and Germany.

Of course, not even the wealthiest nation on earth can afford to employ, if only part time, millions of contractors for decades to get the job done. What's more, with a project of this magnitude and so many billions of dollars at stake, the threat of corruption cannot be underestimated. The misuse of relief funds for designer bags and debauchery clearly indicates that a new model is needed, lest the same mistakes be made and good money thrown after bad.

The silver lining is that timing really is everything: today, like never before, total transparency for such an effort is not just possible; it's downright plausible. In fact, some of the world's biggest software companies have offered the software to achieve this hurricane relief transparency free of charge, including enterprise-caliber database technology, analytic platforms, and the hottest tickets in big business today: performance dashboards. This initiative, Project Visibility, is spearheaded by TDWI, a Seattle-based educational institute that specializes in business intelligence, helping organizations harness the value of their data.

## Hurricane Katrina's Billions

The next hurdle should (but won't) be the easiest to overcome—assuming we take laws such as the Freedom of Information Act (FOIA) seriously. And why shouldn't we? FOIA clearly calls for transparency in government, and what could be more important than knowing where Katrina's billions go? Good thing the government is supposed to provide that data for free, as FOIA says:

“(4)(A)(iii) Documents shall be furnished without any charge or at a charge reduced below the fees established under clause (ii) if disclosure of the information is in the public interest because it is likely to contribute significantly to public understanding of the operations or activities of the government and is not primarily in the commercial interest of the requester.”

Then there's the hard part: services. With so much data in so many formats, pain must be taken to first locate all the relevant data, and then match database fields from one information SILO to another. (SILO is data kept in a Single LOcation, individual spreadsheets that exist discretely, rendering them useless to everyone but the person or small group with access. Odds are that quite a few SILOs are floating around in Katrina's wake.)

And that's just one small part of the picture. Business requirements must be gathered, reviewed, and polished; servers arrayed; software installed and tested; data models mapped and refined; database files of all kinds examined, cleansed, and indexed; batches of data extracted from source systems, then transformed and loaded into a data warehouse, data marts, and operational data stores; analysis “cubes” created to facilitate specific types of queries; connections set up for data feeds from third-party sources; and the list goes on.

So, plenty of services will be necessary. Where in this vast country could we possibly find such a team of programmers to perform all these services for free? How about everywhere? Wherever they are, provided they can log in—that's where. Open your mind to the world of open-source.

## The Open-Source Revolution

Few inventions have impacted mankind more profoundly than the World Wide Web. The wheel, the printing press, the cotton gin, and penicillin revolutionized life in unprecedented ways. The Internet ranks right up there at the top, radically transforming both business and life. And the fun has just begun, because a confluence of technologies, methods, and awareness is poised to transform much of what we know about government as well, in large part due to the open-source revolution.

Perhaps prophetically, certainly symbolically, the Internet itself runs largely on free, open-source software, thanks to the Apache HTTP Server Project. According to Netcraft's *April 2006 Web Server Survey* of 80,655,992 sites, Apache clocked in at about 63 percent

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of the Internet, with Microsoft at 25 percent, Sun at just 2.4 percent, and Zeus at 0.7 percent. That dominance is nothing new: Apache has been on top since April 1996. In other words, the software that runs the majority of Web sites online today and for the last decade—the software that essentially drives the Internet proper—was free and developed in an open-source environment.

## Meritocracy

Equally interesting is the nature of the Apache Software Foundation (ASF), the organization that governs the Apache HTTP Server Project. The ASF is a meritocracy (a form of governance driven by merit) that promotes open, collaborative software development projects. It began as a group of programmers who used the Web to exchange patches of code while creating the Apache Web Server application. In the Apache group, you must first earn the right to join by doing work on at least one of the group's projects. You then must be invited by an existing member and win the approval of a majority of members in a vote. There are currently 185 members listed on the Apache.org site, 181 of them active.

At its root level, the concept of open-source is fairly simple. The meaning of the term varies from one group to the next (and there are many); the ground rule is that the source code is housed openly online for all to see and share. This method improves productivity for several reasons: information SILOs are avoided, everyone is on the same page, collaboration is the name of the game, and many eyes make few the errors.

And let's not forget the magic of free. We find the following at the Apache site:

“What is interesting to note is that the process scaled very well without creating friction, because unlike in other situations where power is a scarce and conservative resource, in the apache group newcomers were seen as volunteers [who] wanted to help, rather than people [who] wanted to steal a position.”

## Linux Operating System

The open-source world goes far beyond Web servers, of course, to the heart and soul of a computer: the operating system. The brainchild of Linus Torvalds, Linux provides an operating system similar in many ways to Microsoft Windows or Macintosh OS. It's described as a Unix-like application that was built with the assistance of developers around the world. Information technology professionals tend to love Unix because of its stability

and elegance; many love Linux because of its Unix-like architecture—and its price.

The source code for Linux is freely available online, as are any number of distributions, which are compiled versions that can run on most PCs. If that sounds like a threat for the traditional closed-source business models of the current market dominators, that's because it is. On Microsoft's own Web site, an Info-Tech Research Group survey reports that 27 percent of mid-sized businesses have Linux installed in their enterprise.

## Service-Oriented Architecture and Web Services

Like the open-source movement, a related technological method continues to gain strength these days: the service-oriented architecture (SOA). Defining an SOA requires a basic understanding of how software is built. A classic example of a closed-source, monolithic application is Microsoft Word. Having started out as a word-processing program, MS Word grew into a database product, layout tool, and communication platform, gravitating toward the all-things-for-all-people model. Developers of an SOA take the opposite approach. Rather than constructing large, multifunctional applications, they build many smaller applications that interoperate using standard communication protocols, thus creating composite applications. (In the Microsoft example, a composite application would be when MS Word and MS Excel work together for a mail merge.)

Web services within an SOA are like Legos: they all fit together, but come in many different shapes and sizes, thus allowing the construction of innumerable complex super-structures. In a way, Web services are like mammals to the dinosaurs of closed-source software. These online applications represent the future of computing for several reasons: they tend to be agile, reliable, accessible, platform-independent, and very efficient (all when designed properly, of course).

## Application Service Provider

Web services often take the form of something called an application service provider (ASP). Many, many ASPs reside online these days, for everything from credit card processing to keyword counting, map making to banking, cake ordering to weather checking. Salesforce.com, Monster.com, even Dictionary.com are ASPs—sophisticated Web services. These applications

run through Web browsers; they don't require installation on a computer's hard drive, per se.

## Amazon Mechanical Turk

Things get interesting when Web services incorporate people into their processes. Such is the case with the Amazon Mechanical Turk, a Web service that turns the tables on the traditional human-computer paradigm. The following is from the Amazon.com Web site:

“Today, we build complex software applications based on the things computers do well, such as storing and retrieving large amounts of information or rapidly performing calculations. However, humans still significantly outperform the most powerful computers at completing such simple tasks as identifying objects in photographs—something children can do even before they learn to speak.”

So, the Amazon Mechanical Turk provides an interface, referred to as an application program interface (API), to a network of humans. The Amazon.com site continues as follows:

“Amazon Mechanical Turk provides a web services API for computers to integrate Artificial Intelligence directly into their processing by making requests of humans. Developers use the Amazon Mechanical Turk web services API to submit tasks to the Amazon Mechanical Turk web site, approve completed tasks, and incorporate the answers into their software applications. To the application, the transaction looks very much like any remote procedure call—the application sends the request, and the service returns the results. In reality, a network of humans fuels this Artificial Intelligence by coming to the web site, searching for and completing tasks, and receiving payment for their work.”

(A remote procedure call is programming language for when a computer calls on an application to do something.)

## Human Intelligence Tasks

Human intelligence tasks are called HITs. Anyone 18 or over with an Amazon.com account can register to do HITs and get paid for them. Amazon takes a 10 percent commission on all transactions, but otherwise charges no fees for the service. The minimum fee for a HIT is \$0.005.

As the next comment is digested, consider the prophetic words of R. Todd Stephens, director of meta-data for Bellsouth: “I'm not worried about India,

because I don't sweat the small stuff. Do I say that to strike fear? Of course I do.”

Blogger Phil Wainewright posted a missive shortly after the Turk took off, clearly defining the depth and breadth of this innovation:

“The reason it's so difficult to believe it's for real is that there's a sense in which it's an extreme parody of the modern, computerized world of work. For what is any enterprise today if not an elaborate Mechanical Turk system where people sit at web terminals and provide the decisions that computer programs need to complete their tasks? ... Taken to its extreme, the Amazon Mechanical Turk could eliminate every clerical and managerial position in corporate America and instead hook those computer programs into its network of suitably qualified casual part-timers working from home or wherever else they're able to log on.”

## Open-Source Government

Assembling the pieces of this puzzle, we now stand poised—yet again—for unprecedented change. The nexus of these technologies, methods, events, vested interests, and human nature will soon achieve gestalt, as a new era of governance dawns.

Much the way Enron spawned the Sarbanes-Oxley Act of 2002, Katrina relief will set the stage for fully transparent governance. Known as “SOX,” the Sarbanes-Oxley Act calls for broad compliance from public companies with respect to financial holdings and reporting accuracy. Furthermore, it mandates that companies document the processes by which they ensure the accuracy of their numbers.

Because of SOX, corporate America has invested tremendous amounts of money and labor hours in technology, consulting, and research, resulting in a culmination of awareness about business processes and financial reporting protocol. The models created by America's most prominent corporations can be used to effect the same transparency in government, right down to the procedures by which things get done and where the money goes. The blueprints already exist.

Like in business, everything in government boils down to processes. Government employees interact with software systems, paperwork, and citizens, pushing projects along bit by bit. By documenting these processes in software applications designed for such purposes, insights can be gleaned of the overall activities. Redundancies can be found, allowing the stream-

lining and optimization that often results in a smaller staff or increased productivity.

## Nationwide Expertise

Expose all those government processes via the Web in open-source fashion, using Web services built within a carefully constructed SOA, and suddenly a nation of subject matter experts can proof and analyze the system itself, right down to the finest detail. The many reviews will minimize errors, and using the Web search techniques that surfers everywhere have mastered, interested citizens will surely gravitate toward their particular area of expertise.

Once they find projects up their alley, these citizen auditors can check payments, verify the accuracy of numbers, comment on proposed timelines, and ensure that price points are within industry standards for everything from air conditioners to zoo equipment. Numbers are powerful. While no analyst or even group of analysts knows everything, somewhere in this country of 300 million people—the majority of which have access to the Web—someone surely knows something about anything.

Active citizen auditors can even set up alerts for themselves, so that they receive an e-mail or instant message any time an event of interest occurs, such as the sale of government property or passage of a certain type of law (as determined by keyword matching, perhaps). When auditors find an error of some kind, they report it via some type of trouble-ticket system.

## Customer Relationship Management

Granted, false alarms will sound, but with an adaptive architecture, the system can literally learn from its mistakes. For example, central to the value of predictive analytics is the ability to sense patterns, gather intelligence about them, and then predict—to some degree or another—future behavior. The predictive analytical capacity of data mining is often used in customer relationship management these days to recommend which products and services should be marketed to particular customers. Response rate increases of just a few percentage points—spread across an enterprise of many

thousand salespeople—can make a significant bottom-line difference.

Such technology can be used to prioritize alarm checking. Patterns will surely appear for alarms that are based on solid evidence, as opposed to those based on faulty logic. One simple example would be surfing time: someone who raises a red flag after only being in the system for an hour or two is less likely to find a real mistake than someone who logged in ten times for an average of two hours each before crying wolf.

## Citizen Auditor Web Service

The job of government staff auditors will thus be optimized. Instead of poring over a haystack of paperwork hoping to find a needle, they'll begin their workday by reviewing a list of prioritized red flags. Perhaps we can call this system "CAWS," for Citizen Auditor

Web Service. Auditors will review their CAWS alerts, and any flags that prove valid will result in those citizen auditors gaining points and thus increasing their stature. The higher the ranking is, the higher the value of their red flags. Ultimately, good auditors can be hired on the basis of their merit.

Because the Internet is interactive, more than the government checks alone should be visible online (except those for top-secret programs and certain others); they should also be connected to the purchase orders that authorized them, the proposals that led to the purchase orders, the other proposals that were considered, the appropriations bill that allocated funds, the applicable laws that were passed, and who voted which way on each.

The issue of security raises questions, but many safeguards are available. Most important, CAWS would not link directly into operational systems, but would be an analytical tool used to see what has happened, find errors, and perform analysis to discover new answers. The key will be to decouple the front and back ends of this solution, such that the government never exposes its internal systems. This can be accomplished simply by inserting an offline process: dump data every night from operational systems onto a series of DVDs, then ship them off-site to a location where the data is uploaded each morning. Problem solved.

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## The Ultimate Check and Balance

Think of citizen auditors as thousands, perhaps millions, of cleaner-fish preening the great white shark of our federal government. Mistakes can't hide from the many eyes, and with a Mechanical Turk-type system, many hands will lighten the work. Open-source government is as it should be: a government of the people, by the people, and for the people.

Of course, as Confucius would say, a journey of a thousand miles begins with a single step. We can't boil the ocean all at once, so the key is to start somewhere; could there be a better entrée than Katrina? Even Louis-

iana politicians have demanded transparency. Let's provide it, while creating a template for such a national system. Now, if we can just get our hands on that data. ❖

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**B**ut, to speak practically and as a citizen, unlike those who call themselves no-government men, I ask for, not at once no government, but at once a better government. Let every man make known what kind of government would command his respect, and that will be one step toward obtaining it.

—Henry David Thoreau (1817–1862), U.S. philosopher, author, naturalist. "Civil Disobedience," originally published as "Resistance to Civil Government" (1849), in *The Writings of Henry David Thoreau*, vol. 4, p. 357, Houghton Mifflin (1906).



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