National Committee on Vital and Health Statistics, Subcommittee on Standards
Standards Within the Context of the Health IT Initiatives:
IT Thought Leaders Panel
February 24th, 2009

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Introduction:

The enactment of the American Recovery and Reinvestment Act (ARRA) portends profound changes to the health care and health IT landscape. I appreciate the opportunity to address this committee on the topic of health IT and standards at this critical moment.

These unprecedented public investments MUST change the way we think about health IT and about achieving the goals of the new law. For years, the public policy approach has been based on trying to motivate and stimulate voluntary, consensus-based action in the private sector. Today, as a result of the massive public sector investment in IT, we find ourselves in a very different environment, in which the government must use these investments to respond to the dire economic crisis we face, deploy the investments to ramp up the nascent health IT sector, and live up to the public demand for accountability to ensure that this large taxpayer infusion achieves the health quality improvement and cost reduction objectives of the new law.

In short, we must get health IT right. Now that the legislative battles are settled, the success or failure will all boil down to how and how well this law is implemented.

The federal government investment in health IT completely changes the landscape. We all need to open our minds to the new opportunities, rather than searching for ways to preserve the old. These times call for new thinking. Health IT is now an area of significant public investment — essentially doubling the size of an industry — via federal tax dollars. We cannot meet our new and more urgent challenges if we operate under old assumptions and approaches.

This kind of spending, if done wrong, can have the negative market consequence of interfering with rapid innovation by locking in today's processes and technologies, which although well-intended, came about without a systemic view. And we risk locking out the very innovations we need for meaningful health information sharing to support better decisions.

Our goal for health IT must be to achieve real health improvements, create jobs, and reduce unnecessary costs. It should not be primarily the creation of standards or the certification of software. Rather, standards and certification should support measurable health improvements. Health improvements are not achieved by the mere installation of software; they are achieved through the effective use of information for better decision-making.

Effective use of information is what keeps a patient from suffering a medical error, helps a doctor prescribe the right treatment at the right time, and allows a care team to provide the best possible care in the most cost-effective way. These are the expectations we have for health IT.

Make no mistake. The American public will not cheer if all we have done with $19 billion is installed software that is either unused or so siloed it cannot be used to improve health. The public will not understand the importance of this investment if administrative costs aren't cut or knowledge and use of best practices is not improved. They will not support this investment if patients and consumers aren't better engaged in their own health care or if they worry about whether their information will be kept private and secure. In fact, we risk the same crises of confidence that plagued so many other government investments in IT.

The risk now is that we can make standards progress on paper, and we can stand up a certification regimen to assess compliance with those standards … and it will move us very little toward our real objectives. It won't create jobs; it won't improve health care quality; it won't contain costs, and it won't create trust across health information networks.

So I'll talk first about objectives, and then about how, under the new authority and provisions of ARRA, the government can help ensure that standards and certification support those objectives.

1. Setting objectives

The right measure of success is not how many physicians use "certified" health information technology; it's whether outcomes are better. And this measure of success can only be achieved if physicians and other caregivers are using the right health IT that enables them to improve outcomes. For example:

- Are there better health outcomes as a result of improved adherence with medications proven to be cost-effective?
- Is there a reduction in unnecessary and avoidable hospital readmissions?
- Is blood pressure better controlled?

- Are there fewer unnecessary medication errors?

The basic criteria for setting such targets should be to boost cost-effectiveness, improve health and quality of life, and reduce costs in the long run. ARRA lays these broad aims out clearly in its statement of purpose for the Office of the National Coordinator for Health Information Technology.

The government is both a major funder and a major investor in the health system we have today. This gives it enormous leverage, but that leverage will be wasted if the government sees its role as dictating the adoption of particular tools or applications. Rather, it should identify high-value health improvement goals against which IT hardware and software enterprises can compete, and make its health IT investments in ways that improve health sector performance.

We need technology to support these goals, help measure them, and facilitate rapid learning and feedback loops so that we can continuously improve. The electronic health records (EHRs) purchased with these stimulus funds by hospital systems and doctors need to have these requirements defined up front.

For an example of how this can work, consider New York City's efforts to encourage small-practice providers to adopt electronic health records. The City focused on 1,000 primary care providers in hospitals, community health centers, and more than 100 small practices, caring for more than 1 million patients. This project has succeeded by setting clear health objectives at the onset.[1] The entire process has focused on using technology to make concrete improvements against population health and prevention goals. During software procurement, for example, the selected EHR vendor enhanced its preventive care functionality to meet the City's health goals. In addition, providers incorporate new workflows as a condition for participating in the program by adopting shared public health goals and quality improvement activities, including decision support tools. The IT effort in clinics parallels other initiatives to deploy information to address the City's most important health concerns — using digital data to track disease, posting provocative subway ads to reduce smoking, and requiring restaurants to publish calorie counts for

[1] Testimony of Farzad Mostashari MD, Msc Assistant Commissioner Primary Care Information Project New York City Department of Health and Mental Hygiene to US Congress, Committee on Oversight and Government Reform Subcommittee on Government Management, Organization and Procurement. November 1, 2007, "Too many Cooks? Coordinating Federal and State Health IT http://governmentmanagement.oversight.house.gov/documents/200711011607

all menu items. This has been called "the most ambitious government effort in the country to harness electronic data for public health goals."[2]

2. **Information sharing and standards:** What's needed now?

These kinds of goals will be critically dependent on private and secure information sharing, and the industry will need to achieve the ability to make such sharing easily possible. The few successful examples of health information sharing we have today came about when implementers set an objective and then deployed technology to achieve it, sometimes by using a software application, and sometimes by just moving critical information to the right user.

When the government built the federal interstate highway system, it did not set the standards for cars and trucks, just the roads. Similarly, with a basic set of standards that enables sharing of critical information among authorized users, we can lay the ground work for innovative products and services and a competitive market that meets these requirements by getting robust technology in the hands of providers and patients.

What's really needed? The truth about standards in large complex environments is that they are not created; they are adopted. Standards are adopted in several stages, evolving as the users find more reasons to need them. We need to start with just a basic set of standards for interoperability using the internet, and other standards will evolve as products and software using them provide value and mature. In health, we face a situation where information sharing is the exception and not the rule. Most systems in use today lack basic connectivity to the most fundamental pieces of information that a provider critically needs to know, like lab results, medication history, or access to the care summary of the most recent provider who saw the patient.

It is always tempting to list all current problems, and then to provision a single, massive solution. But past evidence from such projects, like the FBI's Virtual Case File, the FAA's Air Traffic Control modernization, or the IRS's Electronic Fraud Detection System, show that attempts to provision sudden, massive upgrades are high-risk ventures that often fail to deliver any of the imagined benefits. A particularly relevant example is the Government Open Systems Interconnection Profile (GOSIP) effort of 1986, which mandated the adoption of a particular form of networking technology that would replace core internet technologies. GOSIP became a required Federal Information Processing Standard in 1990 (FIPS 146-1),

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[2] Hartocollis, Anemona, 2/29/2008. City to Pay Doctors to Contribute to Database. The New York Times. Accessed online 2/23/2009 at: http://www.nytimes.com/2008/12/30/nyregion/30records.html?_r=3&emc=eta1

and included both conformance and interoperability testing by vendors. Despite being federally mandated, internally consistent, conformant, and interoperable — GOSIP was largely a failure[3] because few organizations in the field actually adopted it. After 10 years of work, it was replaced in 1995 by a re-written Federal standard (FIPS 146-2) that allowed use of standard internet protocols. We cannot afford to have that fate befall ARRA.

In order to succeed, IT procurement and development of standards have to be incremental and to concentrate on the most basic issue first, which is making it easier to share data in its current form while protecting privacy and security. Standards for moving information between authorized caregivers are the most basic problem for two reasons: first, sharing information is the key element for improving basic health outcomes. Second, improving the ability to share helps create the motivation for improving data quality and adopting more standards. But critically, the converse is not true. Standardized data create no incentive to share.

The initial focus should be on only the critical standards for sharing data — the way it moves from point A to point B over the internet. This would involve initially specifying interface, transport and security standards rather than standards for data expression or the behavior of local applications, because the critical predictor of good outcomes and cost-effectiveness is whether or not data is able to move between a person's various authorized providers. By concentrating on interfaces, transport and security, a network of participants will be able to interoperate, while preserving significant space for innovation in matching EHR applications to a wide variety of local needs.

This is the same recommendation we made in the 2004 Markle Connecting for Health Roadmap.[4] It remains the case that the majority of providers today do not have EHRs. Most data being exchanged, even with ARRA, will inevitably be unstructured.

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[3] http://www.itl.nist.gov/lab/bulletns/archives/b595.txt

[4] In 2004 Achieving Electronic Connectivity in Health Care, **Markle Connecting for Health** wrote: "The cost of conforming to standards will be spread over many more users if the manufacturers of information systems know that the code they develop will be used nationally. We assume minimal thresholds for participation in the system on the assumption that, by offering some value in return for some embrace of standards, we will be able to maximize early membership... Once in, the members will have both the incentive and opportunity to become increasingly standards-compliant…. Employ standards to work with high-function and lower-functioning systems and to facilitate the best possible interoperability among systems of differing levels of sophistication. (Page 42-43, available at the following URL: http://www.connectingforhealth.org/resources/cfh_aech_roadmap_072004.pdf)

ARRA sets forth standards and policy advisory groups that will, under FACA rules, aim to focus on standards needed for the most critical uses of health information. Directed against the health improvement objectives, these bodies can facilitate rapid investments.

Congress has also foreseen a role for the National Institute for Standards and Technology (NIST) in testing standards. Congress also recognized the advisory role of NCVHS. These are all very important opportunities. The processes we have had in place in the past, like HITSP and CCHIT, can be integrated into this new set of requirements. They are nascent enough that they can adapt and contribute along with many important bodies that have contributed to standards and certification in other areas of IT use.

Once health objectives are set, our focus on standards should be on adoption; many standards exist that can be deployed to serve the end of innovative improvement in health outcomes. It is ultimately the users who ratify standards through their use. History is rife with examples where proposed and ratified standards were never implemented, because the users didn't adopt them. See the Appendix to this statement for examples.

The Web took off when innovators like those at the University of Illinois built a browser through their own innovation to meet the objective of making the Internet a platform for sharing information, not because the government specified the standards and certified the browser. The utility of PC's took off when Microsoft innovated and created an operating system that met its goals of individual users having computing power at their desks to share information and collaborate, not when the government certified to standards.

3. **A new urgency for results:** We must focus on moving information where and when it is needed, to those authorized to receive it.

If we are going to learn from history, incremental standards that solve one problem well are better than complex standards that are constructed to solve all problems at the same time. Such complex standards are in general hard to implement by the average health IT department. (See the examples of SOAP and XHTML in the Appendix). It is far better to have health care institutions sharing data that is not perfect than perfecting data that are never shared. This means we have to orient our thinking differently, from a hope that idealized expressions of the health data will solve the use case for sharing, and into the much narrower but more tractable problem of addressing sharing itself, taking advantage of the subsequent impetus that will provide for improved data quality.

This is a very different approach than the road we have been down. But to be effective, HITECH standards adoption must happen this way. The sooner organizations see a reason to share information, the sooner they're likely to embrace standards that make the exchange of data easier. Let us create the reason to share by setting out clear health improvement goals for the use of health IT and focus on good enough standards to transport the information initially so that rapid adoption and innovation cycles can take place in this new marketplace.

4. **A new bar:** Technology will have to implement new privacy policies

Trust is the other critical aspect of information sharing. Information policies that protect information are essential to trust; these policies must influence the implementation of standards and the selection of technology. Standards don't push the send button; people who trust each other do.

Markle's Connecting for Health Common Framework articulates the need for a comprehensive set of privacy policies that must be implemented together. This set of policies has been articulated in the new law, including immutable audit, consumer control, breach notification, and others. The law also requires a Health IT Policy committee, operating under FACA rules, to further specify policies that protect privacy and security in the implementation. These new criteria are critical to getting health IT right.

Without them, choices among technical standards and architectures make de facto policy decisions that determine how personal health information is discovered on a network, how it will be accessed, and where data will be stored or aggregated.

The new HIT Policy and Standards committees are an opportunity to marry policy and technology implementation more closely. As Markle Foundation and Connecting for Health representatives have emphasized before many federal bodies for several years now — policy and technology must be addressed in tandem. New oversight and accountability mechanisms will require these privacy policies to be implemented in the technologies that get funded with taxpayer money.

5. **Accountability for results.**

The Obama Administration has promised unprecedented accountability and transparency in the spending of federal stimulus money. When it comes to accountability in the health IT standards world and health IT governance, the standard for accountability has been ratcheted way up. The administration will ultimately be accountable to demonstrate results,

and those results need to include: health outcomes improvement, job creation, cost savings particularly in administrative costs, innovation in health care delivery.

Government-sanctioned standards and certification efforts must bring in competing voices and competing players in the IT market. It is critical that we don't "lock in" today's processes and technologies, which were designed for very different markets than the interoperable exchange of health information envisioned by the law.

Bill Stead's report and testimony provide a warning. The National Research Council's report emphasized how current products and deployments "fall far short, even in the aggregate, of what is needed to support the IOM's vision of quality health care."[5] Ossifying the current electronic health record systems, or using them as the measure of what users should be purchasing, is a strategic mistake.

What should be our next steps?

Shape Technology Policy to Measurable Health Goals.

a. First and foremost, measurable health goals must be established. The Secretary of Health and Human Services should have the ability to establish and prioritize these goals. Examples might include eliminating drug-drug interactions, reducing redundancy of costly diagnostic tests, etc.

b. Once these goals have been established, the federal government should work with the National Institute of Standards and Technology (NIST) and the HIT Standards Committee, as designated by ARRA, to propose basic standards for transport and sharing for the critical information required. The most important specifications would be for the secure transfer of data, with a range of appropriate data types whose standards would be tightened over time.[6]

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[5] Committee on Engaging the Computer Science Research Community in Health Care Informatics, National Research Council. Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions. Stead, William W and Herbert S. Lin, editors. 2009.

[6] In its 2004 Roadmap document Achieving Electronic Connectivity in Health Care, **Markle Connecting for Health** wrote: "If we create the methodological groundwork for interface certification, there is considerable opportunity to achieve this certification over the Internet without labor-intensive on-site testing. Organizations that fund regional health information projects should foment a collaboration between the National Institute of Standards and Technology, the standards development organizations, major IT vendors and healthcare information trade organizations…" (Page 42-43, available at the following URL: http://www.connectingforhealth.org/resources/cfh_aech_roadmap_072004.pdf)

c. Rather than seeking semantic interoperability (i.e., all data types universally coded in precisely the same way), the implementation specifications should support basic data liquidity, using the commonly used Internet standards like XML, with subsequent effort made to observe and harmonize standards with real-world use and vice-versa.

Validate the Use of Standards with an Open, Market-based Approach

a. When certification is necessary the method must be market-ready, low-cost, and nimble so that certification itself does not become the bottleneck in an effort of this scale. Once the certification criteria are defined there could be a plurality of private certification organizations, including ones like CCHIT, to compete for public and private sector business.

b. HHS could issue an open request for multiple vendors to certify in conformity to the NIST criteria. These could include application vendors or independent bodies. This model is widely used by other E-Gov initiatives across the U.S. Government. NIST has performed similar functions for other agencies.

Conclusion:

Out of what is clearly a shared desire to see our country emerge from its deep economic crisis, we are contemplating the largest federal investment in health IT in U.S. history.

That will bring with it an unprecedented level of public scrutiny to deliver on the promise that health IT can be used in way that will improve the health of patients, save lives, save money, and create jobs.

People will want to see measureable improvements for this investment. ARRA establishes a good framework. We can get IT right. If we do, success will justify further public and private investment.

We thank you for this opportunity.

Appendix: IT Lessons*

* Appendix examples were written in collaboration with Clay Shirky, adjunct professor in New York University's graduate Interactive Telecommunications Program (ITP) and the technical lead of Markle Connecting for Health.

FBI's Virtual Case File: Failures of Management and Design

In one of the most documented IT project failures in the US, the FBI's attempt to modernize their paper-based case system resulted in the loss of 5 years of development and $170 million. In a devastating 81-page audit, released in 2005, Glenn A. Fine, the U.S. Department of Justice's Inspector General, described eight factors that contributed to the Virtual Case File's (VCF) failure. Among them: poorly defined and slowly evolving design requirements; overly ambitious schedules; and the lack of a plan to guide hardware purchases, network deployments, and software development for the bureau.[7]

In its most critical oversight, the FBI failed to define clear expectations for the project. They were still defining requirements for the VCF, even 2 years after the start of the project. Managers, for example, allowed the project to venture into new missions such as evidence management that fell outside the goals for the original system. Ultimately, these unwieldy expectations resulted in a system that was not usable and failed to meet the FBI's mission of the project.[8]

This example is not only a failure in management, but also one of design. The project called for a large centralized database, which left the FBI little flexibility to meet its needs. It is understandable that managers would want to tack on additional functionality, but a centralized system was ill-suited to accommodate these additional services without changing the entire scope of the project. In moving forward, an FBI official recognized the added value of a distributed approach, "We have taken the lessons learned… Sentinel (the FBI's new project) will go beyond VCF. It is part of a larger service-oriented architecture, to develop and deploy services and capabilities to FBI employees." Because of its distributed, service-oriented

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[7] Goldstein, Harry. 2005. Who Killed the Virtual Case File. IEEE Spectrum.

[8] Glenn A. Fine (Inspector General, U.S. Department of Justice). 2/3/2005. Statement on The Federal Bureau of Investigation's Trilogy Information Technology Modernization Project before the Senate Committee on Appropriations, Subcommittee on Commerce, Justice, State and the Judiciary.

architecture, bureau officials expect to be able to add, remove or modify the system's capabilities more easily. In addition, the Sentinel project will be introduced in stages, unlike its failed predecessor's "big bang" approach.[9]

AAS (Advanced Automation System): Unrealistic Expectations and Lack of a Policy Framework Lead to One of the Most Expensive IT Failures in US History

In the early 1990s, the Federal Aviation Administration (FAA) attempted to overhaul the nation's air traffic control system. Intended to provide new tools and displays for controllers, improved communication equipment, and a revamped core computer network — it fell far short. Ultimately, the agency wrote off $1.5 billion of its $2.6 billion investment in the project.

An overambitious agenda and shifting requirements lead to the project's ultimate demise in 2004. The FAA expected that the system would be easy to manage and implement and that it would be a magic bullet for many of their problems. "It was basically a Big Bang approach, (a set of) gigantic programs that would revolutionize overnight how FAA did its work," says Pete Marish, a senior analyst at GAO. This confidence was misguided, however, and encouraged the FAA to develop unrealistic expectations. For example, according to one particpatint, the FAA "wanted the system to have only 3 seconds of downtime a year, but to get the data to prove that requirement had been met would have taken about 10 years. "[10]

The unrealistic expectations were easily aggravated by excessive faith in new technology. One plan, for example, called for the functionality to allow controllers to customize their workstations. However, this flexibility would have made it extremely difficult to test the safety of the system. In addition to these limitations, the project lacked a policy framework to address organizational needs. At the onset of the plan, the AAS was supposed to consolidate two different functions that had been handled by different facilities. The FAA wrote a consolidation plan to merge these

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[9] Dizard, Wilson III, 2005. Sentinel System will Replace FBI's Virtual Case File. Washington Technology.

[10] Cone, Edward. 2002. The Ugly History of Tool Development at the FAA. Baseline Magazine, 2002; Glass, Robert L. 1997. Software Runaways: Monumental Software Disasters. Prentice Hall.

facilities, but it was dropped after political problems. However, the AAS requirements to merge their functions remained intact. The developers were charged with creating a unified workstation for two functions that were no longer going to be unified. Without a policy framework, the expectations for the IT system spun out of control and generated requirements that were impossible to meet.

XHTML vs. HTML and SOAP vs. REST: Simplicity Wins

XHTML was an attempt to redefine HTML (Hypertext Markup Language), in the more flexible but rigorous XML (eXtensible MArkup LAnguage.) HTML is the language Web pages are created in, and is used in some flavor or other by billions of Web pages, but it has internal inconsistencies and is irregular enough to require extra effort for software to make sense of Web documents. The goal of XHTML was to re-define HTML as a type of XML document, to make it more consistent, more extensible, and easier for computers to interpret.

The XHTML standards effort was undertaken in 1998 under the auspices of the World Wide Web Consortium (W3C), a Boston-based Standards Development Organization (SDO) founded by Sir Tim Berners-Lee, the inventor of the Web (and therefore of the original HTML). Despite this auspicious host for the standardization effort, and despite years of work with participants from many of the world's major tech companies, the XHTML effort failed. By 2006, Berners-Lee posted this message[11] to the Web community about the XHTML effort:

> "Some things are very clear. It is really important to have real developers on the ground involved with the development of HTML. […] It is necessary to evolve HTML incrementally. The attempt to get the world to switch to XML, including quotes around attribute values and slashes in empty tags and namespaces all at once didn't work."

Despite having an enormous amount of resources, and after almost a decade of work, the W3C was unable to make XTHML a widely adopted standard, because the work was created by designers and only then handed to practitioners, without much day-to-day involvement of the practitioners themselves. The practitioners in turn never adopted XHTML, in part because continuing to use the current system, which is universally

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[11] Available online at: http://dig.csail.mit.edu/breadcrumbs/node/166 (accessed 2/23/2009).

acknowledged to be sub-optimal, was nevertheless a less-bad option than wholesale adoption of a standard that was hard to migrate to.

The fate of XHTML is not uncommon in the standards world — theoretically perfect systems are often so badly matched with migration paths from existing and working systems that the ideal becomes the enemy of the useful. In distributed systems, standards are not created by Standards Development Organizations (SDOs), because the SDO cannot force adoption. The role of an SDO is at best to propose a standard, but the ultimate vote lies with the users, who will determine its fate. In the case of XHTML, the requirement for dramatic rather than incremental change from current practice had the paradoxical effect of slowing the rate of adoption to a crawl. The solution is to scrap the idea of all-at-once change, and to work with practitioners to make the simplest available challenges, in the order those changes make most sense.

A similar fate seems to be on the way for SOAP (originally Simple Object Access Protocol, later Service Oriented Architecture Protocol.) SOAP born of a similarly good desire for a basic improvement to current practice and, like XHTML, became so unrelated to current practice that its adoption is languishing in the field. Work on SOAP, a method of encoding data to be shared between machines, began in 1998, as a way of updating a previous, and very simple standard, called XML-RPC (Remote Procedure Call, a way of letting machines talk to each other over the internet.) Many major tech firms joined in the development of SOAP, including Microsoft, Sun, and IBM.

Partly as a result, the scope of work expanded far beyond the initial modest goals of the project; today, the SOAP specification and its attendant extensions for addressing, digital signatures, routing, and the like run to thousands of pages. The result of all this work is that using SOAP is an incredibly expensive proposition, available only to firms with a large development staff. Worse, the range of possible uses and configurations of SOAP means that any two given SOAP systems are unlikely to be interoperable without significant additional work; each conforms to the SOAP set of standards, but the standards themselves are so complex that conformity is unrelated to interoperability. The amount of work done on the standard has in many ways defeated its original rationale for having the standard in the first place.

Intriguingly, at the same time development work on SOAP began, work on another form of networking was also underway. Going by the name REST (Representational State Transfer, a model for thinking about how the Web currently works), it allowed developers to achieve many of the same goals

as SOAP while requiring no new standards. Instead, REST was a set of instructions for using existing Web standards for naming and addressing, security, and the like. REST is almost comically simple compared to SOAP, but in that simplicity lies its strength. SOAP was supposed to increase interoperability between different organizations, but succeeded mainly in increasing cost, while providing such a welter of choice that most of the successful uses of SOAP are inside single firms, since they can force standards by fiat, rather than relying on ratification through user choice.

Meanwhile, out on the open Web, experiments with cloud computing have taken the conversation about Web Services from theory into practice. Amazon Web Services, the largest cloud computing platform in existence, offers both SOAP and REST interfaces to its services, and the results are unambiguous: SOAP access to Amazon accounts for less than 1 percent of the usage. The results for SOAP use were so bad, in fact, that Amazon is simply not implementing SOAP as it expands its services, canceling SOAP support altogether for its European launch:

> "We are continuing to support our existing SOAP APIs. That said, given that SOAP requests currently make up <1% of our request volume in the US, we made the pragmatic decision to not extend the SOAP APIs as part of our EU launch."[12]

The lessons from SOAP are similar to the lessons from XHTML: complex standards efforts produce complex standards. Simplicity gets sacrificed for completeness in environments where practitioners aren't consulted. And, most critically, in diverse and distributed systems, simple standards get adopted over complex ones wherever organizations have varying degrees of IT talent and funding.

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[12] Thread: PLEASE deprecate SOAP already. Amazon Web Services Discussion Forum. Available online at: http://developer.amazonwebservices.com/connect/thread.jspa?threadID=18555&tstart=15 (accessed 2/23/09).