

# Peer to PCAST: What does open video have to do with open government?

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**Abstract.** The Obama Administration has outlined a set of principles and practices to support Open Government in which citizens can collaborate with the government to solve problems. The Administration is using technology, especially web-based technology, to support Open Government in practice. Many of the government’s websites include video. We examine the website built to support the President’s Council of Advisers on Science and Technology (PCAST). We critique it and argue that a number of important design decisions made for the current site should be changed to better support Open Government. Key to our argument is what has come to be known as Open Video, an application of the ideals of Open Source Software to video. Our critique is followed by a discussion of a prototype system we have built to demonstrate an alternative to the current PCAST site. Our prototype is called Peer-to-PCAST to call attention to the similarities between our proposals and Peer-to-Patent, the first Open Government system built for a different context, the US Patent and Trademark Office [34].

**H.5.3 Information Interfaces and Presentation:** Group and Organization Interfaces – asynchronous interaction, collaborative computing, computer-supported cooperative work, web-based interaction.

Keywords: Expert seeking, video, Open Source Software, wiki, social web, Web 2.0, online deliberation

## 1. Introduction

Today’s democracies have been called “technical democracies” because the problems that face us can only be addressed with a deep knowledge of science, engineering, and technology [9]. Global warming, the current condition of our highways and bridges, AIDS and influenza, genetically modified foods, stem cell research, and a host of other issues are both politically hot and technically deep. In most government bodies there are long-standing “interfaces” that exist between elected officials and the experts of science, technology and engineering. These “interfaces” are places and institutions where science and technology meet with citizens, society, and government.

The President’s Council of Advisors on Science and Technology (PCAST) is one such interface. Figure 1 shows a video of Professor Robert Paarlberg of Wellesley College giving a talk to the PCAST. In this talk, Paarlberg draws a clear contrast between what he terms the “Green Revolution Model” and the sustainable, organic, agroecological model [1,28,43,48]. As would be expected of someone who sits on the Advisory Council to the CEO of the Monsanto Company – as Paarlberg does – he claims that the solution to hunger in Africa is to deploy modern agricultural techniques of monocropping, genetically modified seeds, and petroleum based fertilizers and pesticides. Paarlberg has, in fact, written a book on the subject [42]. He is quite eloquent in his presentation and makes an excellent case for what

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Politics 2.0 PCAST comments related aphid (1) | preferences | logout

PCAST  
frontpage 0 readers  
a community for 25 days

this post was submitted on 28 Apr 2010  
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Random PCAST clip  
1 point | 4 comments  
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comments  
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MarkDeckert [S] 2 points 11 days ago\* [-]  
Please review Paarlberg's paper titled The Ethics of Modern Agriculture. He makes some interesting points about per bushel impact.  
permalink report reply

aphid 1 point 27 minutes ago [-]  
I'd like to see more data backing up Paarlberg's assertion that "science-intensive" and "precision" farming are environmentally superior on a per bushel basis. Does he even provide a clear definition of what "precision" farming means?

Fig. 1. A threaded discussion pertaining to a PCAST clip.

he terms “Science Intensive Farming.” What Paarlberg fails to mention is his presupposition that the external inputs which the “Green Revolution Model” relies upon will continue to remain available and economical [16,17]. This presupposition is at odds with a large group of scientists who back a concept called “Peak Oil.” This opposing group of scientists maintain that fossil fuels, the external input that modern agriculture is largely dependent on, are likely to become increasingly more expensive and less available in the coming years [3,20,23,26,31].

Despite questions from Daniel Schrag, a Professor of Environmental Science at Harvard, and Barbara Schaal, a Professor of Biology at Washington University, significant ecological objections to Paarlberg’s assertions went unmentioned. As is generally the case in such highly professional fora with powerful people present, a general sense of cordiality is respected. To make a direct attack on someone’s work would be inappropriate and yet Paarlberg is furthering what many respected scientists would consider to be short sighted corporate rhetoric which is likely to cause environmental catastrophe in the near term [27,32]. We propose that a web-based forum can be built to allow videoed PCAST testimony, like Paarlberg’s, to be peer reviewed. We present the design of our web-based, open video technology and explain the various historical and contextual, social and political concerns that have informed our design. We conclude with a short demonstration of the current system.

What we propose is, in one sense, entirely conventional. For example, the use of peer review to evaluate the quality of US science policy proposals has been discussed and advocated for decades [24].

However, seen from another perspective, the questions we address here have gone almost entirely unaddressed. Scientific advisory committees typically count their written reports as their main output, their main deliverable. Yet, now such committees are also producing complicated websites and hours of

digital video available for download. What are these websites and videos? Do they constitute a record of scientific testimony and advice? Or, are they to be understood as a means to allow the general public access to an advisory committee's deliberations? Or, are they superfluous to the main purpose of the committee and, thus, just bad entertainment? If, indeed, they are an essential part of a scientific advisory committee's output, how should they be designed and in what format should they be produced? For example, does it matter if the digital video released by a committee is in a proprietary format? Should the content produced by the committee reside on government servers, or is it fine if government produced materials are hosted and distributed by, for example, a privately-held, for-profit company? Many of these questions traverse the territory of what has come to be known as "Open Video."<sup>1</sup>

National governments are moving from paper and face-to-face presence, as their foundational media, to network-based protocols and data formats. The fundamental research question is therefore this: How do we translate the essential institutions of government into digital networked media and enhance the democratic values that should be the core of these institutions?

## 2. What is PCAST?

Shortly after his inauguration, President Obama appointed his science advisers and set up the President's Council of Advisers on Science and Technology (PCAST). Its functions are broad: "The PCAST shall advise the President. . . on matters involving science, technology, and innovation policy. This advice shall include. . . policy that affects science, technology, and innovation, as well as scientific and technical information that is needed to inform public policy relating to the economy, energy, environment, public health, national and homeland security, and other topics" [39].

In a speech before the National Academy of Sciences on April 27, 2009,<sup>2</sup> President Obama distanced himself from the previous administration's science policy decisions: "Under my administration, the days of science taking a back seat to ideology are over. (Applause.) Our progress as a nation – and our values as a nation – are rooted in free and open inquiry. To undermine scientific integrity is to undermine our democracy. It is contrary to our way of life. (Applause.)" [36].

President Obama goes on to describe his organization and hopes for the PCAST: "That's why I've charged John Holdren and the White House Office of Science and Technology Policy with leading a new effort to ensure that federal policies are based on the best and most unbiased scientific information. I want to be sure that facts are driving scientific decisions – and not the other way around. (Laughter.) As part of this effort, we've already launched a web site that allows individuals to not only make recommendations to achieve this goal, but to collaborate on those recommendations. It's a small step, but one that's creating a more transparent, participatory and democratic government. We also need to engage the scientific community directly in the work of public policy." (ibid).

Two technical details are noteworthy in these comments. First, is the President's commitment to building websites as a form of public outreach and policy development. Second, President Obama's comments are accessible on the web as digital video. In other words, they are not just texts accessible through, for example, the U.S. Government Printing Office. Rather, these comments are part and parcel of a tremendous shift in the Executive Branch towards the goal of having a significant Web 2.0 presence on the web, a presence that has been called Government 2.0 [10].

<sup>1</sup><http://openvideoconference.org>.

<sup>2</sup><http://www.whitehouse.gov/administration/eop/ostp/pcast/about>.

While Vannevar Bush was, effectively, the first Presidential Science Adviser (to Franklin Roosevelt), Oliver Buckley (appointed at the suggestion of William Golden) was the first person to hold the formal title and chair the Science Advisory Committee for President Harry Truman. William Golden also recommended a Science Adviser for President Dwight Eisenhower, James Killian. Killian and Eisenhower set up President's Science Advisory Committee (PSAC), the earliest predecessor to President Obama's PCAST.

The PSAC or PCAST has been reinstated in practically every administration since that time with some notable exceptions. In his second term in office, President Richard Nixon disestablished the PSAC and the Office of Science and Technology. President Gerald Ford reestablished it, but then President Jimmy Carter abolished it but, nonetheless, kept a Science Adviser. President Ronald Reagan had an advisory group, but it had no statutory basis and was not extensively consulted by President Reagan. It was not until President H.W. Bush's term when the PCAST was (re)established by Executive Order 12700, January 19, 1990.

Golden edited a remarkable book detailing this history and collecting together comments from practically every Presidential Science Adviser from 1951 until 1993 [18]. In his introduction Golden bristles at the legislated requirement that the President's science advisors need to conduct their business in way that is transparent to the public. He wrote "To assure the requisite stature and visibility, both with and outside the government, the members of PSAC should be Presidential appointees. Study of the Federal Advisory Committee Act [FACA] of 1972 and the Freedom of Information Act [FOIA] yields little hope that exemption from the rigid requirement for public meetings, pre-published agendas, and the like can be achieved at this time. Even location within the White House Office apparently would not provide a sheltering membrane sufficiently impermeable to insulate a PSAC from the relentless restraints of those Acts" [18, p. xxi].

Golden's opinion that science advisory committees work better when they are sheltered from public view is not singular. For example, a recent ethnography of the Health Council of the Netherlands (a body that offers scientific advice to the Dutch government) noted "[w]ithin the Gezondheidsraad [the Health Council of the Netherlands] much weight is put on the confidentiality of the committee process. Committees, it is assumed, can only work well when their deliberations take place outside the public domain" [5]. Similarly, the National Academy of Sciences (NAS) brought a case, in 1997, to the US Court of Appeals asking that the NAS be exempt from the Federal Advisory Committee Act (FACA), the same act that Golden considered meddlesome. The NAS lost its appeal (to the US Supreme Court), but then persuaded Congress to pass a law that exempts the NAS from the FACA and the FOIA [22]. Thus, one of the main questions that frames our work is this: How open to the public should a scientific advisory committee be?

### **3. The political context: Transparency v. Secrecy, Science v. Religion**

Golden's comments foreshadowed an important difference between the Bush and Obama administrations: the administrations' respective relationships to the general public. While the administration of George W. Bush was committed to secrecy and hiding important decisions from the American public [41], President Obama has committed his administration to the opposite, to transparency.<sup>3</sup>

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<sup>3</sup><http://www.whitehouse.gov/open/about>.

In his Memorandum for the Heads of Executive Departments and Agencies entitled Transparency and Open Government (January 21st, 2009), President Obama wrote “Government should be transparent. Transparency promotes accountability and provides information for citizens about what their Government is doing. . . Executive departments and agencies should harness new technologies to put information about their operations and decisions online and readily available to the public” [38].

In some respects, President Obama’s Memorandum echoes what important members of the Democratic Party have been saying for at least a century. For example, here is a 1915 quote from William Jennings Bryan: “The government being the people’s business, it necessarily follows that its operations should be at all times open to the public view. Publicity is therefore as essential to honest administration as freedom of speech is to representative government” [7].

Remember, however, that William Jennings Bryan was the prosecutor in the 1925 *The State of Tennessee v. Scopes* trial, also known as the “Scopes Monkey Trial,” who argued against the teaching of evolution and Darwinism. Thus, while both Obama and Bryan have spoken in favor of the rights of the public, Bryan’s position was against science, while Obama has been consistently for science and technology.

An argument can be made that the relationship between science and government was in shambles by the end of the Bush Administration [30]. President Obama acknowledges as much in his Inaugural Address where he promised that “[w]e’ll restore science to its rightful place, . . .” [35].

In addition to convening the PCAST, President Obama wrote several memoranda and executive orders that, together, clearly marked a break from the Bush Administration’s policies and philosophies. For instance, on the same day (March 9, 2009) in which he reversed the Bush-era stem cell policy in Executive Order 13505, he also issued the Memorandum on Scientific Integrity: “The public must be able to trust the science and scientific process informing public policy decisions. Political officials should not suppress or alter scientific or technological findings and conclusions” [37].

The Memorandum obviously refers to scandals such as the front page news [46] that, in 2005, Philip A. Cooney, chief of staff of the Council on Environmental Quality for President Bush, had repeatedly edited government climate reports to play down links between greenhouse gas emissions and global warming.

#### 4. What is the FACA?

In addition to the political context, there is an influential legislative context that applies to the PCAST. As William Golden mentioned, one of the most important aspects of the PCAST’s legislative context is this: the PCAST operates under the provisions of the FACA, the 1972 Federal Advisory Committee Act.<sup>4</sup> Simply put “[t]he Federal Advisory Committee Act prevents secret advisory groups from exercising hidden influence on government policy, requiring openness and a balance of viewpoints for all government advisory bodies” [41].

The PCAST is one of over a thousand federal advisory committees.<sup>5</sup> The GSA estimates that 25% of all federal advisory committees are “scientific/technical” in nature, when grant review committees are excluded from the count [19]. The FACA’s stipulations apply to PCAST and all the other thousand-and-more federal advisory committees.

<sup>4</sup><http://www.gsa.gov/portal/content/100916>.

<sup>5</sup>See the General Services Administration’s (GSA) online listing of Federal Advisory Committees by Agency here: <http://www.gsa.gov/portal/content/248953>.

Section 10 of the FACA dictates that all advisory committee meetings are to be open to the public; that notice of the meeting be published in the Federal Register; that interested parties be allowed to attend, appear before, or file statements with any advisory committee; that meeting records and minutes be kept (section 11 insures that copies of these records are available to the public); and, that “the records, reports, transcripts, minutes, appendixes, working papers, drafts, studies, agenda, or other documents which were made available to or prepared for or by each advisory committee shall be available for public inspection and copying.”

The federal advisory committees constitute an important set of linkages between business and government [15]. The FACA is an attempt to make those linkages more transparent. Thus, there is a simple answer to our question: Why does the PCAST produce and distribute videos of its proceedings? One can understand the videos as simply the newest media format for complying with the stipulations of the FACA designed to make advisory committees more transparent.

Indeed, this conclusion would be warranted given the format of the videos on the PCAST website.<sup>6</sup> The videos are not stored on the PCAST website; only links to the videos of the committee meetings are on the PCAST site. Rather, the video is distributed from a commercial site<sup>7</sup> that advertises itself as “B2B Internet TV” aimed at professional demographic audiences. The webcasts are split into several Flash video files each of which corresponds to some section of the posted agenda for the meeting. The videos are presented in a conventional player (i.e., one in which there are start/stop and pause buttons). Closed captions are provided. Next to the video are two links labeled “Submit a public comment.” One link points to the email address of the PCAST: pcast@ostp.gov. The other links to OpenPCAST, a website where the public can post, agree or disagree, and rank posted ideas. This is, also, a commercial site<sup>8</sup> that states “Bring out the best ideas from your customers and stakeholders by giving them a platform to share, vote and discuss feedback.” All of these facilities provide new media formats that one can see match well with the requirements of section 10 of the FACA. For an example, see the March 8, 2011 PCAST proceedings.<sup>9</sup>

## 5. Open government

The Obama Administration has put forward an agenda for online government that is far more ambitious than just complying with the FACA, repairing the Executive Branch’s relationship to science, and promoting transparency. The Obama Administration has called for an agenda of open, collaborative government. While previous governments have been committed to *transparency* – allowing the public to see into the workings of the government – the Obama Administration has made commitment to *collaboration* – getting the public to work together with government to innovate and create new solutions for problems of the government.

Open Government refers to something more than transparency. It refers to public participation and collaboration in government. Beth Noveck, who was United States Deputy Chief Technology Officer for Open Government for two years (2009–2011) and led the White House Open Government Initiative, articulated this difference as a new form of democracy, one she calls “collaborative democracy” [34, p. 39].

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<sup>6</sup><http://www.whitehouse.gov/administration/eop/ostp/pcast/meetings/webcasts>.

<sup>7</sup><http://www.tvworldwide.com>.

<sup>8</sup><http://pcast.ideascale.com/>.

<sup>9</sup><http://www.tvworldwide.com/events/pcast/110308/>.

More recently, in a posting to her blog, Noveck defines open government like this: “Open government is an innovative strategy for changing how government works. By using network technology to connect the public to government and to one another informed by open data, an open government asks for help with solving problems. The end result is more effective institutions and more robust democracy.” [33]

Understood in this manner, the Obama Administration’s emphasis on open government is not simply an effort to move away from the Bush era of secrecy to a new age of transparency. Rather, it is an attempt to design new ways to engage the public to participate, collaborate and innovate with their government.

This has been a difficult point to make, perhaps because it is such a radical innovation itself. Some might confuse this proposal – to create an open, collaborative government – with the proposals of deliberative democracy. But, Noveck emphasizes the difference: deliberation is about citizens voicing their views about the government’s decisions; collaboration is about citizens helping to make those decisions. Deliberation is about discussion, collaboration is about action. Or, more concretely, “Deliberation requires an agenda for orderly discussion. Collaboration requires breaking down a problem into component parts that can be parceled out and assigned to members of the public and officials” [34, p. 39].

## 6. Peer-to-Patent

The best example of an Open Government application is the project Beth Noveck led before joining the Obama Administration: Peer-to-Patent.<sup>10</sup> “Peer-to-Patent is an online system that aims to improve the quality of issued patents by enabling the public to supply the USPTO [United States Patent and Trademark Office] with information relevant to assessing the claims of pending patent applications. This pilot project connects an open network for community input to the legal decision-making process. The community supplies information and research based on its expertise. The patent examiner makes the final determination on the basis of legal standards. This process combines the democracy of open participation with the legitimacy and effectiveness of administrative decision making.”<sup>11</sup>

The system was launched and tested for a set period of time on June 15, 2007. Since then it has been adapted and extended outside of the U.S., notably in the United Kingdom, Japan, and Australia. Currently, USPTO is engaged in a third pilot project with the Peer-to-Patent project. The first two pilot studies were funded by foundations and corporate gifts. The third is primarily supported by the USPTO.<sup>12</sup>

The project constitutes a collaboration between the Executive Branch of the government and the larger scientific community. Scientific experts can sign up to serve in the patent review process.<sup>13</sup> Experts can submit “prior art” (i.e., previously disclosed discoveries and inventions) apropos of a current patent application; annotate and evaluate prior art submitted by others; and, review and discuss patent applications. This provides the USPTO patent examiner a rich intellectual resource for understanding and evaluating a patent application and, thus, greatly strengthens the form of peer review employed in the USPTO.

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<sup>10</sup><http://www.peertopatent.org/>.

<sup>11</sup><http://peertopatent.tumblr.com/>.

<sup>12</sup><http://peertopatent.tumblr.com/sponsors>.

<sup>13</sup><http://www.peertopatent.org/signup>.

## 7. Peer review

Peer review is widely applied in many agencies of the Executive Branch. In a recent wide ranging survey of the application of peer review in government, scholar David Guston writes “Many federal agencies. . . practice forms of peer review in their regulatory, evaluative, or assessment missions. . . . Some of these mechanisms, such as the Science Advisory Board of the Environmental Protection Agency (EPA), are decades old. Others, such as the Board of Scientific Counselors of the National Toxicology Program, are recent innovations” [19]. Arguably, the role of peer review in government continues to expand. In his memorandum on “Scientific Integrity,” President Obama singles out peer review as an important tool for policymakers: “When scientific or technological information is considered in policy decisions, the information should be subject to well-established scientific processes, including peer review where appropriate” [37].

Peer review is seen as a means to insure information quality for government [40]. This has long been the case not only for government but for many other institutions as well: “For more than three hundred years, Western science has relied on peer review as the primary means of identifying work that deserves to enter the domain of certified knowledge” [24, p. 61].

Peer review is practiced in many different forms. Some forms bring reviewers together in face-to-face panels, others solicit independently authored reviews from isolated experts. Some have peers from many disciplines, others are discipline specific. Some use many reviewers, others few. Anonymous reviewers are the norm in some situations; in others, reviewers’ identities are disclosed to the public. Moreover, historically both the forms and functions of peer review have undergone radical transformations over the past few centuries [4]. Thus, there is no single definition of the process of peer review.

Yet, it is frequently clear why a given institution (e.g., tenure review at a university or an academic journal) wants to vet people or information with a process of peer review. Even so, it is not always clear why reviewers participate. Among other aspects of peer review, sociologist Michèle Lamont examines the motivations of peer reviewers in her book “How Professors Think: Inside the Curious World of Academic Judgment.” Reviewers say “[t]hey have agreed to serve on grant peer review panels for a host of reasons having to do with influence, curiosity, or pleasure” [29]. In other words, even as there is a diversity of forms and functions of peer review, there is also great diversity in the motivations of peer reviewers.

## 8. The current state of PCAST peer review

PCAST meetings and reports are reviewed by peers, but not in any systematic manner. For example, the American Institute of Physics reviewed the October 22–23, 2009 meeting devoted to the topic of STEM Education.<sup>14</sup> The professional publication, *Government Health IT*, published a multi-part review of PCAST’s work (January 2011) on the State of Health Information Technology.<sup>15</sup> The investment firm, Knight Investments LLC, considered “Designing a Digital Future: Federally Funded Research and Development in Networking and Information Technology,” December 16, 2010;<sup>16</sup> as did the *New York Times*;<sup>17</sup> and the Association for Computing Machinery.<sup>18</sup>

<sup>14</sup><http://www.aip.org/fyi/2009/133.html>.

<sup>15</sup><http://www.govhealthit.com/blog/state-health-information-technology-according-pcast-part-I>.

<sup>16</sup><http://www.briefingwire.com/pr/knight-investments-llc-look-over-us-office-of-science-and-technology-policy-reports-on-technology>.

<sup>17</sup><http://bits.blogs.nytimes.com/2010/12/21/smarter-not-faster-is-the-future-of-computing-research/>.

<sup>18</sup><http://www.cs.washington.edu/homes/lazowska/nitrd/cacmextract.pdf>.



These reviews are largely laudatory rather than critical. For example, one key claim of the report is this “. . . analysis indicates that a substantial fraction of the NITRD [Networking and Information Technology Research and Development] crosscut budget (the multi-agency spending summary) represents spending on NIT that supports R&D in other fields, rather than spending on R&D in the field of NIT itself.”<sup>19</sup> While that is an important finding by PCAST, the reviews mostly just repeat or paraphrase from the report rather than dispute, discuss, or expand upon the finding.

## 9. What makes a scientific advisory board effective?

How might reviews of the PCAST’s presentations and reports be coordinated in a manner that engages the larger scientific community as collaborators? In this section, we briefly present criteria – derived from the literature – that articulate, in general, what makes for a good scientific advisory board. Next, we present a set of web-based tools that are designed to address these criteria to help improve peer review for PCAST.

In their book “Acting in an Uncertain World: An Essay on Technical Democracy”, Michel Callon, Pierre Lascoumes and Yannick Barth examine a sort of public forum that they call “hybrid.” A hybrid forum is one that mixes ordinary citizens and public officials, scientific experts and the general public. Ideally, the authors say, “Every hybrid forum is a construction site” [9, p. 60, my translation]. In other words, diverse groups like these need to gather to do something more than chat; they need to build something together if democratic institutions are to be maintained under the technical and scientific conditions of today.

In her seminal study of the role of scientific advisers in, especially, regulatory policymaking, Sheila Jasanoff made an analogous observation about the more specific context of scientific advisory boards (rather than more open, hybrid forums): “Though their purpose is to address only technical issues, committee meetings therefore serve as forums where scientific as well as political conflicts can be simultaneously negotiated. When the process works, few incentives remain for political adversaries to deconstruct the results or to attack them as bad science” [24, pp. 236–237].

Thus when they work successfully, scientific advisory committees and hybrid forums, in general, mix politics and science together in their negotiations and consultations. What Jasanoff says about the outcome of these mixed proceedings is perhaps even more surprising but accords quite well with the words of Callon et al.: “What emerges from a successful recourse to scientific advice. . . is a very special kind of construct: one that many, perhaps most, observers accepts as science, although it both shapes and is shaped by policy. That such constructs sometimes break down under political pressure is hardly surprising. Their frequent durability is the greater puzzle, for they are founded neither on testable, objective truths about nature, as presupposed by the technocratic model of legitimation, nor on the kind of broadly participatory politics envisaged by liberal democratic theory” [24, p. 234].

In other words, the outcome of a successful proceeding is the construction of a “boundary object,” something that can be defined like this: “Boundary objects are those objects that both inhabit several communities of practice [e.g., science and policy] and satisfy the informational requirements of each of them” [6].

However, Jasanoff cautions that negotiation and the synthesis of differing views from diverse groups is only half the work of a scientific advisory committee: “If negotiation is the engine that drives the

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<sup>19</sup><http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf>.

construction of regulatory science, boundary work is the casing that gives the result legitimacy. Boundary work by scientists grows out of a premise that seems diametrically opposed to the concept of negotiation and yet is equally essential to the closure of controversy. By drawing seemingly sharp boundaries between science and policy, scientists in effect post ‘keep out’ signs to prevent nonscientists from challenging or reinterpreting claims labeled as ‘science’ ”[24, p. 236].

So while it is necessary to create advisory committees that are diverse and balanced (see section 5 of the FACA and also the National Academy of Science’s advice for “balancing” committees,<sup>20</sup>) successful committees both negotiate across disciplinary boundaries and, also, work to patrol the boundaries between science and policy, experts and the general public. The outcome of negotiation and patrol is a “boundary object” useful to science, policymakers, and the public.

## 10. Open video

Metavid.org [12] is a project co-founded with Michael Dale (now at Kaltura and Wikimedia.org). Metavid is an Open Video project in all three senses of the term: open content, open formats, open technologies. Open Content: At the metavid.org site one can download, for free, any or all of the video of the US House and Senate floor proceedings from January 2006 to the present. Open Formats: The downloadable video is encoded in the Ogg Theora format, an open source software (OSS) video codec unencumbered by privately held proprietary codes, patents, or copyrights. Open Technology: The site is built entirely with OSS; e.g. all of the custom software we have built is open source (GPL) and free for anyone else to download and use, our servers run on GNU/Linux operating system and we make extensive use of open source video tools, frameworks and libraries: ffmpeg, libtheora, liboggz, imagemagick and mencoder. When we began Metavid in 2005, it was one of the first “open video” projects but now there are a number of such projects loosely organized under the Open Video Alliance<sup>21</sup> and sustained by a yearly conference, the Open Video Conference.<sup>22</sup>

## 11. The current state of the PCAST website

For our proposed system, Peer-to-PCAST, we have reused a set of specific techniques developed in Metavid and a set of more general principles of Open Video: open content, open formats, and open technology. We argue that the PCAST website should employ the principles of Open Video in its construction in order to support consensus building and collaboration for Open Government. To make this point we examine the current state of the PCAST website (specifically the video archives of PCAST which can be found on the commercial site.<sup>23</sup>) Our discussion weaves together a critique of the current site with suggestions for improvements, suggestions that we have implemented on our own prototype.<sup>24</sup>

First, it seems obvious, from the perspective of Open Video, that the video of the committee meetings should be hosted on a government website,<sup>25</sup> not – as is now the case – on a third party commercial

<sup>20</sup>[http://www.nationalacademies.org/coi/bi-coi\\_form-0.pdf](http://www.nationalacademies.org/coi/bi-coi_form-0.pdf).

<sup>21</sup><http://openvideoalliance.org/>.

<sup>22</sup><http://openvideoconference.org/>.

<sup>23</sup><http://www.tvworldwide.com/>.

<sup>24</sup><http://metaviddemo01.ucsc.edu/peer2pcast/>.

<sup>25</sup>perhaps here: <http://www.whitehouse.gov/administration/eop/ostp/pcast/meetings/webcasts>.

website.<sup>26</sup> Currently, clicking on the link to any of the video archive produces a warning screen (“You are exiting the White House Web Server. . .”) and then takes you to the third party commercial site.

At the commercial site,<sup>27</sup> all of the video is made available in a closed, proprietary format (Adobe Flash video). Equally obvious, from an Open Video perspective, is that all of the video should be archived in an open source format so that it is unencumbered from any possible commercial conflict of interest. Such conflicts of interests are frequent. For example, currently Apple does not support Flash Video on its iPhones, iPods and iPads.<sup>28</sup> This is not solely an issue of Adobe versus Apple. Any proprietary format owned by a given company will always have pressure put on it by that company’s competitors. Comparatively, it would be better to store the video archive in Ogg Theora, an open source video codec, as we have done on our demonstration site for Peer-to-PCAST.

There are also a set of smaller details of the current PCAST website that we have critiqued and then tried to address in our prototype. These are details of structure and layout.

The current PCAST website hosts videos of PCAST meetings, with each talk or session as its own page. Each of these pages has a large section with the heading “SUBMIT A PUBLIC COMMENT,” providing a link to “E-Mail” and “OpenPCAST.” Both of these links take you away from the video page. Clicking ‘email’ launches a mail client to send email to ‘pcast@ostp.gov’ with no subject defined. “OpenPCAST” launches a third party commercial site in a new window. OpenPCAST<sup>29</sup> is a platform which allows users to “Submit an Idea” to be voted on by other registered users.

In effect, both options for public comment take the user out of the video experience and as interfaces have no memory of which session the user was examining when the link was clicked. Our prototype implements one possible solution to this question.

## 12. The Peer-to-PCAST prototype

Figure 2 shows our highly configurable web-based curation toolset with its related Reddit post [13]. The minimizeable, scalable, and movable tools include a video viewer, academic literature finder/scrapper, inline PDF viewer, commenting panel, and slide viewer. Users are able to move, resize and minimize the various panels. Instead of watching a talking head that contains little information, the video panel can be minimized, allowing the user to listen in while watching the slides and reading relevant literature as shown in Fig. 3. This interface is standards based and implemented using HTML5, jQuery and PopcornJS.

PCAST sessions often extend beyond an hour in length and can cover several subjects in some depth. In order to target comments at specific statements we make use of an annotated timeline element to visualize various temporal elements that occur in relation to the video. Horizontal lines represent different layers of elements: slides, speakers and comments.

This builds on our earlier work on Metavid. Though comparable systems such as Videolyzer and POLESTAR do exist [14,45], they are largely focused on granular discourse analysis and sensemaking. PCAST video contains clearly presented scientific and technical information. We are not so much concerned with improving the understanding of video but rather with looking at larger claims that are part of scientific controversy in the context of academic peer review.

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<sup>26</sup><http://www.tvworldwide.com/>.

<sup>27</sup>e.g., <http://www.tvworldwide.com/events/pcast/100902/>.

<sup>28</sup>see Steve Jobs’ memo on the topic here: “Thoughts on Flash,” <http://www.apple.com/hotnews/thoughts-on-flash/>.

<sup>29</sup><http://pcast.ideascale.com>.

The screenshot shows a web interface for a PCAST session on International Food Security. It features a central video player showing a speaker, Robert Paarberg. To the left, there is a sidebar with a Reddit-style comment section and a list of relevant books. To the right, there is a 'Slides' section with a table of agricultural statistics and a 'Paper Viewer' showing a slide titled 'Genetically Modified Crops in Developing Countries' with the text 'PROMISE OR PERIL'.

VOLUME OF FOOD PRODUCTION	+ 5 PERCENT
LAND AREA IN FARMING	- 4 PERCENT
WATER USE IN IRRIGATION	- 9 PERCENT
EXCESS NITROGEN USE	- 17 PERCENT
PESTICIDE USE	- 5 PERCENT
GREENHOUSE GAS EMISSIONS FROM AGRICULTURE	- 3 PERCENT
INCREASE IN TOTAL ENERGY USE IN AGRICULTURE	1/8 THE RATE OF INCREASE IN THE REST OF THE ECONOMY

Fig. 2. Our highly configurable web-based toolset for curation and peer review with reddit context.

The screenshot shows the same PCAST web-based toolset interface, but rearranged for active research. The central video player is now displaying a slide titled 'CHRONIC UNDERNUTRITION IN RETREAT, EXCEPT IN AFRICA' with a line graph showing the prevalence of underweight children 0-59 months old from 1980 to 2005 for Africa, Asia, and LAC. The 'Paper Viewer' is now displaying a paper titled 'Sustainable Farming: A Political Geography' by Robert L. Paarberg.

Year	Africa	Asia	LAC
1980	23.5	45.4	12.5
1985	23.5	40.0	10.0
1990	23.5	35.0	8.0
1995	23.5	30.0	6.0
2000	24.8	25.0	5.0
2005	24.5	20.0	5.5

Fig. 3. Our toolset rearranged for active research instead of passive watching.

In a given PCAST video, the presentation represents the longest portion. We create navigation markers at each slide transition, providing navigable discursive “blocks.” During the portions of video in which a speaker’s slides are not present (the introduction of a speaker at the beginning and Q&A portion at the end), we use speaker changes as navigation blocks. When the user begins entering a comment, the closest relevant block (slide during the presentation, speaker during other portions) is automatically selected. Before submitting the comment, a user may adjust which portion of video the comment refers to. Comments are visualized as an additional layer in the timeline, making it clear to users where previous comments have already occurred and possibly pointing to controversial claims.

We propose that comments be accessed and stored on the open source site Reddit.<sup>30</sup> The source code for this site is readily available.<sup>31</sup> Reddit is a social news website that provides the ability to create private forums (called subreddits) moderated by their creator and accessible only to invitees. Aside from its proven user interface [11], Reddit has a number of features which make it a solid platform for discussion:

- Voting: every article (or, for PCAST, segment of testimony) and comment can be voted upon by each user. Voting information is used to control the display of contents and comments.
- Subreddits: content is organized into subreddits. Membership to subreddits can be controlled through both user subscriptions and moderation of “private” subreddits.
- Roles: reviewers are given membership to private subreddits by moderators. Moderators of a subreddit can give moderation power to others and control content.
- Karma: voting scores for both a users comments and submissions are tallied and can be viewed by others.<sup>32</sup>

Reddit is comparable, in a number of ways, to the third party commercial site that the PCAST currently uses to host comments, IdeaScale.<sup>33</sup> IdeaScale provides a way for users to post comments and vote on them and the system uses the votes received to rank a comment thus making the comment either more or less visible to subsequent visitors. However, there are two key differences between Reddit and IdeaScale.

First, Reddit is open source software, and IdeaScale is not. We believe it is best to build Open Government websites on open source code so that the processes supported by the sites are transparent to the public. For example, voting on IdeaScale is somewhat analogous to voting on Reddit, but how are votes counted and then used to calculate the visibility of a post or poster? With Reddit it is possible to review the voting algorithms by inspecting the code. With IdeaScale it is not possible to even license the code<sup>34</sup> and so, ultimately, one cannot know how votes are counted on IdeaScale or even if, indeed, certain votes count at all.

Second, Reddit supports moderated discussion by providing the means to assign users specific roles with powers to control content. IdeaScale does not support roles. While this may seem anti-democratic on our part to argue for a system that supports differentiating contributors and assigning them varying powers in the online exchange, it is not. What we hope to support is what Noveck, cited above, calls a “collaborative democracy,” where people work together on a task that has been decomposed into different parts that people with different skills and can address with their specific, respective expertise. In other

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<sup>30</sup><http://www.reddit.com>.

<sup>31</sup><https://github.com/reddit/reddit/wiki>.

<sup>32</sup>“Karma” is the cumulative tally of all votes for or against a user’s submissions or comments (separate scores are maintained for each), where a vote for has the value of a single positive unit and a vote against has the value of a single negative unit.

<sup>33</sup>see <http://ideascale.com/opengov/> and, specifically, <http://pcast.ideascale.com>.

<sup>34</sup><http://ideascale.com/pricing/>.

words, we do not want to support a generic contributor; rather we want different people, scientists with different fields of expertise, to contribute using what they know best. To support specific contributions, roles are necessary.

Previous work has been done to create a Web 2.0 platform for studying impact assessment of public policy. For example, Heidinger et al. [21] define a set of Web 2.0 application requirements and show how those requirements were met in the design and evaluation of their application. In particular, we share their interest in defining different roles and separate mechanisms for those roles, the use of collective intelligence and voting to suppress potential disruption by unknown authors, and the need to provide intuitive user interfaces and extensibility.

In our prototype, the moderator(s) of a subreddit act as curator, controlling the selection of testimony to be reviewed and working with our research mining invitation system (described below) to guide the selection of an appropriate pool of experts. Invited experts have an automatically created account with appropriate subreddit membership and can proceed directly to viewing the testimony around which they were invited via a link in their invitation email.

While a number of our suggestions are aimed at supporting one aspect of what Jasanoff has identified as crucial to good scientific advisory committees – the ability to negotiate and find consensus – we have another set of suggestion to support the other side – boundary work. As already quoted above, this is what Jasanoff calls boundary work: “By drawing seemingly sharp boundaries between science and policy, scientists in effect post ‘keep out’ signs to prevent nonscientists from challenging or reinterpreting claims labeled as ‘science’ ” [24, p. 236].

We want to support two mechanisms of science to make sure that comments on the PCAST site privilege scientists and stay focused on scientific concerns: peer review and attention to a contributor’s reputation as measured by a citation analysis of the scientific literature. The voting mechanisms of Reddit will, we believe, provide a suitable format for peer review of the scientific testimony shown in the PCAST videos. However, this will only be practical if the set of discussants is largely restricted to people who have credentials as scientists. We have built an “invitation system” to address this issue.

As much as we would like to imagine that a fully automated invitation system would be feasible, prior work indicates that it is not. For example, Hovy et al. [8] describe efforts to employ machine learning and text structure analysis techniques to automatically map out the scientific literature (and thus highlight the important scientists) of biomedicine. Unfortunately, their algorithms still require some human training to handle a new area.

This work leads us to believe a flesh-and-blood curator or editor of some sort will always be required to guide the invitation process. In [13] we describe a set of tools we have developed to assist with this process. By limiting participation to published authors selected by the curator via our literature exploration interface, we ensure that every vote, comment, reply and rebuttal is coming from someone within the scientific community.

Our invitation system takes a document based or “query-dependent” approach to *expertise seeking* [47, 44]. The search process begins with a set of keywords to find relevant papers via academic search engines.<sup>35</sup> From here the system scrapes a initial pool of candidate PDFs, capturing title, author and extracted email address metadata using a combination of open source software packages.<sup>36</sup> The initial pool is generated using keyword co-occurrence and a first degree expansion along co-author and citation networks [2,25]. The curator is then able review titles, authors and article text, eliminating off-topic entities and identifying especially relevant authors and titles for further network expansion.

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<sup>35</sup>See <http://scholar.google.com> and <http://academic.research.microsoft.com/>.

<sup>36</sup><http://www.cpan.org/>.

### 13. Conclusions

In this paper, we have defined PCAST and provided a description of its history and its current political and legislative contexts. These contexts entail a set of constraints that need to be met in the design of any website for PCAST. For example, the FOIA dictates that meeting agendas be published and that the public have access to the meetings. Over and above these constraints, the Obama Administration has raised the bar further by declaring its support for Open Government, the means to allow citizens to not only see what the government is doing, but also collaborate with the government to solve problems in new ways. We also consider the academic literature on the use of scientific advisory committees for policymaking in order to identify the essential functions of a committee like PCAST. Especially, the prior work of Jasanoff [24] illustrates how scientific advisory committees must both negotiate across the boundaries of science and politics, but also, simultaneously, do “boundary work” to preserve the borders that separate science from other kinds of expertise.

Taken together, all of these constraints (historical, political, legislative, and scientific) can be understood as a set of design criteria for Open Government websites. Some of these design criteria are directly addressed by prior work in the fields of Open Source Software (OSS) and Open Video. Others are addressed by prior work on the design of online discussion platforms and peer review. In this paper we enumerate these design criteria and then critique the existing PCAST website. Where we have found differences between the design criteria and the existing website, we have proposed some possible alternatives and implemented them in a prototype system and website we call Peer-to-PCAST.

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