Networking Distributed Public Expertise: Strategies for Citizen Sourcing Advice to Government

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Networking Distributed Public Expertise: Strategies for Citizen Sourcing Advice to Government[1]

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Abstract

The potential of crowd sourcing has captured the imagination of many managers and professionals across all sectors of society, but left many others quite skeptical. This is not only because conceptions of the wisdom of crowds appear counter-intuitive, but also, if taken literally, these concepts can be misleading and therefore dysfunctional for governments seeking to adopt innovations in distributed collaboration. This paper challenges conventional notions of the wisdom of crowds, arguing that distributed intelligence must be well structured by technical platforms and management strategies. After clarifying these conceptual issues, the paper explains how collaborative networking can be used to harness the distributed expertise of citizens, as distinguished from citizen consultation, which seeks to engage citizens – each on an equal footing. Networking the public as advisors aims to involve experts on particular public issues and problems distributed anywhere in the world. The paper then describes the lessons learned from previous efforts to citizen source advice, and why governments should again pursue this strategy as a means to inform policy and decision-making. This is followed by a set of nine strategies for fostering the bottom-up development of governmental initiatives aimed at harnessing distributed public expertise.

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Introduction: Capturing the Potential of Distributed Expertise

The diffusion of the Internet and Web has greatly expanded the potential for distributed collaboration, such as through sharing documents, contributing comments and co-creating information, as demonstrated by the successes of open source software development.[i] A growing number of visionaries see these initiatives heralding a revolution in how organizations, including governments, will function, by tapping the wisdom of crowds – the idea that the many are smarter than the few (Surowiecki 2004; Tapscott and Williams 2006; Malone et al 2009). These visions have been defined as 'crowd sourcing' and 'mass collaboration'. However, the very notion of crowds and crowd sourcing is misleading.[ii] In order to capture distributed intelligence, networks of individuals must be cultivated and managed. As argued in this paper, they are not crowds. Networking platforms and management strategies must be carefully developed to capture the value of distributed expertise.

Citizen Consultation versus Expert Advice

Discussion of crowd sourcing in the public sector, such as through conceptions of 'Wiki government' or 'collaborative democracy', is complicated by the potential to blur distinctions between citizen consultation and expert advice. Noveck (2009: 17) defines collaborative democracy as 'using technology to improve outcomes by soliciting expertise (in which expertise is defined broadly to include both scientific knowledge and popular experience) from self-selected peers working together in groups in open networks.' This is a useful definition, but does not make a sharp distinction between two very different roles that networking can play in government.

One is gauging opinion, which comes closest to 'collaborative democracy', that might ask citizens to respond to policy options, for example, on the basis of their experience. The other is engaging expertise, which might be based on scientific, technical, or experiential knowledge, such as being at the location of a problem. Using the Internet to gauge opinion is primarily focused on citizen consultation, while soliciting expertise online is focused on obtaining expert

advice. Understanding how to engage and respond to expertise can be as essential as consultation to the vitality of democratic institutions and processes.

The very legitimacy of decision-making in a liberal democracy depends on a government's responsiveness to public opinion. Even statesmen, taking positions in opposition to public sentiment, would seek to carry the public. Governments in liberal democracies have traditionally viewed their citizens as constituents and have thus sought to gauge and consult public opinion. Public opinion polls, committee hearings, and consultation exercises are largely geared to understanding the balance of public opinion concerning policies and decisions. New information and communication technologies (ICTs), such as the Internet, enable more direct and frequent patterns of consultation.

However, citizens are more than constituents, whose opinions are equally legitimate. Citizens also have the potential to be experts on particular issues, where some citizens have more expertise than others, such as when they possess specialized knowledge or particular experience relevant to a specific subject. Viewed as experts, the challenge for government is not to air public issues and gauge public opinion. The problem is to find relevant experts, on the basis of merit and a spirit of voluntarism, wherever they live or work. The next problem is to find ways to bring their expertise to bear on a particular question in a timely and effective manner.

Expertise and the Internet

Experts are individuals who have gained the experience or skills to be judged as authorities by others knowledgeable about a particular area (QED). Citizens are not necessarily experts, but any given citizen might conceivably have expertise in some specific areas. Experts could be citizens of a particular nation, but many might not be. In any given area, not all the experts are citizens of your country. Moreover, not all experts are equal as some experts might be viewed as superior to others. In such ways, getting the advice of experts is very different from consulting the opinions of citizens.

The expert has long been a critical aspect of governance, from Machiavelli's *The Prince*, written in 1513, to the present day, political scientists have wrestled with the role of experts in governance, particularly in democratic regimes (Benveniste 1977). Of course, expertise is already embedded in routine practice, such as when governments hire consultants, conduct studies, or build models to advise public officials on particular issues. However, the Internet provides mechanisms to create distributed problem-solving networks that can complement, if not substitute for, in-house expertise and paid consultants, to provide timely and effective advice in ways that could reduce the costs to government, while engaging citizens in new and meaningful ways in the process of governance.

Approach of this Paper

This paper shows how the Internet can be used to form various types of networks, which I have called 'collaborative network organizations' (CNOs), that can perform a variety of functions important to bringing expertise to bear on policy and decision-making. After developing the concept of distributed problem-solving networks, I briefly review experience with initiatives aimed at networking distributed intelligence. The paper provides an overview of how networks can be used by governments to harness distributed expertise, outlines lessons learned from early cases, including the key opportunities and risks to those who seek to employ them in the public sector. The paper concludes with recommendations on how government should utilize CNOs to inform policy and decision-making at all levels. It suggests ways to nurture a series of pilot projects, orchestrated by a set of platforms, guidelines and policies that will enable bottom-up initiatives that can engage experts, be well managed, and inform policy and decision-making.

The Rise of Networked Individuals

The degree to which individuals can control the patterns in which they network with other people – within and outside the organization – is one of the biggest

ICT-enabled changes afoot in companies and civil society. It's empowering a revolution that I would compare to one that put PCs on the map in the early 1980s.

The Internet, through the power of search and social networking tools, allows individuals to build virtual networks within and beyond the organization. Individuals can decide who should be communicating with whom. Organizations no longer have a monopoly on which colleagues should be communicating – inside or outside of the organization.

The advantages of tapping distributed intelligence, in comparison with information systems in formal organizations, include the potential to:

- Improve on an individual's judgment by pooling the views of multiple people, provided they have no prejudice and a greater than even likelihood of being correct (de Condorcet 1994 [1785]);
- Aggregate geographically distributed information and intelligence;
- Enhance diversity, bringing together heterogeneous viewpoints; perspectives, and approaches (Page 2007);
- Enable more rapid diffusion of questions and answers by permitting simultaneous review rather than sequential processing;
- Avoid negative aspects of small group processes, such as 'groupthink' (Sunstein 2004);
- Enable more people to be engaged in, and understand, public issues; and
- Support greater independence of, and less control by, established institutions with established interests and ways of thinking (Dutton 2009).

Mining distributed intelligence enables an organization to move decision making nearer to the ground level, such as empowering individuals who are closer to the actual customer, service, or problem to be solved. As a result, the people who are best informed about a particular topic or activity can become involved in the resolution of problems. Collaborative organizations enabled by Internet technologies also will allow people to mine distributed

intelligence within and beyond the organization, expanding the boundaries of the organization.

Many organizations aren't thinking about the 'networked individual' -- the networking choices and patterns of individual Internet users. They're still focused on their own organizational information systems and traditional institutional networks. They may be a bit confused by new developments, like social networking or crowd sourcing, and their confusion is justified in many respects. On the one hand, there is a tendency for organizations to be reactionary or even protectionist about colleagues getting involved in activities that they don't understand. Rather than put up walls, managers need to get involved in collaborative networks so that they can better understand them and capture their value for the organization. Many know that the delicacy and complexity of administrative and political issues in the public sector cannot be simply delegated to a crowd. What are these networks, if they are not unmanaged crowds, and how can governments use them to inform policy and practice?

Distributed Problem-Solving Networks

The diffusion of the Internet, Web and related information and communication technologies (ICTs), such as mobile, has increased the potential to network experts, whether distributed locally or around the world. The idea that expertise can be purposively brought together to solve real world problems has given rise to the concept of 'distributed problem-solving networks'.[iii]

This counter-intuitive vision has captured the imagination of many through the popularization of the so-called 'wisdom of crowds'. As a metaphor, this concept has been successful in conveying a departure from traditional approaches. However, it has also been misleading when taken literally. Crowds do not write Wikipedia entries. Managed sets of networked individuals contribute to co-productions, like Wikipedia. Crowds include multiple people, but they are often prejudiced and often have a low probability of being correct

– violating basic assumptions behind the value of pooling judgments. For such reasons, crowds are often wrong.

This paper seeks to clarify a workable vision and strategies for tapping distributed intelligence. Properly understood, and managed, distributed expertise presents a real prospect that governments can turn to solving critical problems, from bringing individual experts together to manage a crisis to tapping the 'civic intelligence' of the general public (Schuler 2001).

Electronic Networks of Expertise: A Brief History

The emergence of CNOs can be seen as the latest stage in a forty-year thread of initiatives to harness distributed expertise. For example, the development in the 1960s by the RAND Corporation of Delphi techniques[iv] in forecasting sought to reduce the bias created by influential individuals in the social dynamics of co-located face-to-face groups of experts. The potential for computer-based communication networks to enable the sharing of expertise accelerated the drive towards distributed collaboration in the 1970s, such as with computer conferencing, group decision-support systems and later initiatives around computer-supported cooperative work.

One of the early innovations in computer conferencing was driven by the ambition to create a platform to quickly network experts in the event of national emergencies and policy issues. Developed in 1971, by Murray Turoff and colleagues at the US Office of Emergency Preparedness, the system was called The Emergency Management Information Systems And Reference Index (EMISARI) system. Using Teletype terminals that linked to a central computer over telephone lines the system used many features of contemporary collaboration technologies, including applications for real time chat, polling, and threaded discussion.[v]

The diffusion of personal computers across organizations shifted the focus away from computer conferencing to the development of 'groupware', executive boardrooms, and other applications to reconnect individuals within

and across organizations through networks.[vi] Various groupware and computer-supported cooperative work projects pursued many of the same objectives tied to the distributed expertise to share, jointly contribute to, and create, information products and services.

The concept is as relevant to the public sector today as it was in earlier decades: government can use electronic communication to bring experts together to address an urgent issue. They do not need to be available at the same time. They do not need to be in the same time zone to collaborate effectively. For example, EMISARI was used to inform US President Richard Nixon's wage and price control program to tackle inflation.[vii] But today, the technical platforms to support distributed intelligence are further advanced and tied to a critical mass of users, which did not exist in the 1970s.

The Shift to Citizen Consultation

However, in the public sector, governmental initiatives tended to focus more on engaging citizens, rather than designated experts, in policy and decision-making (Table 1). For example, one of the first commercial experiments with interactive cable communication, the QUBE system in Columbus, Ohio, experimented with permitting viewers in Columbus to be polled during the broadcasting of debates, such as on town planning issues (Davidge 1987). For example, a network of QUBE systems was used to poll viewers on their reactions to a major speech by President Jimmy Carter.

Interactive cable systems were eclipsed by the use of electronic bulletin board systems (BBS) and computer conferencing systems, such as the Public Electronic Network (PEN) in Santa Monica, California (Guthrie and Dutton 1992). PEN was organized by the city, and enjoyed a limited period of success, but declined with the rise of the Internet, which moved users away from this local system, and an inability to establish rules of order for discussion (Dutton 1996).

Table 1. Networking Citizens versus Experts.

	Citizen Opinion	**Expert Advice**
Networked Individuals	Citizen Consultation, Polling, e-Petitions	Distributed Intelligence through Collaborative Network Organizations
Individuals, Interest Groups and Lobbies	Meetings, Hearings, Letters, Petitions, Elections	Paid Consultants, Representatives of Interest Groups, Lobbies

Since this early period of experimentation with electronic city halls, and forums, attention shifted to citizen consultation, such as in enabling governmental units, such as parliamentary committees in the UK, to obtain public feedback on issues (Coleman 2004). New Zealand, for example, organized an online consultation on the ethical issues of pre-birth testing – a debate that could determine what children are born.[viii] In the UK, the development of a system for citizens to draft and endorse petitions was an innovative approach aimed at connecting the Prime Minister's Office with citizens.[ix]

The Potential Shift Towards Distributed Intelligence

With the Web and subsequent advances, such as the Semantic Web, great emphasis has been placed on employing the Internet to better inform the public, such as initiatives around the world to put public information online, and more recent initiatives to open government data for deep linking, search and reuse.[x]

Access to government information and data is important to distributed problem solving. If individuals can obtain government information online and collaborate with others over the Internet, they have the potential to hold government and other institutions more accountable (Dutton 2009). Even

serious games have been developed online that are designed to better inform and engage citizens in public policy issues, such as the environment, or to solve practical problems, such as tagging photographs or other images on the Internet, through what are called Games with a Purpose (GWAP).[xi]

Approaches can go well beyond the opening of government information and could exploit the potential for the Internet to enable contributions from users, and in the co-production of information and advice. In comparison with the public sector, the development of systems that enable collaboration in everyday life, business and science, has been far more prominent. These same approaches could be turned to bring distributed expertise into governmental processes. And technical advances, such as embodied in Web 2.0 and social networking applications, have made this easier, such as by enabling users to rate the comments of contributors. However, the use of the Internet to involve experts in government decision-making has not been prominent since EMISARI. This is because government faces challenges that are different from business and civil society. The next section provides an overview of the kinds of systems that are most prominent, before discussing how these can be applied in government.

The Developing Promise: Collaborative Network Organizations

In academic research, private industry and civil society, new forms of collaboration have begun to emerge, which offer real promise for the public sector. Distributed problem-solving networks are composed from a variety of different kinds of applications. They can be classified by whether they link individuals within an existing community or organization via Internet-enabled applications that aim to solve particularly complex and novel problems, such as addressing the ‘bugs’ in software, or are pre-structured by Internet platforms that enable new inter-organizational networks to generate or mine insights gathered from the interaction of distributed actors, such as between medical specialists.[xii] Others have classified networks by whether they focused on ‘information aggregation’; ‘prediction model aggregation’; or ‘problem-solving’.[xiii]

However, these categorizations suffer from being based on the function or purpose for bringing together a distributed group of people. This over-simplifies the diverse goals and objectives of the actors behind their success. My synthesis of a variety of case studies revealed multiple goals and objectives behind the complex ecology of actors shaping their design and use. These initiatives often simultaneously address many different problems, some simple, others complex. This makes it unrealistic to group initiatives or approaches by any specific category of problem as the choice of network is seldom driven by a simple rational solving of a pre-defined problem. More often, a network becomes a solution space looking for emergent problems to solve.[xiv]

Instead of characterizing the underlying purpose of complex sets of technologies and activities, which are often multiple and conflicting, it is more useful to identify the types of collaborative activities that are underpinned by these ICT networks and tools (Dutton 2009). Even this approach is more complicated than it may appear since most networks exhibit multiple and overlapping design features.

Nevertheless, a simplified typology can be constructed by focusing on the activities they primarily support rather than the purposes they are designed to serve. That is why I refer to them as ‘collaborative network organizations’ (CNOs), instead of ‘distributed problem-solving networks’.

The three most general ways in which CNOs use Internet technologies are for: (1) sharing documents, data, and other digital objects, such as through hypertext links; (2) supporting contributions to collaboration, such as user-generated ratings or other content; and (3) supporting cooperative co-creation, such as group authoring of text (Table 2).[xv] Taking these categories, it is possible to identify three types of CNO, which focus on supporting collaboration through:

1.0. *Sharing:* The ability to create linked documents, data, and objects within a distributed network, thereby reconfiguring how and what information is shared with whom. This is exemplified by Tim Berners-Lee's invention of the Web to share documents at CERN, which has been moved forward by his later articulation of the idea of a 'semantic Web' to support more intelligent search, and retrieval, of linked data, such as illustrated by open government data initiatives in the UK[xvi] and US[xvii]. From the World Wide Web to Web 3.0, these advances are focused on better sharing, whether of documents or data.

2.0. *Contributing:* The ability to employ social networking applications of the Web to facilitate group communication, thereby reshaping who contributes information to the collective group, such as by enabling ratings or comments by users.

3.0. *Co-creating:* The ability for individuals to collaborate through networks that facilitate cooperative group work toward shared goals (e.g. joint writing and editing of Wikipedia), thereby reconfiguring the sequencing, composition, and role of multiple contributors.

Key features of different types of collaboration networks overlap. For instance, networks enabling user-generated content also exploit the hypertext linkages so valuable in finding and sharing documents. Likewise, cooperative joint collaboration - enabled by collaboration 3.0 - exploits the potential for user-generated content as well as hypertext links, at the same time as focusing on the collaborative production of documents or other information products.

This classification of three types of collaboration networks should not mask the degree to which each type is embedded within a broader array of communication networks and channels. For example, the use of the Internet to support collaboration on a project should recognize that travel for face-to-face meetings can also be central to the team's working, with online and offline contributions often combining to forge a collaborative community. Many developers of Wikipedia come together at annual 'Wikimania' conferences.

Table 2. Examples of Distributed Collaborative Network Organizations.

Type	*Illustrative Application*	*Example*
1.0 Sharing	Using e-mail and shared documents for the design and management of a large-scale, distributed projects that require the sharing of information	The Atlas[xviii] research project at CERN used e-mail, attachments, and Web-based documents to support collaboration among 1900 physicists in 37 countries working on a high energy physics experiment
	Use of shared, viewable databases for coordinating distributed collaboration	The Bugzilla[xix] project used a database to track software defects and manage repairs for Firefox and other Mozilla open source software projects, enabling individual contributions to be allocated
	Broadcast search: networking problem holders and solvers through awards, prizes, and other incentives	InnoCentive[xx] uses broadcast search to join solution 'seekers' with problem-solvers, who compete for prizes by generating solutions[xxi]
	Deep linking and search: enables both documents and data to be linked and searched	Neurocommons[xxii] enables access to biomedical information through deep searching and natural language processing of open abstracts and datasets (Wilbanks & Abelson 2010)
2.0 Contributing	Aggregating and prioritizing news content	Digg[xxiii] and other news platforms find, aggregate, rate and prioritize news
	Sharing insights, information and opinions among experts in a field	Sermo[xxiv] links licensed physicians in the USA to share information and assist each other and sponsoring organizations
	Predicting outcomes	Information markets[xxv] are used to aggregate the judgments of individuals to predict public and private events
	Collaboration through massive multiplayer online games (MMOGs)	Seriosity[xxvi] uses MMOG to help prioritize and manage e-mail and manage information overload generally
3.0 Co-creating	Open source software development	Firefox developers have used the Internet to prioritize key features to produce a more user-friendly version of the Mozilla browser[xxvii]
	Open 'wiki' content creation, allowing users to collaborate - add and edit online content	Creators of Simple Wikipedia use Media Wiki to write, and simplify complex text entries in Wikipedia[xxviii]
	Open production of creative artefacts, such as films	A Swarm of Angels[xxix] uses the Internet for international creator-led collaborative development in making a film

Governmental Applications

These various types of CNOs illustrate a basic problem with overly simplistic visions of throwing problems to a crowd. These are well-structured and managed activities, often involving small groups, if not a single individual problem-solver. They are not crowd behavior. There are some applications of CNOs that require relatively little expertise, such as distributed monitoring or surveillance. In such cases, crowd sourcing or mass collaboration are more reasonable terms, but still not accurate, such as when individuals residing near the Gulf of Mexico logged sightings of oil or other impacts of the Deepwater Horizon Oil Spill. The voluntary participation of people in the right location to observe these effects is critical.

However, when specialized expertise is required, CNOs should be less focused on the wisdom of the crowd, and more focused on finding a handful of experts among the many. Nevertheless, examples of any of these types of CNO abound in civil society and increasingly in business, but are less common in government and the public sector in general.

This is why conceptions of Wiki government or democratic collaboration can be misleading: lumping together very different kinds of problems and network solutions, and confusing citizen consultation with citizen sourcing of expertise. In the public sector, there are initiatives around the world aimed at using the Web, Web 2.0, social networking sites and even mobile phones and texting (SMS) to engage citizens in discussion forums, e-consultations, polling and petition systems, that enable citizens to post ideas, get better access to government information, and register their opinions (UN 2010: 83-91). President Barack Obama's Twitter feed has had a large following, creating an opportunity to follow the President day-by-day. The Mercyhurst College Institute for Intelligence Studies created a 'Police Act Review Wiki' in 2007 that enabled citizens of New Zealand to register and contribute to revision of this legislation.[xxx] The UK Treasury has asked the public for suggestions of budget cuts.[xxxi]

Open government data initiatives seek to enable deep linking and search of data as a means to enable better access to government information. In this spirit, the US Patent and Trademark Office (USPTO) opened patent applications to the public as a means to get more eyeballs on the problem to complement and support the work of patent examiners. Called 'Peer-to-Patent', the USPTO invited members of the public to become community reviewers.[xxxii]

Wikis in particular have been used for serious purposes, ranging from supporting primary school children in walking to school[xxxiii], to their use by military and intelligence communities, including the US military's 'Milipedia', for sharing information by the Armed Forces. The Office of the Director of National Intelligence, Intelligence Community Enterprise Services, inspired by an essay on wikis and blogs (Andrus 2004; Thompson 2006) developed 'Intellipedia', a wiki, comparable to Wikipedia, for sharing information within the US Intelligence Community. Intellipedia includes information that can be accessed at different levels of classification, from Top Secret to unclassified.

Lessons Learned

Governments worldwide are experimenting with ways to use these same advances of the Internet and Web to engage the public in ways never before feasible. However, there have been many failures and dashed expectations are commonplace. They are not the inevitable outcome of technological, generational, social and economic change, as argued by Don Tapscott (2006) and others. The successful development of networks that can solve particular problems is quite difficult. However, experiments with collaborative network organizations provide a number of lessons for embarking on this strategy.

Technology: Using Existing eInfrastructures that Support Collaboration

Open source software has contributed a variety of tools for CNOs, such as MediaWiki, software that can be used to create wiki-based collaborative

environments. These infrastructures are being built. The public Internet itself represents an open platform for distributed collaboration, using tools such as wikis and collaborative software that is widely available as a service, such as collaborative editing tools, like Google Docs. The US intelligence community has an unclassified collaboration space, Interlink-U[xxxiv], a set of Web-based services, tools and technologies, which includes Intellipedia. The current availability of such platforms and tools is one of the major enablers of collaboration in all sectors. An individual or agency does not need to start from scratch by tailoring existing tools to their particular purpose. The Internet platform and the tools of collaboration, from e-mail to wikis, are increasingly accessible to growing segments of the public.

The Value of Top Management Support

CNOs can develop without top management support. As noted above, networked individuals can choose to collaborate within networks of their choosing. This will be as difficult to stop as it was for managers to stop personal computers from being brought into the office in the 1980s. Therefore, networked individuals will be able to use CNOs to fulfill their own objectives, and often enhancing their productivity in the workplace, even without top management support. However, if organizations in the public sector wish to foster the development of CNOs to solve problems that they wish to be addressed, then top management must create a climate that is supportive of their development, such as by top managers recognizing the value of these initiatives or being a visible participant in them. There have been examples of networks that were successful until a change of management undermined their support within the organization, such as in the case of ‘Feet First’, a site designed to encourage children to walk to school.

The Importance of Managing Collaboration

The most prominent design feature that emerged from empirical studies of CNOs was that each aimed at reconfiguring who communicated what, to whom, and when, within the network. The cases demonstrated that these are

seldom viewed simply as ‘crowds’ involved in collaboration, but regulated interactions among networked individuals - regulated in part through the architecture, and in part through management, of the network, such as the assignment of editing rights and privileges. For example, broadcast search might reach out to millions to find one ‘problem-solver’. Likewise, a Wikipedia entry is likely to be written, edited and up-dated by a small group of experts in a particular subject area, not a crowd. In addition, most of the successful CNOs have very strong leaders or champions, sometimes taking on the role of a ‘benevolent despot’, being able to resolve issues in a timely way and move ahead (Cassarino, and Geuna 2008).

A Core Set of Contributors from a Critical Mass of Users

Successful networks are able to build a critical mass of users. This often takes time and work in recruiting members who form a community, feeling a sense of ownership and value within the network. Alternatively, it is possible to bring a problem to an existing community of users. However, while many users are necessary, a small minority of ‘core participants’ often makes most contributions to the network (Richter 2008), conforming to the so-called ‘power law’ – where only a few are most active, with levels of activity quickly trailing off to form the long tail of the distribution, with most people making very few contributions.

Incentives for Networked Individuals and Networked Institutions

CNOs are not old style management information systems (MIS), designed top-down to provide management with information about the organization and its parts. They are built by their users – networked individuals – and inform and meet the needs of their users (Dutton and Eynon 2009). It is in the process of users sharing, contributing to, and co-creating information and services of value to them that they create a system of value to the goals of the organization as a whole. William Heath has referred to this as a control shift (Ctrl-Shift).[xxxv] Users are able to ‘innovate for themselves’, and in this sense democratizing the information system (von Heppel 2005: 1). Top managers

are no longer in control, but they are in a position to ‘cultivate’ or kill the development of CNOs that could serve their organizations (Richter et al forthcoming). They need to be open and supportive of losing control over content and features in order to enable users within the organization to feel a genuine sense of ownership.

Motivations Behind the Modularization of Tasks

Successful systems often need to be extremely modular in their allocation of work or tasks. For instance, one of the earliest and still successful uses of e-mail has been for broadcast search. A typical query is: Does anyone know someone knowledgeable about a particular topic? Questions like ‘Who knows?’ can be ignored by those who do not know the answer and quickly dealt with by those who do know. Particularly when dependent on voluntary contributions, the key is to develop tasks that can be done quickly and easily.

For example, when a reader of Wikipedia reads an entry and sees a mistake or the need for up-date, it is possible to edit the entry and complete the task in a matter of minutes. It is the cumulative contributions of many editors making small contributions that have resulted in the unpredictably successful growth and quality of this online encyclopedia. By keeping tasks modular and easy to complete, it is possible for a multiplicity of individuals with a plethora of diverse motivations to drive collaboration. When the task becomes more comprehensive and difficult, or when you are asking very hard questions, more structured incentives are required, such as offering a prize to the ‘problem-solver’ as done in the case of InnoCentive, or remuneration as in the case of a paid consultant.

Why Governments Avoid Collaborative Network Organizations

The Transportation Safety Authority is credited with creating the first US government blog in 2008 (Noveck 2009: 15). This was behind other sectors, such as in the area of ‘business intelligence’. It is not by chance that CNOs are less common within the public sector. Government officials have many

reasons for not experimenting with collaborative networks, and it is critical that initiatives address these concerns. Some of the major rationales in the public sector for not moving ahead include the following:

Risk Aversion

Many CNOs have failed. Success is not at all guaranteed. Many governments have tinkered with blogging or wikis only to find that few people participated, and that the quality of contributions was low. Government officials therefore expose their units to the risk of a highly visible failure. A strategy should encourage multiple initiatives, and an expectation that many might well fail, but that some will succeed. It is in cultivating these initiatives, identifying the successful ones, and building on and scaling up these successful efforts that new approaches to exploiting distributed intelligence can be cultivated in a virtuous cycle.

Concerns Over Levels of Participation: Success is Not Measured by Numbers

A related concern is the worry that collaborative networks will not attract large numbers of people. For example, in all Web-based initiatives, it is common to ask how many people contributed, commented on a blog, for instance, or rated options, than it is to focus on the quality of the ideas that were developed. This concern over numbers should diminish if efforts to citizen source expertise are distinguished from efforts to consult with citizens as constituents, where numbers make a more significant difference in the legitimacy of the activity. The most successful collaborative network organization might find the one person best positioned to address a question.

A Focus on Evidence-Based Policy

Government policy can be easily undermined by flaws in the evidence supporting policy decisions. Put positively, many in the public sector have been increasingly committed to evidence-based policy, meaning decisions supported by the best scientifically based findings. In most cases,

collaborative network solutions can be less rigorous. For example, physicians use Sermo to ask other physicians about potential side effects of various combinations of medications and get answers within weeks (Bray et al 2008). However, a valid evidence-based solution in healthcare and the medical sciences normally requires rigorous clinical trials that could take years to fund, design, and analyze. Clinicians are increasingly comfortable with using social networks for some level of information when stronger evidence is not available, and this ability to function and depend on Wikipedia, social networking, and other error prone but generally reliable systems is growing. While networking is not a substitute for more systematic evidence, collaborative network organizations can provide good enough information for moving ahead until better information is available. In fact, some of the most innovative academic research has employed creative approaches to harnessing collective intelligence (Nielson 2011).

Gaming of Outcomes in a Political Arena

The idea that the many are wiser than the few is based on an assumption that all individuals have no prejudice and a greater than even probability of being correct.[xxxvi] In the political push and pull of government policy and decision-making, it is often difficult to isolate areas in which individuals do not have a serious stake in the outcome. They do have a prejudice. Moreover, the impact of policy decisions is often quite problematic. Many experts might not have a more than even probability of being correct. In fact, it is often the case that the most vexing questions are highly contested and very uncertain, but with high stakes in the outcome. Stakeholders seek to lobby and influence the decision-making process to favor their preferred solution. Expertise can have a political dimension, such as when the advocates of different policy positions each hire their own experts or build their own models (Dutton and Kraemer 1985).

In this respect, the citizen sourcing of expertise could be subject to gaming, such as by nominating or encouraging experts that are known to favor a particular solution. Instead of a rational ‘problem-information-decision’ sequence of decision-making, there is a fear of a more political ‘decision-

propaganda-conformity' approach, using public consultation or evidence to support predetermined choices (Dutton and Kraemer 1985: 1-20). It is not surprising, therefore, that many politicians and public officials are concerned that the dynamics of the crowd could be manipulated and heavily gamed by lobbyists and interest groups. As with other CNO activities, this possibility must be monitored and managed to detect and control such attempts. Transparency is one general antidote to this problem, as it enables networked individuals to identify efforts at gaming outcomes and hold actors more accountable.

It is also useful to distinguish areas in need of public consultation – obtaining the views of stakeholders – versus the citizen sourcing of expertise. Polling, discussions, ratings and other tools can be used to gauge public sentiment. Even here, tools are developing for the analysis of text and reading the Web that can detect lobbying, such as when many duplicated e-mails or messages are submitted to a consultation. Consultations and citizen sourcing of expertise could be subject to political pressures. In both cases, it is important to recognize this possibility and maintain the transparency and accountability of the process.

Reluctance to Give Up Control over Communication

Politicians and public officials, even more so, are trained to control information about their operations. Unauthorized leaks to the press are often costly, potentially setting back progress on plans or decision-making. This was starkly illustrated in the aftermath of the WikiLeaks revelations of US embassy cables, and the Afganistan and Iraq war logs. While WikiLeaks resulted from a security breach, the idea of creating another channel between government agencies and the public, such as a blog, is often seen as opening up more opportunities for unapproved and potentially inaccurate or misleading information to be circulated. Likewise, creating more opportunities for the public to ask questions, pose problems, and make demands, will open governments to more pressures to respond to more members of the public. Of course, this reflects the traditional mindset that expertise resides within the

organization. It is this mindset that the proponents of democratic collaboration face in communicating their vision. However, because it is a reality, one way to address is concern is to start small with simple steps, such as starting a blog, and getting managers, particularly those concerned or confused by the idea, to get involved. Experience with new Internet and Web technologies is one of the best approaches for gaining a learned level of trust in their value.

Concerns over Civility and a Lack of Expertise

Related to concerns over relinquishing control to people outside the organization, and to the online world, is a fear that the organization will permit individuals with too much time on their hands, axes to grind, or with a 'loose screw' into the conversation. There are grounds to this concern, such as the degree that people are more prone to over-react to e-mail or online messages, such as by flaming. However, there are a number of effective approaches for countering contributors who do not have the expertise valued by a collaborative network. One is to set up rules on the level of participation allowed, such as putting a word limit on contributions. Another is to allow users to rate the contributions of other users. For example, physicians on Sermo rate the advice and expertise provided by other physicians, leading some to gain a strong reputation and the views of others to be discounted (Bray et al 2008). This creates an incentive for all to take care in crafting their contributions, while modularization keeps the task at a manageable level. Finally, particular posts within open systems often generate mentions in social networking sites and by other contributors, shining a light on particularly valuable contributions and contributors.

Committing Politicians and Officials

Finally, many public agencies avoid public consultations, particularly the direct polling of citizens, to avoid the appearance of a public mandate. If a polling exercise suggests that most citizens want option a or b, it will be more difficult for the public body to choose the alternative. Whatever caveats are placed on

the exercise, such as highlighting its non-representative nature, the fear remains.

With respect to tapping the advice of distributed experts, this fear should be less relevant. In most cases, small numbers of citizens will be involved, and any advice will have no more legitimacy than other forms of expertise. While it is nevertheless costly to go against the advice of experts, the outsourcing of citizen advice is likely to result in a more diverse range of expert views on the problem, and therefore be less threatening than cases in which there is a single study or advisory report.

Reasons Why Collaboration Can Succeed in Government

While there are many arguments for government officials not experimenting with CNOs, there are ways to counter these arguments, and there are more compelling reasons to do so, many of which are tied to the general advantages of distributed intelligence.

Direct Communication with a Diversity of Independent Experts

The Internet provides a means for less mediated communication between public officials and the citizen as expert or constituent. US President Franklin D. Roosevelt was probably the first politician to make extensive use of radio to communicate directly with the public, such as through his fireside chats in the early 1930s. He would encourage listeners to write him and would also often mine letters from the public, viewing them as a potential source of good ideas. However, advances of the Internet and Web enable more instant and direct interaction than Roosevelt could have imagined with the birth of broadcasting.

Distributed intelligence is also likely to be more diverse by virtue of its geographical and institutional spread. In Washington DC, there is often an urge to get ‘Outside the Beltway’, since the lobbyists on the Beltway have such frequent interaction that they are subject to group think by being too immersed in the thick of the policy community. It is important to go outside for

more diverse and independent input, which can be achieved through distributed intelligence.

The Convening Power of Government

Compared with civil society and most firms, governments have a particularly strong power to capture public attention. The convening power of a President or Prime Minister or other major elected officials is great, and could be employed to bring experts to a community of relevance for policy and practice. For example, many vital online communities of practice would value the posting of a question by a prominent public figure. This enables government to effectively tap the wisdom of existing communities of expertise.

Compatibility with Open Government and Open Innovation

Collaboration is supported by, and aligned with moves toward more open government. Efforts to enhance transparency and accountability in the public sector are compatible with collaboration, such as by making more public data searchable and accessible to the general public. In this respect, open government platforms provide informational resources to support public oversight and research related to public issues and problems. That said, the use of computer-based techniques for business intelligence has been developed for some time, despite a wide range of proprietary data. Therefore, the legitimate need to keep some data secure, such as to protect personal privacy of the data subjects, or to protect national security, should not block the success of distributed public intelligence. In fact, better systems for security could foster a more open approach for access to legitimately public information.

Synergy with Citizen Consultation

A major theme running throughout this paper is the distinction between citizen consultation and the citizen sourcing of expertise. However, continuing governmental efforts to enable and improve on citizen consultation, such as

through making more documents more easily searchable and accessible, will help create the tools and communities for contributing expertise, rather than opinion, on particular topics. It is impossible to entirely divorce advice or expertise from public opinion. For example, if experts identify policy options, a broader citizenry might be useful to consult on their preferences among these options.

Building on Experience with Paid Consultants

Governments have long relied on the outsourcing of advice, primarily through the use of paid consultants. CNOs are a complementary mechanism for outsourcing advice – citizen sourcing, which might substitute in some cases, and complement other cases of paid consultation. It brings problems to the attention of more people, many of who are geographically distributed. In fact, it is possible to pay contributors within CNOs, such as in the case of InnoCentive, further diminishing any distinction between outsourcing to consultants versus citizen sourcing. The parallels illustrate that citizen sourcing advice is not a radical departure, but a logical, measured extension of existing patterns of outsourcing expertise that takes advantage of new technical opportunities.

Speed and Urgency

CNOs can move very quickly, once a network is in place, by enabling simultaneous review by more individuals. The rationale for EMASARI in the 1970s was around the demand for bringing expertise together as rapidly as possible. Civil society has been able to demonstrate the speed with which people can be brought together to address disasters, such as the 2010 Haiti earthquake, or the Deepwater Horizon oil spill in the Gulf of Mexico, such as in using SMS, Twitter, and the Web to make eyewitness reports that can then be visualized on Web sites.[xxxvii] Speed not only enables government to act more rapidly, but also soliciting advice from citizens is an action in itself.

Centrality of Documents to Policy and Practice

Finally, since nearly all policy alternatives are instantiated and spelled out by documents, CNOs are well suited for the co-creation of policy. The production of policy advice and decision-making is information intensive work that is compatible with the role of CNOs.

A Way Forward for Government

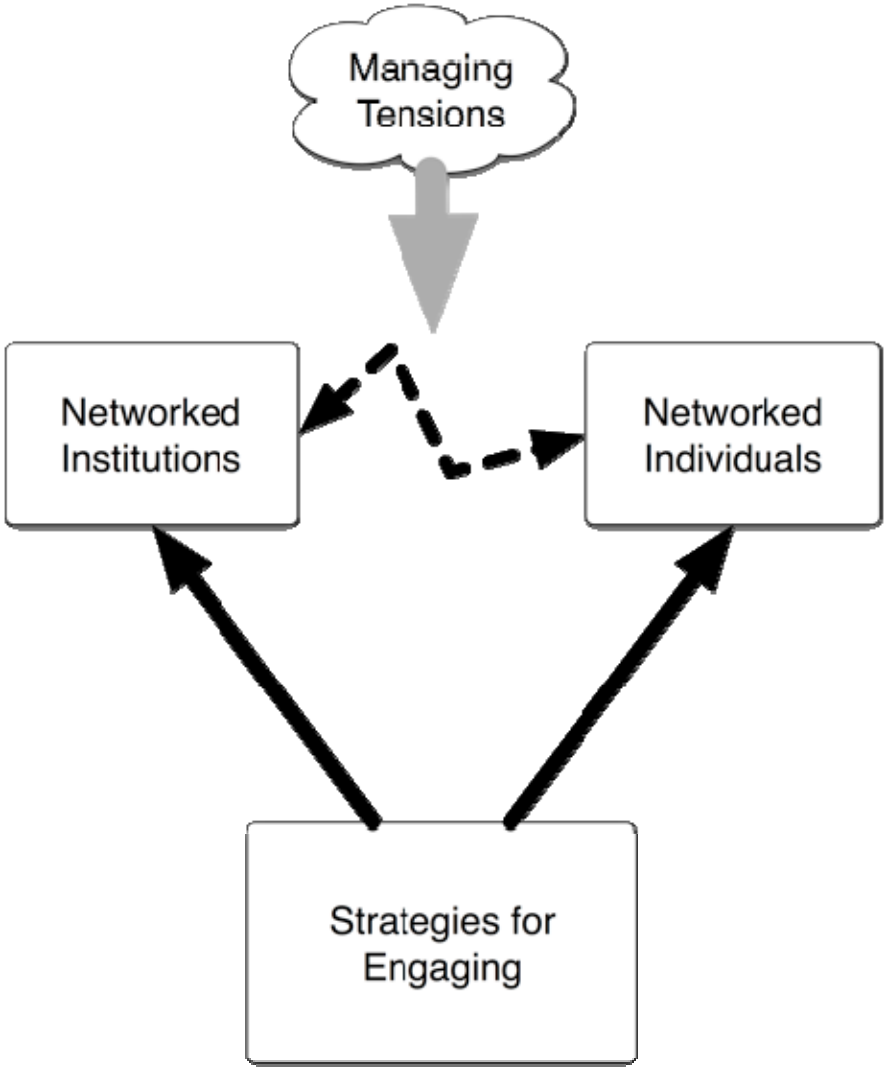
There are many uncertainties raised by efforts to capture the potential of distributed expertise. However, there are strong counter arguments to these uncertainties, and the potential remains great. CNOs provide a means for doing more with existing resources at a time when financial constraints dictate the need to search for more efficient ways to govern. However, arguments will not establish the validity of this approach. The benefits of distributed intelligence need to be demonstrated through early projects that set out to harness distributed expertise for government. Therefore, this paper draws from this background to develop a set of strategies for introducing distributed intelligence into government policy and decision-making.

Figure 1 illustrates the central strategies and tensions guiding these strategies. First it is necessary to engage networked institutions and networked individuals. Networked institutions, such as governments, must support efforts to use distributed intelligence. Governmental actors cannot simply legislate or pronounce the existence of a collaborative network organization, but they can do a great deal to frustrate their development, such as by not permitting departments or individuals in government to use tools like blogging in their official capacities. Managers and executives have an array of strategies for blocking activities, but they have less capacity to initiate CNOs. This lies primarily with networked individuals. It is essential that individuals – inside and outside of government – to choose to participate in distributed problem-solving networks.

Again, the motivations can be manifold. Experts might participate to demonstrate their expertise, to gain a reputation, too pursue their passion for

a subject, or simply for the joy of contributing. There is no single motive. CNOs need to engage communities of users from which they can draw on the expertise of key members, while keeping the costs of participation low. Platforms, such as Intellipedia and Wikipedia, foster the development of communities of networked individuals. Also, networked individuals participate in a variety of different communities of users that cross the boundaries of any single platform or organization. Prominent politicians and government officials have the ability to appeal to these communities for help. They can become distributed problem-solving networks.

Figure 1. Strategies for Engaging Government and Experts.



In addition to engaging these two types of actors, using some of the strategies outlined below, it is also necessary to manage the tensions between them. At the extreme, networked institutions often value control and secrecy, while networked individuals thrive on autonomy and openness. Reconciling these tensions can be approached by establishing a set of policies, principles and guidelines that are viewed as reasonable to each actor, and by enabling the bottom-up development of a variety of initiatives.

Policies, Principles and Guidelines

It is critical to set policies and 'rules of order' that apply for government CNOs, just as a *Robert's Rules of Order* might be applied in public meetings to ensure that procedures are fair and permit views to be heard (Dutton 1996). A useful starting point can be found in the policies and guidelines adopted by Wikipedia, including its 'five pillars', such as participants should 'interact in a respectful and civil manner'.[xxxviii] Ideally, there would be basic guidelines for participation in citizen sourcing activities that would be applicable across a wide variety of communities and policy areas, even if some communities needed to tailor them to their particular needs.

For example, one key issue is whether the contributions of participants should be moderated. If a moderator is to be used, who will moderate? Will any comment or input from a citizen expert be posted, or posted after moderation has determined its appropriateness, for example. A moderator might determine whether a submitted comment should be posted, for example, or remove or edit a comment that has been posted, such as if it were judged off topic, factually wrong, or sufficiently discourteous that it would undermine discussion. Moderation is much less contentious if decided at the outset of a process and if it is judged to be fair, competent and timely. Speed is particularly important, as contributors want to know if their interventions are taken into account. This feedback is one major reward for their participation.

Who can participate? Will it be open to the global Internet community or restricted to citizens, to those with security clearances, or those with a

particular expertise? Sermo was restricted to licensed physicians in the US, but still had over 50,000 participants. While the scope of participation can be narrow or broad, a fundamental error of many government agencies is to restrict the scope of participation and not engage a critical mass of users.

Will contributors be able to rate the contributions of others? Many successful systems incorporate ratings of comments. Even social networking sites, such as Facebook, have mechanisms for indicating when a comment is liked or disliked. Participants normally care about the judgment of their community of users, which can make ratings powerful.

Must contributors be anonymous, identified, or should this be an option? Anonymity is sometimes used to prevent gaming or lobbying offline by making it more difficult to contact participants outside the CNO. Some have insisted on identifying contributors in order to force more civil behavior, but a lack of civility is less often a consequence of anonymity than it is a side effect of being alone and talking to a computer rather than a real person. Therefore, it may be important to use names, photographs, and other devices to create a greater social presence, if other rationales do not dictate otherwise.

Will contributions be limited in length, such as by imposing a word limit? Will contributors be limited in the number of posts or contributions they can make? There is a risk that limits could undermine the participation of core contributors, so any general limitation is likely to be counter-productive. Poor ratings or deletions of inappropriate contributions are likely to be effective in discouraging them, while not penalizing excellent contributions. Individuals who edit Wikipedia, for example, often return to see if their contributions were accepted. This can be a motivation for making ever more serious contributions to a network.

Will the activities of a network be completely open or restricted? For example, a government site might find some uses not in the public interest, such as using the Internet to support ‘Human Flesh Searches’ (HFS), in which networks are used to ask humans to search for humans, such as someone

who committed an offense. HFS would be viewed as using distributed intelligence or crowd sourcing to extend surveillance rather than problem-solve. Other searches, such as surveillance of beaches for oil, can be very well supported through crowd sourcing.

These policies and guidelines need to be negotiated in ways that assure managers and executives – the networked institutional guardians – that they will do no harm, while ensuring experts that they will have sufficient autonomy and visibility that their contributions could be meaningful. The exact nature of the guidelines is less important than transparency and that they are mutually agreed from the start. Changing guidelines, such as by imposing moderation in a forum that has been un-moderated, is less desirable than having the right level of moderation in the first instance. That said, all communities have rules that evolve over time.

Strategies for Bottom Up Innovation

Guidelines and policies provide a social infrastructure for enabling bottom-up innovation. A government cannot simply launch a pilot or a project in collaborative networking. That is the old model of developing an MIS. Of course, one of the earliest efforts to create a distributed problem-solving network, EMISARI, was launched by a government agency and was called an MIS. However, it was not a success at the time, and today, this would be even less likely to succeed. Champions need to emerge who are willing to build a community or to bring problems to an existing community to be solved. This does not mean that governments simply wait and see what happens. Champions can use a number of strategies to foster bottom-up CNOs, described in the next section.

Table 3. Fostering Bottom-Up Collaboration Networks.

1. Do not reinvent the technology.
2. Focus on activities, not the tools.
3. Start small, but capable of scaling up.

4. Modularize.
5. Be open and flexible in finding and going to communities of experts.
6. Do not concentrate on one approach to all problems.
7. Cultivate the bottom-up development of multiple projects.
8. Experience networking and collaborating – be a networked individual.
9. Capture, reward, and publicize success.

Nine Strategies

Champions within government can start bottom-up CNO initiatives if they:

1. Do not reinvent the technology. Tailor existing software, such as MediaWiki[xxxix], rather than creating a homegrown system from scratch. The Internet is enabling increasing numbers of individuals to have access to the same content and the same tools. It is increasingly viable to use open source tools on the Internet and Web to build systems that are accessible to a wider population, and do not depend on in-house IT expertise and resources.

2. Do not focus on specific tools, such as Web 2.0 or social networking. Despite the popularity and cache of particular applications, it is important to focus on the activity that will be supported: sharing, contribution, or co-creation (Table 2, page 12) and bring the tools together to support it. Generally, most collaborations will want to move to the ability to co-produce documents, so tools that enable all of these activities are useful to build in from the start. The tools should follow from the activities you seek to support.

3. Start small, but with a design that is scalable. Many fears that surround distributed public intelligence stem from confusion over what it is, or major misunderstandings about what it will do. In discussing a policy blog with a senior official in a public agency, it became clear that he imagined a personal blog about what people did during the day. It became evident that he needed to see a mock up of the blog so that he would better understand what the proponents had in mind. In the realms of ‘crowd sourcing’ and ‘mass

collaboration', advocates cannot assume that everyone understands exactly what is being proposed. By starting small, opponents and detractors can learn more about the activity and either worry less or actually become enthusiasts.

4. Modularize. Finding the right level for modularizing tasks is key in two respects. First, it regulates the difficulty of participation, shaping the success of any online collaborative activities. Asking questions or posing problems that are too difficult will undermine the likelihood of anyone participating. This is an art that will require experimentation. Secondly, by modularizing tasks, and focusing on specific issues that are aspects of a larger problem, the exercise reveals less about the nature of the big questions, which an agency may wish to protect. In such ways, modularizing tasks increases participation and lowers the risks of citizen sourcing of expertise.

5. Be flexible in where you go for expertise. For some questions, there may be a strong community of experts, making it most sensible to bring your question or problem to that community of users. In other cases, there may be no community, making it useful to use a platform, such as Intellipedia, to build a community around a particular area of expertise. However, it would be a major social undertaking as it would require government to attract users to this platform and to build a community of users around it. An alternative is for government to go to communities of users with relevant expertise. Of course, both strategies could be pursued simultaneously.

6. Do not concentrate on one solution to all problems. Wikipedia covers a wide range of topics, but it is creating and maintaining an online encyclopedia. It has a clear focus. As Wikipedia began to be used for reporting breaking news, the team set up a separate space, called WikiNews.[xl] Different communities of users are likely to frequent these different parts of the wiki, with each facing different problems, such as the priority placed on the timeliness of the news, as compared with encyclopedia entries, for which timeliness is less critical.

7. Cultivate the bottom up development of multiple projects. With top management support, many open technical platforms, and a set of policies and guidelines for users, a government could cultivate the development of a wide array of CNOs. Some large corporations have literally hundreds of CNOs within the firm. Each needs a champion, and these champions cannot be dictated from the top down. Networked individuals need to sense a value in networking on particular topics, and some need to take leadership roles, such as being a champion for a particular initiative. For such reasons, their formation is an emergent phenomenon, but one that can be cultivated by top management support and policies and guidelines that are welcomed by the users. Anyone in government should know that they might be able to go to the Internet or to a particular community on the Internet to get information, ask a question, or to solve a problem.

8. Get personally involved in distributed collaboration as a 'networked individual' and encourage your colleagues to experience this process. It is particularly important that managers or professionals within a particular institutional setting gain this experience. This is how people learn how to use networks and capture the value of CNOs for your organization.

9. Finally, it will be important to capture, reward, and publicize best practice – success stories. These will help shape support for distributed networking, and also provide lessons for those leading other networks. This need not be a difficult job of documenting case histories, but simply acknowledging success stories that others can see as easily as by clicking a mouse and going to the Web site.

Summary: Distributed Public Intelligence

Expertise is distributed geographically, institutionally and socially. It has become a cliché, but no less correct, that not every expert in any given field works for your government or any other single organization. In a multitude of cases across the public sector, expertise is often located closer to a local problem or across the globe - beyond the reach of government officials when,

and where, advice is most needed. This paper explains how government can creatively harness the Internet to tap the wisdom of distributed public expertise, and points to a set of challenges, guidelines and strategies for realizing this potential for networking with citizens not only as constituents, but as advisors – experts.

There are many reasons that public officials will cite for not experimenting with innovations in distributed collaboration, but these concerns can be addressed and countered by a strong set of valid reasons for moving forward on initiatives. Success will be the best counter-argument. A wide-ranging set of small, but visible projects for tapping the wisdom of distributed civic intelligence could be an incremental step for radically transforming how governments connect with citizens as experts. To get these started, champions need to emerge that understand that their agency or department is supportive of their use of networking, and has a basic set of policies, procedures and guidelines that can be built upon and not reinvented by each initiative. Developing these policies and guidelines, and following nine general strategies, such as documenting existing success stories, provides a place to start in citizen sourcing advice to government.

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Notes

[i] Weber (2004) documents the success of open source software.
[ii] In this sense, I would not agree with the thrust of Malone et al (2009). There is not a strict dichotomy between hierarchy and crowd sourcing as CNOs are managed networks albeit not strictly hierarchical in all activities.
[iii] This label is derived from terminology of InnoCentive, and adapted by Paul A. David, where it defined a project at the Oxford Internet Institute, entitled ‘The Performance of Distributed Problem-Solving Networks’. http://www.oii.ox.ac.uk/research/?id=45
[iv] http://www.iit.edu/~it/delphi.html
[v] An overview of EMISARI is provided by OEP (1973), and is a core feature of an innovative book on computer conferencing (Hiltz and Turoff 1978).
[vi] Johansen (1988) provides an overview of groupware and other early collaborative tools.
[vii] http://www.livinginternet.com/r/ri_emisari.htm

[viii] http://www.goodpracticeparticipate.govt.nz/levels-of-participation/collaborative-processes-and-partnerships/bioethicscasestudy.html
[ix] http://petitions.number10.gov.uk/
[x] http://opengovernmentdata.org/ Also see Wilbanks and Abelson (2010).
[xi] http://en.wikipedia.org/wiki/Game_with_a_purpose
[xii] A definition and rationale for this early classification is provided by David (2007).
[xiii] S. E. Page, 'Diversity in Distributed Problem-Solving Networks', Text of lecture at an OII Forum, Saïd Business School, Oxford, 31 January 2008.
[xiv] This is similar to the 'garbage can' model of organizational decision-making, in which people in organizations have solutions looking for problems to which they can be applied, such as outsourcing a problem (Cohen et al 1972).
[xv] These three categories parallel a categorization of the Web developed by Hofkirchner, et al. (2007), and further developed in Dutton (2008).
[xvi] http://data.gov.uk/
[xvii] http://www.data.gov/
[xviii] http://atlas.ch/
[xix] http://www.mozilla.org/bugs/
[xx] http://www2.innocentive.com/
[xxi] See Lakhani et al (2007).
[xxii] http://sciencecommons.org/projects/data/background-briefing/
[xxiii] http://digg.com/about/
[xxiv] http://www.sermo.com/
[xxv] Croxson and Bray (2008)
[xxvi] http://www.seriosity.com/
[xxvii] http://www.mozilla.com
[xxviii] den Besten and Loubser (2008)
[xxix] http://aswarmofangels.com/
[xxx] This was part of the Mercyhurst Innovative Use of Wikis Project of the Institute for Intelligence Studies. http://wikispacesintel.wikispaces.com/
[xxxi] http://spendingchallenge.hm-treasury.gov.uk/
[xxxii] http://www.peertopatent.org/
[xxxiii] http://www.feetfirst.govt.nz/about
[xxxiv] http://ra.intelink.gov/ provides remote access to Intelink-U, which is content hosted on the network, DNI-U, a secure US Government network maintained by the Intelligence Community Enterprise Services Office (ICES). Intelink-U and DNI-U were formerly an unclassified network, called the Open Source Information System (OSIS).
[xxxv] http://williamheath.net/?tag=ctrl-shift
[xxxvi] This is called the 'Jury Theorem (Condorcet 1994 [1785]).
[xxxvii] http://oilspill.labucketbrigade.org/page/index/1
[xxxviii] http://en.wikipedia.org/wiki/Wikipedia:Five_pillars
[xxxix] http://www.mediawiki.org/wiki/MediaWiki
[xl] http://en.wikinews.org/wiki/Main_Page