# A COMMUNITY FACILITATION MODEL FOR E-GOVERNMENT: A CASE STUDY IN MONITORING WATER QUALITY

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## ABSTRACT

This chapter introduces a community facilitation model for e-government. The central tenet of this approach is the empowerment of a segment of the population to act, by providing the tools and information necessary to tackle issues that have been difficult to address with traditional approaches to government. Under this model, government provides an initial spark and then plays a supporting role in the growth of the community. By doing so, the costs of the program are minimized while the impact of the program is maximized. We examine the viability of the model by looking at a case study in water quality monitoring. The case illustrates the power of a government facilitated community of action to address an important problem, and it suggests that such a model can be applied globally and may be relevant to government initiatives beyond water monitoring.

**A COMMUNITY FACILITATION MODEL FOR E-GOVERNMENT:**

**A CASE STUDY IN MONITORING WATER QUALITY**

Electronic government initiatives have become a key component of ambitious programs aimed at transforming the way that government operates, with a specific focus on becoming more citizen-centered, effective and efficient (Grant and Chau 2005). As such, electronically mediated government programs are an increasingly important part of the interaction between governments and their citizens. This is true in the largest and most well developed countries in North America and Western Europe as well as smaller nations such as Malta and Mauritius (United Nations World Public Sector Report 2003; Grant 2005). Whether the intended interactions are between any combination of individual citizens, not-for-profit organizations, businesses, or governments, the potential efficiency and cost-effectiveness of the electronic delivery of government services appears promising (Accenture 2004). In addition, proponents of the expansion of e-government contend that it has a unique ability to empower citizens "by allowing them to contribute directly to the process of public government, as well as being a catalyst for economic and social development" (Grant 2005).

In much the same way that corporations have increasingly adopted a market orientation rather than a product orientation – i.e., a focus on their customers' needs and wants, and their relationships with their customers – governments are being encouraged to adopt a more citizen-centered view (OECD 2003). Although not everyone agrees with this approach to government (Hutton 2005), it is clear that there is a nearly universal desire for more efficient and effective government. It is also apparent that developing
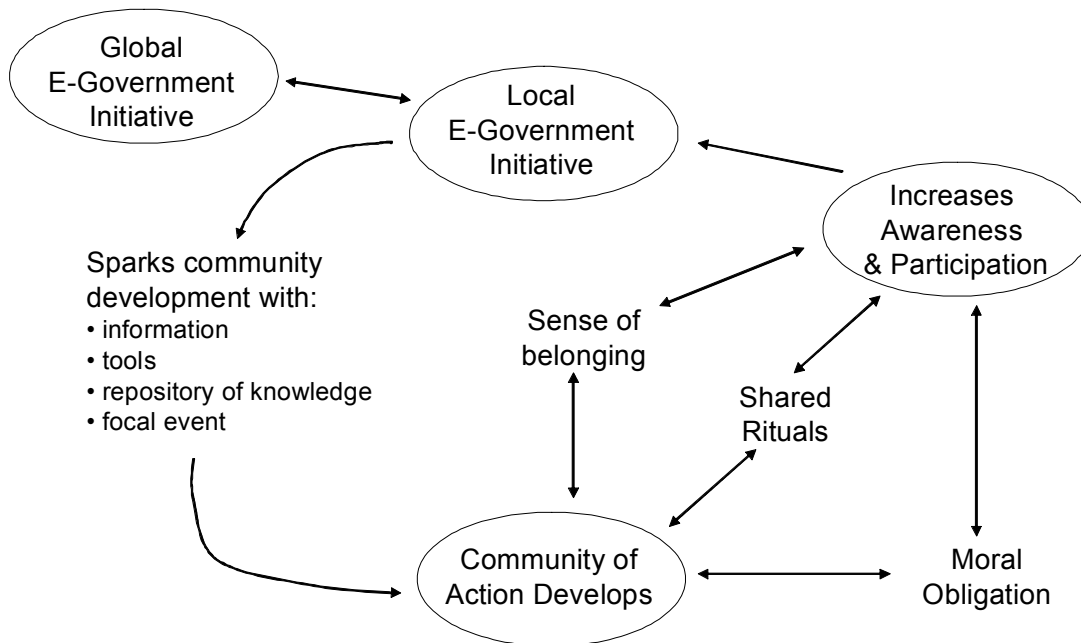
countries and developed countries will have to work together to deal with some of the most serious problems that governments face today – e.g., terrorism, the drug trade, economic policy, healthcare and disease control, and environmental issues. For each of these concerns, managing critical information and gaining citizen support are prerequisites for effective government action. On both counts, the internet, and electronically mediated communication more generally, offer a significant advantage over traditional approaches in the dissemination of information and the organization of dispersed populations. However, to-date few useful models have been proposed that would allow governments to capitalize on these advantages, and even fewer of these models have real world examples of their application and their potential for success on a global scale (e.g., Grant and Chau 2005).

In this chapter, we introduce a community facilitation model for e-government. The following sections describe the model and its theoretical underpinnings. In our model, government provides an initial spark and then plays a supporting role in the growth of the community. By doing so, the costs of the program are minimized while the impact of the program is maximized. In the following sections, we examine the viability of the model by looking at a case study in water quality monitoring. The case illustrates the power of a government facilitated community of action to address an important problem, and it suggests that such a model can be applied globally and may be relevant to government initiatives beyond water monitoring.

# A COMMUNITY FACILITATION MODEL FOR E-GOVERNMENT

We propose a general conceptual model (see Figure 1) that outlines an opportunity for governments to capitalize on the advantages of electronic communication over the internet to facilitate the development of *communities of action*. The central tenet of this approach is the empowerment of a segment of the population to act, by providing the tools and information necessary to tackle issues that have been difficult to address with traditional approaches to government. Rather than command and control, within this framework government supports the development of a self-sustaining community by setting the wheels in motion for a low-cost citizen-driven initiative.

**Figure 1:  Model of E-Government Facilitation of Communities of Action**

Global E-Government Initiative

Local E-Government Initiative

Sparks community development with:
• information
• tools
• repository of knowledge
• focal event

Increases Awareness & Participation

Sense of belonging

Shared Rituals

Community of Action Develops

Moral Obligation

Our model is couched within the generic framework for e-government proposed by Grant and Chau (2005). In particular, our model is appropriate for both the short-term e-government goal of improving the delivery of services and the longer-term goal of transforming government to be more effective and efficient citizen-centered. In terms of service delivery, leveraging the capability of a website to collect and disseminate information within a targeted community of volunteers is a basic function for an e-government initiative that aims to facilitate community development. However, unlike information campaigns that focus on traditional advertising (television, radio, print, etc.) or direct mail (letters, brochures, flyers, leaflets, etc.), the internet allows citizens to interact with the material, adapting the available tools and knowledge to their own uses. As a result, a website allows citizens to access information and connect with the government to the extent that they are comfortable and interested. Importantly, it also makes it easy to pass this information on and involve others in the program. This level of functionality moves the initiative beyond service delivery to citizen empowerment (Grant and Chau 2005). Finally, as the community grows and evolves, the government and its citizens enter into a partnership wherein the problem/issue that the government originally defined is addressed through decentralized collaboration rather than centralized control.

## Sparking Community Development

The process begins with a spark from the government. Having identified an issue (whether that identification is made by the government or its citizen) that can be addressed by citizen action, the government works to organize and allocate key resources to facilitate such action. For example, if the government is interested in expediting the process of taxation it can offer online resources for obtaining and filling out the forms, as

well as submitting the completed forms and electronically transferring payments or refunds. To the extent that people adopt this method of submission, the government is saved the time, effort and expense of transferring data from paper forms into digital formats for processing and storage. Another example, is the ability of the government to reach its citizens with a personal experience of monitoring water quality, enhanced awareness and understanding of water quality, and a database of water health indicator data that would otherwise be too numerous and complex to be addressed in a cost-effective manner without the support of citizen volunteers. This can be accomplished, as we will see in the case described below, by providing individuals with the tools and the knowledge they need to effectively collect data and spread the message of watershed health on the government's behalf. The general idea is that governments can put in place the resources required to facilitate the development of communities of action.

However, as was evident in the explosion of poorly planned commercial websites in the late 1990s, it is not enough to simply make the information (interactive or otherwise) available. It has to appeal to a specific segment of the market – in this case, a segment of the citizenry – and it has to be effectively promoted. This can be accomplished in a number of ways; however, in this chapter we will focus on one particularly effective technique that involves concentrating promotional efforts around a focal event that serves as an initial catalyst for a more comprehensive program. This technique has been used by charities (e.g., Terry Fox run for cancer, and the Live 8 concert for African poverty, etc.), special interest groups (e.g., gay pride parades, earth day, etc.), governments (e.g., veterans day, national holidays, national history day, etc.), and others to draw attention and recognition. In facilitating a community of action this

type of promotion is especially relevant as it provides a cost effective and efficient way to "get the message out" and motivate people to take action by suggesting a specific time and place to get involved. Having generated that initial interest and action, we propose that there are three components that are critical to successfully developing and sustaining an active community.

**Three Critical Components**

In our model, the community of action is created to increase awareness and participation in and around an important government issue. This can be on a local, regional, national or international scale. In some instances, as in the case below, a program will be active at all levels of government within and between nations. The important point is that communities that contain these three components will have the potential to sustain and even grow in an organized and directed fashion with minimal government involvement. As a result, this model of community facilitation through e-government has the potential to address serious problems at a variety of geographic levels in a very efficient and cost-effective manner. The three components that we suggest are critically important to success in this regard are: shared rituals and traditions (Douglas and Ishwerwood 1979, Durkheim 1965, Marshall 1994), a sense of belonging (Gusfield 1978, Weber 1978), and a sense of moral obligation (Muniz and O'Guinn 2001). We argue that these three components can effectively improve participation rates and contribute to an increase in awareness and visibility for a government initiative, above and beyond traditional approaches. As participation increases and citizens' "hands-on" involvement increases, their experiences further reinforce their preference for community membership and increase their commitment to the initiative (Hoch 2002).

Shared rituals can take a number of different forms from prayer to the initiations of college fraternities and from riding a Harley Davidson to breast feeding. In general, members of the community can identify themselves by some specific behaviors that they engage in. These rituals can create and help perpetuate the history and culture of the community, and they can help to define who the community is and what it does (Douglas and Isherwood 1979). Moreover, rituals can transmit the norms and values of the community to its members as well as to outsiders (Marshall 1994). In addition, from the perspective of e-government facilitated communities of action, shared behaviors of this sort can help to connect and sustain the communities when many of its members are geographically dispersed and may never come into face-to-face contact with each other.

At the center of the notion of community is the members' sense that they are a part of something bigger then themselves. It is a feeling of connection to other people that are a part of the community, as well as a sense of being different from those who are not community members. It is not just about shared attitudes or superficial similarity (Muniz and O'Guinn 2001), but a deeper "conscious of kind" (Gusfield 1978). Finally, for our model to be effective, the members of the community need to feel an obligation to act in a manner that is consistent with the goals of the government, which in turn should reflect the goals of the citizenry at large. This sense of moral obligation to other members, as well as to the community as a whole, helps to motivate individuals to act and to act appropriately.

## Global Diffusion of Regional Success

It is worth emphasizing that the type of community that we are describing differs from the notion of a community as an entity bounded by geography. That is, an e-

government community is *not* defined by a particular geographic location the way a town is. In fact, one of the key advantages of the electronic facilitation of a community is that the community can be geographically diverse. This makes the global diffusion of a community-based program, which was initially successful in one area, much more portable to new and different areas. In particular, the fact that the type of community that we are describing would generally be facilitated through an internet website means that the information can be easily passed across regional boundaries and adopted or adapted by other governments facing similar issues. This allows communities in one region to learn from, and benchmark themselves against, groups that are pursuing similar goals through similar means in other parts of the world. The case study that follows examines one example of a project that began in one nation and has since received citizen participation in a wide variety of nations, both developed and developing. In particular, we discuss a local adaptation of a global initiative, which illustrates the potential for a community facilitation approach to e-government.

## A CASE STUDY IN MONITORING WATER QUALITY

World Water Monitoring Day (WWMD) began as National Water Monitoring Day (NWMD) on October 18, 2002 to commemorate the 30th anniversary of the U.S. Clean Water Act. WWMD was created by America's Clean Water Foundation with two major purposes in mind. First, it was designed to serve as an educational platform to introduce people to the importance of water monitoring and connect them personally with efforts to protect and preserve their local watersheds. Second, it aimed to expand the base of information available about the health of each watershed over time. The success

of the program lies in its ability to collect an unparalleled quantity of timely water quality data by coordinating people from geographically dispersed, and in some cases isolated, sites around the world.  To make it work in an efficient and cost-effective manner, WWMD has been a pioneer in the application of e-government principles to the facilitation of communities of action.

The program has a broad scope aiming to reach participants from around the world. With the initial interactive website and program components designed and in place for the earlier, and less ambitious, NWMD project, the progression to the globally active WWMD was a natural one with little additional effort or expense. Since its inception as NWMD three years ago, WWMD has registered approximately 40,000 participants, about 5000 of which are from outside the United States. This global community of volunteer water monitors has sampled at over 6500 locations in 50 countries.  In the following sections, we turn our attention to one specific instantiation of WWMD that was recently launched in the Canadian province of Alberta.  In doing so, we illustrate the key components of the community facilitation model for e-government proposed in this chapter, and we discuss how such a model can be adapted and applied to this and other projects in both the developed and developing world.

**Alberta Water Quality Awareness**

Following the WWMD approach, the Alberta Water Quality Awareness (AWQA) Day program was designed as an education and awareness initiative aimed at increasing public consciousness surrounding the quality of freshwater systems throughout the province of Alberta. The program specifically targets watershed stewardship groups, school groups, and other community groups.  However, it also encourages individual

citizens to participate, by asking them to collect water samples, and aims to instill a personal connection between Albertans and their local waterbodies. By involving local citizens as partners and active leaders in water monitoring, this e-government initiative provides a spark for community development.

The Government of Alberta departments of Environment and Agriculture, Food and Rural Development along with Agriculture and Agri-Food Canada and a number of other industry, agency and non-profit partners have launched the first AWQA Day, to act as a pilot project and determine the success, feasibility and community support for maintaining AWQA Day as an annual event. These programs fall among an extensive web of volunteer citizen monitoring initiatives around the world such as bird counts, indicator species monitoring and plant identification. What sets the more recent programs apart from their predecessors is the sophisticated use of, and level of integration with, the far-reaching and efficient forms electronic communication.

The central activity supported by the AWQA Day program is the sampling and testing of local waterbodies for basic water quality indicators using a standardized test kit. Following the example set by WWMD, AWQA Day procured and distributed sampling kits that provide the supplies required to monitor four basic water quality parameters: acidity (pH), temperature, dissolved oxygen content and turbidity. These test parameters were chosen because they are easy to carry out in the field, and because they can reveal important changes and signal trouble spots in the overall health of the waterbody. Various aquatic organisms require differing ranges of these three characteristics within their habitat. Outside these ranges of acidity, temperature, turbidity, and available oxygen, certain reproductive and feeding processes are disrupted, which

can result in species decline and elimination. Each test kit is able to test up to fifty water samples, which is important because it improves the efficiency and cost-effectiveness of the program by allowing volunteers to conduct tests at multiple locations and/or share the kits among members of a sampling group.

At the root of AWQA Day is the organization of funding, the production of promotional materials, the development of electronic communication tools, and the creation of an overall program design capable of sustaining AWQA Day as an ongoing event. These administrative functions are orchestrated by a central committee of interested and knowledgeable individuals from established government branches and non-profit organizations, along with the support of funding partners. WWMD served as a foundation for the Alberta initiative to capitalize on the knowledge and experience of an existing and successful program. As a result, the inaugural AWQA Day program was able to focus on building partnerships and promoting the education and awareness value of a volunteer monitoring program, while avoiding many of the pitfalls associated with the development of an entirely novel event.

**Creating the Spark**

The public presentation and promotion of the AWQA Day program was organized around four main areas: the website, promotional brochures and posters, incentive prizes for group participation and field contacts. Program information, links and resources on related topics and means of contacting others involved in water sampling are presented and accessed through the website, which is the critical touchpoint for AWQA Day. The subsequent core components of the AWQA Day design are developed to attract interested participants to the website and inform a broad audience of the existence of the

program. The design of the program is relatively simple because it is primarily citizen-administered, through electronic access, with minimal support from the government and other coordinating agencies. This allows the program to emerge from the traditional top-down form of awareness building to a participant-owned, context-malleable education system.

Participation in the AWQA Day program relies on the internet for both participant registration and the ultimate reporting of water quality data. The website itself is a database supported interface that enables participants to access and modify their own personal profile within the database by logging on and receiving a unique user id. Citizens of Alberta are able to register as individuals or as part of a group, locate the sites they will be monitoring, and enter their subsequent findings. Once the event has taken place, participants can access reporting information on all registered sampling sites on the basis of the four water quality indicators. This information is accessible online and retrievable in a number of ways. Results are plotted on a map of the Province of Alberta depicting locations of sampling sites and the range of values recorded for the four water quality indicators. The information is also reported by major watershed, by waterbody type, by municipality, and/or by participant affiliation.

However, the web component of the program is not limited to the database of water sampling results. Similar to WWMD, the AWQA Day website supports numerous resources on water quality, volunteer monitoring, and other water related topics. Further, the interactive abilities of a web-based program provide countless opportunities for personal interaction. For example, participants are able to access a calendar of community water sampling events, information on group participation and event-

planning, links to other sites with local and international water monitoring initiatives and information on water system health. In addition, organizational functions such as built-in participant evaluations can ease the continuation of an up-to-date, efficient and cost-effective program in subsequent years. These computer-mediated behaviors promote water stewardship and encourage the development of a water monitoring community.

Like WWMD the AWQA Day program is built around one central day, in this case June 5. However, water sampling and program participation take place over a longer period (approximately one month). During this time participants join events, festivals and community programs where they become personally engaged with the health of watersheds in their area. The window of water sampling and data entry reveals a *snapshot* of water quality in the areas sampled, meaning multiple locations are tested within a short period of time with standardized equipment and techniques. Snapshot monitoring is a useful methodology for this type of volunteer program that is capable of increasing quality assurance in the results reported by reducing the seasonal and technical influences on water quality. Although, a single sample does not provide comprehensive picture of water quality and many other extraneous influences are present, snapshot monitoring is an important indicator tool, especially as information on the health of our water resources is compiled over time.

**Facilitating a Community of Action**

Of course, WWMD and related programs, such as AWQA Day, are not the only means of water monitoring. Data is collected on the quality and health of waterbodies across the province and around the world by different government bodies and professional organizations. This type of monitoring builds scientific and quality assured

data on waterbodies from various seasons and locations. However, it is clear that not all waterbodies can be effectively monitored in this way because of the tremendous expense and time commitment required. As a result, only a subset of the total water system has traditionally been monitored and that data is used as an indicator of the overall water system health in an area.

AWQA Day does not compete with on-going practices but rather celebrates the various forms of monitoring by coming together at one focused and coordinated event. Volunteer monitoring provides an opportunity to expand on existing efforts and link participants with other like-minded citizens and their local watersheds, and at the same time build a repository of locally-generated water quality data. In this way, a large number of citizens are personally involved and a wide span of watersheds, scattered throughout the province, are monitored. Participants are able to collect substantial amounts of data that fit with their own needs, wants, particular locales and interests. Moreover, they are able to do so with an ease and efficiency that would be too expensive and too far-reaching a task for the limited number of professional field technicians and educational outreach specialists.

**Shared Ritual, Moral Obligation and a Sense of Belonging**

Critical to the development and ongoing support of a community of action is the emergence, or in this case intentional encouragement, of shared rituals, moral obligation and a sense of belonging. Each of these elements is present in the AWQA Day community. At the heart of the program are the citizens who take an active role in using the test kits to collect data and play a part in the monitoring of provincial watersheds. By

doing so, they all share in a *common ritual* at a specified time of year, organized through the AWQA Day website and facilitated by the program's supply of monitoring kits.

In fact, encouraging citizens to take part in assessing province-wide water quality is less about the collection and analysis of rigorous data than it is about increasing awareness of freshwater systems and water quality issues throughout the province. The AWQA Day program believes that the benefits and outcomes of this type of volunteer monitoring are strongly aligned with the goals of the program: to encourage protection of water resources, rekindle a sense of responsibility and stewardship towards local water systems, recognize potential sources of threat and harm to water bodies, and rediscover the value of our water systems. In other words, more important than the data that is being collected is the *sense of moral obligation* that the volunteers feel towards their local water systems. The provision of a central and personal means of accessing the resources necessary to seek context-specific awareness is facilitated by electronic communication.

The thrust of citizen monitoring programs, such as WWMD and AWQA Day, is to develop the tools and resources necessary for citizen action and personal stewardship, which allows the program take on a life of its own and thrive within a framework of shared knowledge and common goals. Developing a *sense of belonging* to a community is integral to the success of the AWQA Day program. The program design supports a rudimentary collection of data and reporting of findings. However, the actual event of becoming involved, linking with other individuals and community members, and getting out there and participating, fosters a sense of belonging and a richer community experience (Selznick 1996). The collaboration and coming together of interested citizens from across the focal area is essential to forming community ties, which allows AWQA

Day to develop a life of its own and to keep the associated administrative costs manageable. Sharing and community efforts are fundamental to this type of monitoring program. In this case, the community has the ability to build itself and use the website for purposes beyond the original intent.

Once in place, the AWQA Day website acts as a hub for water quality initiatives across the province, with numerous functions and abilities. As mentioned earlier, the internet-based framework of these programs ensures flexibility in the capability, level and growth of participant interaction. As the program matures, it becomes more and more an exercise in participant-owned information. The existing applications of the AWQA Day website, such as the event calendar, are important for the development of community involvement. Through event postings participants can link with on-going local activities, share existing knowledge and experience in their local areas, and get involved. Other facets of electronic communication may improve upon the initial community development through such outlets as on-line discussion forums and sharing boards, where the interpretation and extension of sampling results is in the hands of the participants. In this manner, the website acts as a springboard where the community of volunteer water monitors adapts the abilities of their new form of communication to keep stewardship and action at the forefront of their interest in water system health within their day-to-day lives.

This sense of belonging can be an especially important catalyst for action among community members that may otherwise feel isolated. In some cases, feelings of alienation surface with geographic isolation and are compounded by a history of government programs that have been imposed from a distance (Bell 1998). Yet, isolated

areas are often at the centre of the development and maintenance of environmentally favorable practices, especially with regards to natural resources. In many cases, these efforts rely on work within remote, rural and impoverished areas. Individuals who carry the bulk of this responsibility tend to feel overwhelmed, unsupported and unequipped to do the work required to change their practices to those of environmentally sustainable action. In Alberta, and elsewhere, rural areas are the most susceptible to this isolation (farms, ranches, etc.) and yet integral to bringing about action and practical change. The development of a community, with shared rituals, a sense of moral obligation and a sense of belonging, can reduce the barriers of isolation (Wellman 1999).

**A Self-Sustaining Community**

Our model of e-government community facilitation (Figure 1) depicts the self-reinforcing, and potentially self-sustaining, effect of community development. Specifically, we are suggesting that after a community develops to include the three critical components (i.e., a sense of belonging, shared rituals and moral obligation), positive reinforcement helps to sustain and grow the community beyond the initial spark provided by the government. Each component can play an important role in increasing awareness and participation in the focal event. For example, the more you feel you belong to the community and have a moral obligation to the community, the more likely you are to participate (and entice others to participate) in the focal event. In turn, greater participation in the shared rituals has the potential to further increase the community members' sense of belonging and moral obligation. These processes then create a loop of feedback that, when positive, has the potential to strengthen the community and contribute to its ability to grow and evolve over time. The stronger and more successful

the local community, and therefore the local government initiative, the greater the base from which the program can be adopted and adapted by other interested parties (e.g., other governments on a global scale).

## Global Adoption and Adaptation

The community facilitation model should be of special interest to developing countries that lack the sufficient government resources and/or international support to tackle environmental (and other) issues directly, yet are faced with some of the most pressing problems on the planet. In many cases, developing countries deal with a global sense of isolation, impairing the individual ability to take action in their daily lives to assess or at least discuss the quality of their local waters. The e-government model of community facilitation, as instantiated in the various volunteer monitoring programs, is applicable here as it supports and encourages citizen action in an efficient and cost-effective manner.

Although this chapter has focused on the AQWA Day project that is specific to the Province of Alberta, World Water Monitoring Day is now active in 50 countries from the U.S. to Turkmenistan and from France to Pago Pago, and is monitoring over 6500 sites (see Appendix A for more detail on WWMD and AWQA Day summary statistics). Central to each of these programs is the facilitation of a community of action, which is sparked by a government initiative, but relies on the energy of a community of volunteers to sustain and enhance it. Adapting the model presented here to different geo-political and economic realities provides a potentially rich avenue for future research.

**The Success of AWQA Day**

AWQA Day's pilot year saw close to one third (substantially higher than the global average of one-fifth) of the 900 AWQA Day registrants reporting results from close to 1000 sampling locations. This is interesting given that, in contrast to the user-pay structure of the WWMD program, AWQA Day provides the test kits free to registered participants. One might expect that when the kits can be obtained at no cost to the participant, the sense of obligation would be lessened. However, we find that a much higher percentage of Albertans who received kits reported results. The fact that registration in the program is limited by the number of free kits available each year, may have had an impact here. With a smaller scope, AWQA Day was able to engage a more intimate community, yet it managed to span the barriers of geographical isolation within the province and provide monitoring data on areas that might otherwise have gone unexamined.

In general, the citizens of Alberta responded enthusiastically to initial AWQA Day promotions for a variety of reasons and with a broad scope of expectations. People expressed, through the overwhelming response to AWQA Day, a desire to act. They want to be a part of the process that increases awareness of, and collects important data on, the health of a resource, which they rely on and share with so many others. However, the organization and community facilitation of the AWQA Day program provided the critical spark that encouraged such action and directed it in a meaningful way. In some cases, it was a need to become involved with monitoring the quality of their local water systems, because their livelihoods depend upon the sustainability of the resource. Others – e.g., school classes, home-schooling groups and other academic institutions – sought

out AWQA Day as a means to connect students with a hands-on, practical experience of the freshwater systems studied within their curricula. The preservation of the integrity of natural ecological systems was the motivation for many more. AWQA Day provides a central focus and outlet for watershed stewardship and community groups to plan events, rally support and encourage further action.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

In this chapter, we have proposed a community facilitation model for e-government and examined a relevant case study. It is worth noting that we are not claiming that a single case study provides empirical support for the model; instead, the AWQA Day example is used to motivate the framework as a relevant and useful way to think about and implement this type of program. In other applications, different components of the model may receive more (or less) emphasis. For example, a government program designed to bring together a group of scientists to examine a specific environmental problem may put more emphasis on building a repository of knowledge than on organizing a focal event. In developing countries where many of the citizens do not have reliable access to a computer or the internet, more emphasis on supplementing electronic community facilitation with physical means for information distribution (e.g., a local library or school) might be appropriate.

The AWQA Day case study suggests that each of the model's critical components can make an important contribution to the successful facilitation of this type of community of action. However, additional research is required to determine the relative impact of each of the model's key components. Similarly, it is reasonable to suspect that

the nature of the project and the history of interaction between the government and its citizens, will impact the ability of the government to successfully implement this type of program. There is a significant element of trust and cooperation between the relevant parties that is likely to be a prerequisite to effective community development. This could be further influenced by the non-government organization/multi-level-government partnership represented to different degrees by both WWMD and AWQA Day. Partnerships of this type may also enhance (or disrupt) trust and cooperation at the community level, as compared to a program delivered by a government department acting alone. Our model implies that feedback, and the interaction between the government and the citizens involved in the program, plays a critical role in the development of communities of action. Additional research that further illuminates the nature and impact of these relationships would be valuable.

Along the same lines, a number of other questions arise from the model and case study, which suggest potentially fruitful areas for future research. For example, to what extent can more general interest in sustainable development or environmental awareness be encouraged by this type of program? Are there additional technologies that can be applied to programs like AQWA Day – for example, geographic information systems or mobile communications – to improve implementation and increase community involvement? How does the role of the government, and the citizenry, change over time as the community evolves and objectives change?

From a practical perspective, the literature on community development and the global success of WWMD suggest that through community facilitation governments may be able to improve the efficiency and effectiveness of programs that are important, yet

remain difficult to justify from a cost perspective if they are managed from the top-down. Electronically supported monitoring programs such as WWMD and AWQA Day, are still in the initial stages of development. Nevertheless, it is clear that communities can be built upon shared interests and a latent or unfocused desire for action by citizens. In addition, it seems that these types of programs are still evolving, adopting best practices from one region and disseminating them to others. As they continue to grow and adapt, and the communication technologies continue to improve, this type of citizen centered initiative appears to have the potential to transform the way that government works (Grant 2005). In the short-term, the potential for improving service delivery argues for the continued use of e-government systems where and when they can efficiently and effectively improve upon the more traditional bureaucratic infrastructure.

The case study described in this article illustrates one type of problem to which a community facilitation model of e-government can be applied. However, we believe that the general principles advocated here can be applied to a variety of problems that are beyond the scope of traditional centralized solutions. What the AWQA Day case study demonstrates is that having identified a problem, and a segment of the population interested in addressing that problem, governments can empower citizens to educate themselves and take action. Moreover, to the extent that the three critical components of a community are present, the community has the potential to be self-sustaining, able to grow and evolve with minimal ongoing government support.

The internet is an especially useful and relevant technology in this regard, because it is a potent enabler of grassroots power (Urban, Sultan and Qualls 2000). Nevertheless, it requires that the technology is in place and accessible. In the developed world the

internet is becoming a pervasive part of everyday life.  In the developing world it is far less prevalent, which may impede the ability of e-government initiatives in the places where they could have the greatest impact.  Initiatives like MIT's Media Lab's $100 Laptop Project (HDLP) and the related One Laptop per Child vision (see http://laptop.media.mit.edu/), as well as programs like United Kingdom's Digital Links International (which collects and donates computers to developing countries; http://www.digital-links.org) are a step in the right direction.  However, much more remains to be done to realize the global potential of e-government.

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# APPENDIX A:  WWMD STATISTICS AND SOURCES

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