

Government 2.0: Making Connections between Citizens, Data and Government

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1. Introduction

The revolution in information and communication technologies (ICT) has been changing not only the daily lives of people but also the interactions between governments and citizens. The digital government or electronic government (e-government) has started as a new form of public organization that supports and redefines the existing and new information, communication and transaction-related interactions with stakeholders (e.g., citizens and businesses) through ICT, especially through the Internet and Web technologies, with the purpose of improving government performance and processes [1].

The evolution of e-government has been studied as different stages [2] that describe the patterns of interactions of digital governments with the public: The first stage of e-government focuses on “digital presence” with simple information-providing Web sites of a passive nature, namely a digitization of government information. The second stage provides simple Web-based interactions of governments with citizens, businesses and other government agencies through email contact and interactive forms that can dynamically provide information needed. The third stage of this evolution provides online transaction services such as license renewal, permit applications and tax payments. The next stage is when the government promotes shared governance to transform how the government operates, in terms of seamless information flow and collaborative decision making.

In the first three stages, e-government can be seen as a process of modernization of the public sector from paper-based tasks and processes to digital ones. These stages are based on the “information delivery model” and the “public administrative process automation model,” resulting in fast and convenient 7/24 access to government information and services, and achieving more efficient government with streamlined and automated services within and across government agencies. The information in these stages has been flowing in one direction, from the government to the public, with limited feedback from citizens. We often call this type of e-government *Web 1.0-based e-government* or Government 1.0.

The last stage has not yet been fully achieved, since the transformation of government requires a meaningful dialog between this government and the citizens as well as among citizens themselves. Information should flow not only from the government to the citizens but also from citizens to the government and among citizens. The citizens’ voices should be heard and reflected back to transform the existing government policies. In order to achieve this kind of transformation, there needs to be extensive technological support for citizen participation. In addition, the government needs to make sure that government releases and information are available to the public for informed discussions and participation. This dialog, in turn, will promote the collaborative decision making process by including the public in the inception of new government policies.

We introduce the concept of “open government,” so-called Government 2.0, and its required principles, functions and technological enablers to lead to a transformative, participatory model

of e-government. We first briefly survey the current adoptions and uses of social media for Government 2.0 in the US, and then move on to introducing the research and application topics of this special issue.

2. Open Government – Principles and Requirements

The *open government initiative* of the US federal government [7] urges the implementation of three principles for a government: *transparency*, *participation*, and *collaboration* (shown in Figure 1). Transparency in government can be achieved by providing the citizenry with information about what the Government is doing, which promotes increased accountability. Government agencies should disclose information about their operations and decisions rapidly in forms that the public can readily find and use. Participation encourages the public engagement by increasing opportunities for the public to participate in policymaking and to provide the government with the collective knowledge, ideas, and expertise of the population. This kind of participation enhances the Government's effectiveness and improves the quality of its decisions. The principle of collaboration demands partnerships and cooperation among the federal government agencies, across all levels of government and with nonprofit organizations, businesses, and individuals to improve the effectiveness of government. The directives to implement these principles are specified in [6].

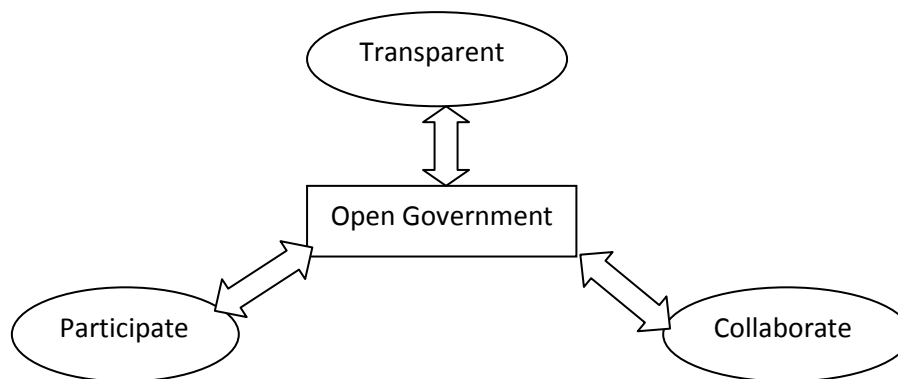


Figure 1 Three Principles for an Open Government

“Web 2.0 Technologies” refers to a collection of social media through which individuals are active participants in creating, organizing, editing, combining, sharing, commenting, and rating Web content as well as forming a social network through interacting and linking to each other. The Web created using these social media is called Web 2.0 or Social Web. The Web 2.0 technologies include blogs, wikis, social networking hubs, (e.g., facebook, myspace), Web-based communication modes (e.g., chatting, chat groups), photo-sharing (e.g., flickr), video casting and sharing (e.g., youtube), audio-sharing (e.g. Podcasts), mashups, widgets, virtual worlds, microblogs (e.g., twitter), social annotation and bookmarking of Web sites, and many more.

Table 1 shows brief definitions and functions of these social media. Through these social media, individuals act as active agents in creating, organizing, combining and sharing Web content. The emphasis is on the “outside-in wisdom of crowds approach” where the data and information are created by the people outside of an organizational boundary through a collaborative manner in the network. This is different from the “inside-out authoritative know-all” approach typical in the Web 1.0, where an organization is the key creator and organizer of the content and the people are considered consumers of the information.

Table 1 Social Media Types

Blog	A Web log (Blog) is a Web-based interactive application that allows one to log journal entries on events, or to express opinions and make commentaries on specific topics. It is a popular content generation tool. Blogs typically consist of text, images, videos music, and/or audios.
Microblogging	The process of creating a short blog that is primarily achieved through mobile devices to share information about current events or personal opinions. A well-known example is Twitter.
Wiki	A Web-based collaborative editing tool that allows different people to contribute their knowledge to the content. One author's content can be modified and enhanced with another author's contribution. A well known example of this application tool is Wikipedia.
Social Networking	A Web-based tool or model that allows individuals to meet and form a virtual community through socializing via different relationships, such as friendships and professional relationships, sharing and propagating multi-media information, exchange interests and communicating.
Multimedia Sharing	The rich multi-media contents such as photos, videos, audios are shared through multi-media sharing tools. Typical examples include Youtube, Flickr, Picasa, Vimeo, etc.
Mashup:	An application that uses contents from two or more external data sources, combines and integrates them and thus creates new value-added information. This is a reuse and repurposing of the source data by retrieving source contents with open APIs (Application Programming Interfaces) and integrating them according to the information needs, instead of navigating them sequentially.
RSS	A Web application that can pull the content from sources that are structured in standard metadata format called RSS (Really Simple Syndication) feeds such that it is easy to syndicate the contents from RSS formatted documents. The RSS feeds or Web feeds can be published and updated by the authors such that the updates can be easily inserted and quickly updated in content aggregation sites. The RSS feeds (also called atoms) are annotated with metadata such as the author and date information. The RSS based content aggregators include news headlines, weather warnings, blogs, etc. Once the source content is updated, the content aggregator sites will be updated thus always sharing the updated content.
Widgets	Small applications either on the desktop, a mobile device or the Web. The widgets bring personalized dedicated content to the user from predefined data sources.
Virtual World	A virtual world is an interactive 3-D computer-simulated world where avatars, controlled and played by the users, interact with each other as inhabitants.
Social Bookmarking& Tagging	A tagging system that allows the users to describe the content of the Web sources with metadata such as free text, comments, evaluative ratings and votes. This human generated collective and collaborative set of tags forms a folksonomy and helps cluster Web resources.

The required functions of open government can be easily achieved by adopting the Web 2.0 technologies, which promote public participation. An adoption of Web 2.0 applications in a commercial organization creates a platform called Enterprise 2.0 that supports employees with social media tools to enhance the productivity, customer relationships and communication quality as well as efficiency of the organization.

According to McAfee [5], major functions of Enterprise 2.0 should include: Search, Link, Authoring, Tags, Extensions, and Signal (SLATES). The search capabilities support the employees to effectively search for resources and knowledge. The linking capabilities provide

employees with tools to create complex and valuable social networks. The authoring function allows the employees to publish and share their opinions, experiences, and knowledge. Tags help people to organize and connect knowledge for effective sharing, and collaborative filtering helps them to extend the overall knowledge in a specific domain. The new information can be rapidly disseminated using signal functions such as RSS or Twitter. Similarly, the adoption of social media technologies in the government results in the founding of Government 2.0. This should include the above functions not only for the civil servants within the diverse government agencies, but also for the public who are external to the government’s organizational boundary.

3. Government 2.0 – Social Media Uses in Government

Social media can be considered as a disruptive technology [2] for government, creating “disruptive innovation” in the digital government as well as augmenting digital government with better services and management. To create “innovative disruptions” [3], the government needs to develop strategies and models for how to use these enabling technologies to achieve a transformation of every aspect of government, such as service provision, decision and policy making, administration, governance and democracy.

The US government has been adopting social media to share information within government agencies and across government agencies, as shown in Table 2. Above all, the government disseminates information to the wider public, making a rich set of government information available to stakeholders and individual citizens and allowing massive participation of users, often called “crowd sourcing.” The use of this technology has greatly extended the notions of participatory democracy and of a digital market place of information.

Table 2 Government Applications of Social Media

Technology	Goals	Examples
Blogs	Attract new audience for government information and services; Puts human face on government Opens up a conversation	Federal agency public-facing blogs Elected officials blogs Interesting topics blogs Pandemic leadership blogs
Wikis	Collaboration (e.g. Project management, Knowledge management); Create a better work product; Use mostly enterprise wikis, restricted to community of practice; Enhance community participation in decision making	Community support (e.g. GSA collaborative work environment), Intellipedia (wiki for intelligence agencies), diplopedia (State department wiki), peer-to-patent wiki, NASA wiki for object oriented data terminology
Social Networking sites	Reach people where they are	CIA recruit facebook
Multimedia (Video/photo/podcasting)	Share rich set of governments’ multimedia data with people in coordinated manner	Library of Congress Flickr stream, Federal photo sharing site (http://www.usa.gov/Topics/Graphics.shtml) (e.g. air force photo gallery, federal agency youtube), State photo sites, White House podcasts, NASA audio/video casts, government services podcasts (us.gov), DOD’s TroopTube for troops to connect to their

		families and supporters
Mashups	Provide combined content from different government data sources; Share contents and expertise from different sources; Create more rich contents for decision making	USA search mashup combines search engine results, forms database, FAQ database, images and categorization related to keyword search; NASA's Atrolicio.us, Google map with government data
RSS	Get regularly updated content out; Link back to authoritative source; Ties feeds to email alerts	Usa.gov library of federal RSS feeds, EPA RSS feeds, disaster news feeds, NOAA watch feeds
Widgets, gadgets, pipes	Prebuilt applications to add more interactivity and functional capabilities on a web page will allow users to develop widgets using government data to expand the reach and functionality and share these widgets.	FBI most wanted widget, DHS hurricane info widget
Virtual Worlds	Train and educate with simulations	Departments of Defense and Homeland Security emergency management planning preparation

These social network systems allow large scale distributed collaboration, information sharing and creation of collective intelligence in government areas at all levels from local to federal. Governments are facing unprecedented transparency requirements and openness, further encouraged through electronic grassroots mobilizations using social technology. The transformative power of the social media on the government is often described as paradigm shift as shown in Table 3.

Table 3. Comparison between Traditional Government vs Government 2.0

Traditional Digital Government	Social Media-based Digital Government (Gov 2.0)
Information provision (information sink) model	Information source (creation) model
Service provision model	Service demand model
Policy enforcement model	Policy making and negotiation model
Agency internal decision making/governance model	Shared governance

The government, modeled as an information and services provision entity, and as a policies enforcement and decision making body has been transformed into a participatory government, which involves citizens and other organizations (e.g., NGOs) as collaborators and partners in information creation, service enhancement and policy making. This shared governance model and the participation of the citizens in digital government is a step towards a more democratic process, for which the term *e-democracy* has been coined. This new paradigm makes government more transparent, more accountable, and more trustworthy, since the citizens,

government officials and other stakeholders participate in policymaking, content creation, data collection, knowledge sharing and structuring, and collaborative decision making.

4. Research Topics

Digital government 2.0 faces many research challenges, such as

- How to analyze the immense data collected through crowd participation to be appropriately used for policy making;
- How to search and share the abundant data and essentials for collaborative government tasks;
- How to apply social media as an innovative solution for governments;
- How to measure the behaviors and patterns of social media uses and what kind of values government can draw from them
- How to facilitate citizen engagement in online debates for e-democracy
- How to integrate data from different sources without endangering privacy, and how to manage identity where social Web data can be linked easily
- What are the interoperability issues in Government 2.0 and how to design the interoperability capabilities in Government 2.0
- Whether the Web 2.0 signature, i.e., wisdom of the crowds, can be simulated to facilitate the collaborative service delivery
- How to alleviate the problem of “noisy” data and extract the high quality data from the mass participation and content production.

This special issue features articles that address some of these challenges. It is a collection of articles that are extended versions of selected papers from the 10th International Conference on Digital Government Research (dg.o2009) that address many of the abovementioned research and application challenges in the use of Social Networks and other Web 2.0 technologies in government. The papers provide theoretical, social scientific, empirical, and technical approaches in establishing and adopting the new digital government paradigm.

Scott Robertson and his colleagues investigate how a popular social network site (Facebook’s wall) has been used as a public sphere for political discourse among the 2008 U.S. Presidential candidates. The paper examines the linkage patterns of people who posted links on the Facebook walls over two years prior to the 2008 U.S. Presidential election. The analysis of linkage patterns is conducted in terms of intensity of participation, breadth of participation and content of participation, each measured by analyzing posting behavior such as quantity and frequency of wall postings, as well as content. The analysis of the linkage patterns may shed light on the requirements for public sphere functionalities. It concludes that the public sphere should provide role taking functionalities such that the users have commitments to an ongoing dialog, and that users could show respect to understand other participants. It also should provide equal opportunities for all participants and a ground for exchanging ideas and critiques. However, it still remains to be shown whether the outcome of the dialogs and participations in such a public sphere will result in the informed political decision when casting their votes.

Clemens Heindinger and his colleagues address the research challenge of analyzing the public opinions and impact statements on proposed policy, norms and regulations by incorporating policy-making knowledge structures in a Web 2.0 application platform. This social web system allows the legislators and experts to analyze the policy impact statements through community-based editing and voting. It provides analysis capabilities to compare alternative policies and to measure the policy impacts to select the best alternative policy. The impact statements are entered with policy topic categories and relationships to other statements or objectives. The specification of a topic category and the relationships are used to identify and query whether a statement is linked to support a policy or measure or it is in conflict with the objectives. These relationships and topic categories entered by the participant citizens and subsequently filtered by the experts are the basis of the analysis and decision making needed to provide an analytical tool for the impact of statements made from multiple perspectives.

The main idea behind government 2.0 is participation by citizens. Nicolas Maisonneuve and his colleagues applied citizen participation as a novel solution for environmental noise pollution sensing, that can bypass and eliminate installation of expensive monitoring stations. The prototype system NoiseTube allows the citizens to measure their personal exposure to noise in their everyday environment by using GPS-equipped mobile phones as noise sensors. The citizens are directly involved in the assessment of urban and environmental sustainability. This draws upon the ideas of wireless sensor networks, participatory sensing, people-centric sensing, and citizen science. The geo-localized sound measurements and user-generated metadata can be shared with an online community. As a result, each user effectively contributes to a collective noise monitoring and mapping campaign.

Cristiano Maciel and his colleagues address the question of how to promote public participation and involvement in the deliberation processes for democratic decision making. They present a Government-Citizen Interactive model which is a virtual community model with a special debate structure and social opportunities for citizens to engage as individuals responsible for community decisions. The virtual community model structures citizen participation in different stages: i.e., initiating the process by registration and creating a user profile, creating a virtual community of citizens, registering and posting demands, conducting a consultative debate, clustering demands, voting and deliberating. The debate is organized in the Democratic Interaction Language —DemIL— which classifies opinions and their supporting arguments in the categories ‘for,’ ‘against’ and ‘neutral,’ which allows easy retrieval and resource classification. A prototype of this integrative virtual community model called the Democratic Citizenship Community (DCC) has been developed and used by citizens. The analysis of this environment sheds further light on the understanding of and improvement of areas for better e-participation for decision making processes in government.

Chun and Warner discuss the issue of finding government information using collaborative tagging. In government 2.0, using social media, citizens actively participate in producing content, but the abundance of content causes the difficulty of determining what truly useful and relevant information is to be shared for mission critical tasks and to produce better citizen services. They propose a data model of rich social tags and a Citizen-Government collaborative tagging environment. The collaborative annotations capture not only the semantics but also the pragmatic and social aspects related to the resources, such as who, when, where, how and for what related tasks the resources are shared. The rich tag data model creates the ability to filter, discover and search new and dynamic as well as hidden resources, to navigate between resources in a search by traversing semantic relationships, and to recommend the most relevant government information, even when distributed over different agencies.

Adegboyega Ojo and his colleagues examine the semantic interoperability issues associated with the emerging Governance 2.0 networks. Semantic Interoperability is the ability of interacting network entities —agency systems, citizens, social media, etc.— to have a consistent understanding of the shared information and the ability to resolve differences in the conceptualization of entities and the members' abilities. These abilities include semantic description, mediation and discovery, where one can ascribe meaning to the information they wish to share, discover information they need based on descriptions provided by others, and process the shared information in a way consistent with the intended use. A case study has been employed to analyze scenarios for possible semantic conflicts in a Government 2.0 information sharing environment. Based on these semantic interoperability requirements, they propose a conceptual framework that can guide governments and their agencies in developing semantic interoperability capabilities. It specifically calls for analysis in three dimensions to achieve interoperability of government 2.0: (1) policy, governance, organizational and technical interoperability; (2) the level at which the semantic interoperability needs to be addressed, e.g. network (whole of government) or entity (individual government agency); and (3) the communication layers – context, protocol, message, contents and domain are associated with semantic conflicts.

The privacy preserving data integration problem from diverse data sources is more highlighted with the lightweight Web 2.0 applications, such as the mashups and dataspace systems. Government organizations collect and maintain different kinds of data concerning the same entity (citizen), according to their major functionalities and tasks involved. In order to share and have an integrated and unified view of an entity, data from different sources needs to be reconciled to be integrated. If the identifiable fields (e.g., name, social security number) are exchanged, the data integration is no problem, but the personally identifiable information cannot be shared among different government organizations due to various privacy-related rules and regulations. Choenni, van Dijk and Leeuw propose an approach for data linking and reconciliation for the same entity that is based on similarity of data content from different sources using common schemata of data sources. A similarity function takes a record from each data source as input and computes a similarity value as output expressing how similar the records are. The quality of reconciliation among data records is also measured. A prototype of reconciliation system to integrate Dutch criminal data sources (police data source and justice data sources) shows the approach is effective with 93% of accuracy.

Aichholzer and Strauss present an important emerging aspect of e-government 2.0, i.e., an electronic identity management system (e-IDMS) for citizens. They argue that emerging e-government services will be increasingly advanced transactional types that will process and share personal data for personalization and collaboration among governments. The rethinking and changes in services and citizens' interactions encouraged in Web 2.0 requires an improved secure identity management for online identification and authentication of citizens prior to consuming government services. It describes how the Austrian federal government took the initiative of the EU-Commission and implemented an innovation process of e-IDMS. It employed a theoretical framework mainly based on the concepts of actor-centered institutionalism and the transformative capacity of new technologies. The e-IDMS system is designed as a complex techno-organizational infrastructure, and reflects on the adoption and use of the system in terms of perceived privacy threats.

Kievink and Janssen draw attention to the similarity of the Web 2.0 principles to *simulated gaming*, since both employ the 'wisdom of the crowds' to facilitate the collaboration. They employ the simulation gaming as an instrument to manage multichannel service delivery with

multiple actors and roles from different organizational boundaries, and use it as a transformation tool to explore possible innovative service process alternatives and alternative policies through the participants' collaborative participation. The paper proposes the service delivery game model that involves the scenario introduction, a round of scenario play, a stage of developing alternative approaches for multi-channel service delivery using the participants' tacit knowledge and role playing, and evaluation and reflection phases to compare alternative solutions. It provides two examples of simulated gaming for multi-channel services of the Dutch municipality governments, i.e., the address change request service and the car registration permit service. The simulated gaming stimulated the participatory and collaborative aspect of the Web 2.0 principles and resulted in innovative process and policy alternatives to improve the coordination of involved parties for the multi-channel services.

In addition to the papers, we feature two book reviews. Gil-Garcia reviews "Wiki Government" (2009) authored by Noveck. It presents a novel use of the Wiki social media called the 'Peer to Patent' to review the patent applications using the participation of citizens in the patent review process. It can serve as an exemplary report on citizen participation and the innovative application of social media in government.

Handbook of Research on ICT-Enabled Transformational Government: A Global Perspective (2009) edited by Weerakkody, Janssen, and Dwivedi, reviewed by Gong, can serve as a good reference book for researchers and practitioners to create and maintain transformational government. The topic ranges and the domain ranges are diverse to satisfy readers with different purposes and interests in electronic government.

This special issue presents papers that address research issues related to the open government requirements: transparency, participation and collaboration. Specifically, in order for government to be transparent, government information should be easily accessible, searchable, and integrated, without fear of personal information leaks and using a robust identity system. For collaborations among government agencies and between governments and citizens to come about, data integration and interoperability need to be achieved through semantic mediation such that the data is meaningfully integrated and shared. For participation to occur, the citizens should have a platform to express their opinions without losing discussion threads, and this platform should also provide the government with tools to analyze and evaluate the impact of making certain policy decisions. In addition, the social media and Web 2.0 concepts should be creatively utilized for the development of innovative programs and tools.

We hope that the papers of this special issue have opened up the issues and challenges residing in the use of social networks for government purposes and in Government 2.0, where citizens, data providers, and government agencies are making unprecedented connections. We hope that this special issue can serve as a platform to go beyond what social media currently have to offer, to make open government a reality.

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