The use of Web 2.0 on Mexican State Websites: A Three-Year Assessment

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Abstract: Web 2.0 tools and applications (e.g., blogs, wikis, forums, RSS, podcasts and videocasts) as well as social markers (e.g., Del.icio.us, Technorati, Facebook and Digg) have reached government and commerce sites; however, there is still a dearth of research related to the adoption levels of such tools. The purpose of this research is to contribute toward filling this gap by assessing the impact of this trend on Mexican local government sites by asking the following question: to what extent have local eGovernment websites in Mexico adopted Web 2.0 tools and applications? To answer this question, the paper starts by reviewing key concepts of Web 2.0 applications in government portals. On the basis of a longitudinal evaluation of Mexican local government sites, we found that most of the websites analyzed have increased their use of Web 2.0 tools and applications; however, we also found that not all applications are equally well-developed or used on the local websites. Web 2.0 is only in the initial stages of adoption in Mexican government websites.

Keywords: government 2.0, eGovernment, social media, Twitter, Web 2.0, websites

1. Introduction

The use of technology in government has a long tradition. In many senses, public administrations devote great amounts of effort to generating valuable information to provide services, as well as for decision and policymaking purposes (Bozeman and Bretschneider, 1986; Rubin, 1986; Tapscott and Williams, 2006). O'Toole (1998) supports the advantages of using information technology to reduce costs and improve government efficiency. The use of Internet, and most recently Web 2.0 applications, represents an evolution in the use of information technologies in government. These advanced applications facilitate higher levels of interaction between Web content, information users and information producers. More specifically, 'Web 2.0' refers to a new collection of applications and tools based on the concept of creation of content produced and shared by the very same users of a website. In other words, consumers of information have become "prosumers" or producers of part of the information that they consume (Tapscott and Williams, 2006).

Some of these applications are the social networks, micro-formats, social labeling, RSS (content syndication), blogs, videoblogs, podcasts, wikis and forums. Examples of commercial websites that implement these applications include Technorati, Digg, Facebook, Flickr, YouTube, MySpace, Twitter and Del.icio.us, amongst others. Some government sites are also starting to include some of these applications. Web 2.0 applications may be considered the next step in Internet development technologies.

As part of this study, we evaluated the use of Web 2.0 tools on state sites. Specifically, we focus on the use of blogs, wikis, forums, RSS, APIs (such as Google Maps), podcasts, videocasts, social markers (such as Del.icio.us, Technorati, Facebook or Digg) and social networks. All of these applications, although they may appear to be very different, share certain characteristics, such as the generation and classification of information and content in a collective manner, the integration of communities, and the production and consumption of socially distributed knowledge.

These common characteristics allow them to be categorized as Web 2.0 tools and applications. These tools have proven themselves to be efficient mechanisms for developing political activism (Yang, 2009; Mesgari and Bassellier, 2011; Trechsel et al.; 2003, Krishna and Jai, 2011), perhaps the most well-known case of which is that of the Obama presidential campaign in the United States (Dochartaigh, 2001). They have also proven useful as tools for handling relationships with the media (e.g., Twitter), and as an alternative way of disseminating content in the face of social problems or political crises, such as the recent elections in Iran, the coup d'état in Honduras, and the deposition of

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the presidents of Egypt, Tunisia and Libya (Hewson and Laurent, 2008). Government sites that use Web 2.0 applications have the potential to generate greater interaction between different social actors (Attia et al., 2011), and as a consequence, greater citizen participation in government processes, which have recently been termed 'Government 2.0'. These applications are beginning to be used at all three levels of government and within diverse areas of public policy.

A recent study revealed that Mexicans between the ages of 18 and 28 years were dissatisfied with the level of communication established between them and political parties, and suggests that more interaction, concrete proposals and more direct messages are needed (Juarez and Marchant, 2011). Previous studies mentioned that Internet users propose that Web 2.0 tools could be an effective mechanism for opening alternative channels of communication. Although the use of these tools is developing very quickly in the relationship between government and citizens, we know little about the outcomes reached by the use of Web 2.0, and even about levels of adoption by government. Given the scarcity of research in this field, we started this research on Mexican state sites that have already worked with Web 2.0 tools. Based on measurements of these technologies taken from Mexican state sites in 2008, 2010 and 2011, this paper will show the extent to which they are currently used, and in which areas of state government these sites are used more frequently.

In this way, following this introduction, the paper is organized into four sections: Section II includes a review of the literature on electronic government, state portals and Web 2.0 as it relates to state portals; Section III is a description of the research methods; and Section IV includes the main findings, and the final section draws conclusions and discusses implications.

2. Electronic government and Web 2.0

This section of the paper constitutes a review of the relevant literature on electronic government, Web portals and Web 2.0. The first subsections include key concepts of electronic government and Web portals. The final subsection introduces the main Web 2.0 applications and their relationships with electronic government and Web portals.

2.1 Electronic government and websites

There are different definitions of 'electronic government', but all concern the use of Information and Communication Technologies (ICT) in carrying out the activities of governments (Gil-Garcia and Luna-Reyes, 2008). Some emphasize the use of ICT applications for undertaking administrative tasks, and others for providing services, and yet others for developing democracy. Government sites are just one example of these types of applications and their use is spreading, not just in Mexico, but in many countries around the world. According to the United Nations Organization, only three out of the 192 UN member states have no presence on the Internet (United Nations Public Administration Program, 2008, UNAP, 2008). In Mexico, in addition to the Federal Government's significant presence on the Internet, which is the 56th place on the last UN ranking (United Nations Public Administration Program, 2010), all state governments and a significant number of municipal governments have a presence on the Internet. Internet sites are now one of the primary means of providing information, dealing with applications and services, and interacting with different government dependencies. Web 2.0 tools have the potential to take these relationships to the next level and change interaction schemes between citizens and their participation in government processes and decision-making (Yáñez, 2009).

There is still no consensus on how best to define the term 'electronic government'. From analysis of the literature on the topic, Gil-Garcia and Luna-Reyes (2008) concluded that electronic government is or should be "the selection, implementation and use of information and communication technologies in government to provide public services, improve the effectiveness of administration and promote democratic values and mechanisms, as well as to create a legal framework that facilitates the development of intensive initiatives for the use of information resources and promote the development of the knowledge society." State government sites are just one example of the application of electronic government. The development of these applications is not only due to pressure from the public to receive the same service it receives from the private sector, but also to the government managers' perception of a multitude of potential benefits to public administration (Luna-Reyes et al., 2009). A government site is understood as "an access point integrated into a state government Internet site which provides both external entities and government personnel with a single online access point to state resources and information" (Burley-Gant et al., 2002).

2.2 Government sites as communication systems

State sites can be considered government-citizen communication systems that function via computers and Internet. This communication system is characterized by the integration of different media and their interactive potential. Multimedia extends the reach of electronic communication to every aspect of life (from home to the workplace, from schools to hospitals, from entertainment to trips) (Castells, 1998). In the mid nineties, governments and companies were searching frantically for ways to position themselves and establish this new system (Castells, 1998).

In this sense, state sites are immersed in a new multimedia system that includes and covers all expressions of culture. In this new kind of society, all types of messages work in a binary fashion of presence/absence, whereby presence enables the communicability and socialization of the message. While the function of communicability is present in all state sites, socialization is only present in some given that not all have the tools and applications needed for this socialization to take place between users and government. From a society perspective, communication based on electronic means (typographic, audiovisual or via computer) is communication (Castells, 1998). This means that the media – in this case, the site – is immersed in this multimedia universe and fulfills the role of communicating Government information. Furthermore, due to the multimodality and versatility inherent to multimedia, it is capable of covering the full range of expressions, as well as diverse interests, values and imaginations, including the expression of social conflicts.

2.3 The evolution of sites and models for communication and socialization

There are various different models that explain the processes of development and evolution of Internet sites (Layne and Lee, 2001). A few years ago, and taking these evolutionary models as a base, an evaluation of state government sites in Mexico was conducted (Almazan, Gil-Garcia, and Luna-Reyes, 2007, 2008). The stages of Information, Interaction, Transaction, Integration and Participation were proposed as complementary but not mutually exclusive components that can be used to characterize the development of government sites (Sandoval-Almazán et al., 2008). Furthermore, this reference framework can be reinterpreted from a theoretical standpoint in relation to the communication systems included in the previous section. The communication that arises from the interaction between government and citizens can take place in different ways, as explained below.

Information Stage. The characteristics of the sites that belong to the information stage are comprised by those that only display information on the activities of public administration. Examples of these characteristics include news or announcements about events, as well as services available to citizens. The communication that takes place between the government and citizens at this stage is one of sender to receiver, which is horizontal and one way. In this, as well as other levels of site development, the receiver plays both roles mentioned by Castells (1998). They can be interactors by choosing their communication path as well as deciding and selecting the topic and the knowledge that they hope to obtain, as well as the media; or they can be interacted with by users that, within their own capabilities and possibilities, select and seek out knowledge from inside a media which provides them with limited options. Nevertheless, the inherent characteristics of the information stage limit the users' capacity to interact, relegating them to the position of interacted. The interactor, in addition to being able to use the information provided on the site, will access information from other sources, such as the radio, television, and newspaper.

Interaction Stage. Characteristics inherent to sites in the interaction stage include applications that allow interaction between citizens and the government, such as forms for asking questions and making enquiries, forums, or automated applications such as virtual public servers. Communication between citizens and the government at this stage is two-way, from the sender to the receiver and vice versa, establishing channels for interaction, such as electronic mail or those mentioned previously. At this stage of two-way communication, there are more opportunities for interactors to choose their means of communication.

Transaction Stage. Characteristics of Internet sites at the transaction stage mainly include what have been topics of electronic commerce. The main difference between this and the interaction stage is the interchange of services and application processes with a well defined cycle and on many occasions, the payment of fees. Communication between the government and citizens at the transaction stage takes place from the sender to the receiver and vice versa in much the same way as in the Interaction stage. Nevertheless, since these are services with clearly defined cycles and processes, it is more

common to find an interest in obtaining feedback on how they have performed. One example is online services that can be carried out by citizens.

Integration Stage. Characteristics inherent to the integration stage make reference to the capability of the site to present itself as a single window for providing services to the citizen and transparently making known which agency or agencies are in charge of delivering the services or information. At this stage, not only does communication take place between the government and citizen but also between government dependencies, which in turn communicate this information to the citizen and provide feedback from the government to the citizen, the citizen to the government and between government dependencies. For example, municipal government sites that make it easy to obtain construction permits and licenses needed to start a business on the same site required different agencies that participate in this process to coordinate and work together. This coordination can be achieved in different ways ranging from using an agent to process all the applications submitted by citizens to the technical integration of data and processes between different agencies that enabled them to offer the service without the need for an agent.

Participation Stage. Government sites that demonstrate traits of the participation stage offer citizens the ability to socialize and in this way obtain full interaction. At this stage, communication is most extensive, taking place between government and citizen, between dependencies, between citizens and providing feedback.

Communication produced through the use of Web 2.0 tools takes place according to the type of population and media they choose to obtain information from. In the case of interactors, as mentioned by (Castells, 1998), Web 2.0 tools are useful applications for obtaining information without needing to search for it, which simplifies the job for the user. For example, once configured on your personal webpage or email, RSS feeds enable information to be filtered so that you only receive the information you want, without the need to enter the site that produces it.

As for interaction, searching for and finding information within media is made easier by the introduction of these tools on the site; however, it is important not only due to the type of population using the media but because Web 2.0 is implementing applications that make communication possible between different actors within a site, in which communication takes place in settings where citizens and government communicate with each other.

2.4 Web 2.0 internet sites and tools

The term 'Web 2.0' has yet to be fully defined in a manner widely accepted by experts in the field. It was coined by O'Reilly in 2005 who defines it as "a platform that extends to all connected devices," although these devices are not just limited to being interconnected; instead, much of their functionality rests on the fact that they use technologies that allow users to build the content and format of sites. Table 1 shows a comparison made by O'Reilly (2005) between Web 2.0 applications and traditional applications.

Table 1: Comparison between Web 1.0 and 2.0

Web 1.0	Web 2.0
Double click	Google AdSense
Ofoto	Flickr
Akamai	BitTorrent
mp3.com	Napster
Encyclopedia Britannica Online	Wikipedia
Personal websites	Blogging
Screen scraping	Web services
Page views	Cost per Click
Domain name speculation	Search engine optimization
Directories (taxonomy)	Tagging ('folksonomy')
Publishing	Participation
Content management systems	Wikis
Stickiness	Syndication

Source: O'Reilly, 2005

O'Reilly says that Web 2.0 is a mechanism for social cohesion and cooperation. More recent works, such as that undertaken by Tapscott and Williams (2006) describe the phenomenon as follows: "The new Web is fundamentally different in both its architecture and applications. Instead of a digital newspaper, it is a canvas where every splash of paint contributed by a user enriches the tapestry; whether people are creating, sharing or socializing, the new Web is about participating rather than passively receiving information" (p. 37).

The term Web 2.0 is still under debate, Wilson mentions that a lot of concepts have been causing confusion and ambiguity about the term. He proposes that Web 2.0 must be understood as follows: "Web 2.0 refers to the second generation of the Web, wherein interoperable, user-centered Web applications and services promote social connectedness, media and information sharing, user-created content, and collaboration among individuals and organizations" (Sandoval-Almazan and Alonzo, 2011).

According to this idea Web 2.0, reveals itself as a revolutionary way of gathering, organizing and sharing information. Some of its better-known examples include Google, weblogs, Wikipedia, YouTube, MySpace, Twitter and Second Life. Other authors have pointed out some differences:

- Web 2.0 facilitates flexible design, creative reuse and updating;
- Offers the user an enriched and interactive interface;
- Facilitates collaboration for creating and modifying content;
- Allows new applications to be created by reusing and combining data and sources;
- Establishes social networks between people who have the same interests; and
- Supports cooperation in gathering collective intelligence. (AMIPCI, 2011)

Murugesan (2007) defines 'Web 2.0' according to its distinctive applications: blogs, RSS (Really Simple Syndication), Wiki (Web-based tool for massive collaboration in the management of content) or a system to create or manage content, tags, (keywords added to articles or blogs, and shared via social webpages), folksonomy, information taxonomies created by users as social markers. Lastly, another tool is mash-ups (websites that combine services and information from multiple sources on the network). Wilson and his colleagues (2011) gather several concepts of Web 2.0 and their authors (see Fig, 1).

Type	Definition	Sample Reference	Examples
Mashups	The "mashing" together of two or more Web services or applications (Sutter, 2009)	(Sutter, 2009)	PadMapper.com, Flickr Maps
Information-sharing Sites	Sites whose primary purpose is the sharing of information or media, from videos to photos to articles to bookmarks/links	(Sutter, 2009)	YouTube.com, Flickr.com, del.icio.us
Social Networking	Online social networks help users keep in contact and receive updates from their friends, family, and colleagues	(Sutter, 2009)	Facebook.com, Orkut.com
Syndication	A service that tracks updates to various sites on the Web, aggregating the various "feeds" for later consumption	(Sun, He, and Leu, 2007)	RSS, Atom
Weblogs (Blogs)	A personal Web page or diary, easily updated and generally displayed in reverse chronological order	(Ip and Wagner, 2008)	HuffingtonPost.com, Engadget.com
Wikis	A website that anyone can edit	(Kane and Fichman, 2009)	Wikipedia.org, Wikihow.com

Source: Wilson (2011), p. 11.

Figure 1: Web 2.0 features and concepts

Wamelen and Kool (2008) promote the idea of a second society built on the basis of this platform. They present a series of distinctive platform characteristics and compare them against those of Web 1.0, such as generic vs. specific, static vs. dynamic, closed vs. open, and personal vs. collective. Additionally, they present precise functions that Web 2.0 applications must fulfill, such as sharing information, mobilization, scheduling meetings, support and transaction capabilities. Lastly, Yamakami (2007) proposes that mobile content may also evolve towards mobile Web 2.0 content.

Web 2.0 is a social network platform because its content is user-generated – as if it were a collective intelligence – transforming users into co-producers of content and not just passive subjects who only receive the information. Interaction plays a vital role in this platform. This capacity for interaction is vital, and to achieve it, governments must consider this type of tool very seriously (Woods, 2007), not just as a way to enable the bureaucracy to reduce its costs and allow a greater flow of information, but also as a way of approaching citizens and making sure their participation enriches government efforts.

Although relatively new, Web 2.0 tools and applications have been used on government websites in such countries as Germany where de Kool and Van Wamelen (2008) proposed six categories for analyzing electronic government using Web 2.0, gathering case studies in their country to demonstrate the use of Web 2.0. Web 2.0 has also been suggested as a way of solving problems related to information transparency in governments. Kubicek (2008), who submitted those ticket systems used for providing services, suggested that this tool could also be employed to improve transparency and rendering of accounts, through the use of social networks (Kubicek, 2008). A number of other studies have presented different cases of electronic government and the use of Web 2.0 tools applied to public administration, such as mass collaboration, digital democracy and the use of distributed computing – cloud computing – as a means of improving attention and services both at the state and municipal level (Chenok, 2008). Lastly, Eliason and Lundberg (2006) focused their attention on investigating the specific use of Web 2.0 in designing municipal websites using gender as a tool to reduce the complexity of sites and better organize content. These researchers gathered data from seven Swiss municipalities in order to evaluate the impact of Web 2.0.

The current public administration trend of open government (o-government) or transparent government has begun to use Web 2.0 tools to interact with the citizenry and request their opinions on just how open federal government should be to its citizens. This initiative from the United States' President, Barack Obama (Memorandum of Transparency and Open Government), and the White House website, which invites citizens to participate in this initiative through discussion forums whose purpose is to establish principles (Gobierno-de-Estados-Unidos, 2009b) and come up with proposals for law reform (Gobierno-de-Estados-Unidos, 2009a) are clear examples of how these technologies can be used by government. These alternatives, which have opened up the North American government online to promoting citizen participation in specific issues and policy creation, are innovative for governments, and represent the first time that these alternatives have been used as examples of online government.

Some of the risks that may arise from the use of Web 2.0 tools and applications are data isolation, exclusion of content, privacy issues and the risk of improper use of the information (de Kool and van Wamelen, 2008). Even though the usefulness of Web 2.0 in governments is promising, the great question that prevails is whether public sector organizations are able to commit to this new way of interrelating with their citizens, and improving user-experience and their perceptions of public services (Juarez and Marchant, 2011). Recent research points in that direction, as the most frequent use of Web 2.0 features has changed the behavior and organization of the governments, adapting these kinds of technologies to their tasks (Hewson, 2008) and improving the way in which they interrelate with citizens (Wilson et al., 2011; Warkentin et al., 2002). That is why it is important to make an exploratory research and provide empirical evidence to assess the extent to which Web 2.0 has been involved in government websites, as a first approach to the field.

3. Research design and methods

This section describes the data collection methods and the procedures followed to analyze the data. Online research has become a common practice nowadays; however, very few methodologies and research models have been developed to this end. This situation creates confusion and difficulty about validity and trust in research findings that collect data online (Linders, 2011). Using innovative data collection strategies, however, does not compromise the validity of the findings; Gallupe (2007) mentions that current information systems (IS) research seems more concerned with "how" the

research is conducted than "what" research is conducted and "why". Yang (2009) develops the concept of Internet-mediated research (IMR): “Internet-mediated research involves the gathering of novel, original data to be subjected to analysis in order to provide new evidence in relation to a particular research questions” (p. 58). This kind of research, though, like any other study, requires careful planning, design, and piloting. Its most obvious advantage is cost and time efficiency.

For this research on Web 2.0, the target population is comprised by the websites of the 31 Mexican states and the Federal District. Three independent observers viewed sites in three different periods of time. The first one took place during the first half of 2008; the second observation was on March and October 2010, and the third and last observation was held on March and October 2011. These last two observations focused only on collecting data from Web 2.0 features. Researchers from the 2008 observation used a guide to evaluate the state sites and record the inclusion of Web 2.0 tools, as well as the sections of the site that used these tools. Data from these observations were collected by each observer and summarized by one of them. In order to get the results related to the use and the frequency of Web 2.0, it was first determined whether the Web 2.0 tools were used, followed by their frequency. In other words, the number of times a tool was used in the sections of the different state sites.

To complement this initial measurement in 2008, two more observations were made in 2010 and 2011 that only looked at Web 2.0 tools linked to the Twitter and Facebook social networking sites in order to understand what impact this social media technology has on the web pages of state governments. We choose these two Web 2.0 tools because they are the most used nowadays with more members than any other. More specific questions include: “How do these governments currently use social media tools?” and “Which state governments use Facebook and Twitter to raise awareness?”

Once the sample from the 32 states and the two social networking platforms were chosen, the procedure was as follows: each platform was visited to determine whether the government web pages had valid accounts – Twitter or Facebook – which were validated by entering them and verifying that they did in fact belong to the selected government and not a fictitious or erroneous name. During this validation process, data provided by the sites were noted down, such as the amount of individuals that follow in the case of Twitter and the number of “friends” in the case of Facebook. This information was collected during the months of March and October 2010 and again in 2011, using the Web browsers Firefox and Safari, and a broadband Internet connection, with an approximate time of 15-20 minutes spent on each website.

4. Findings and discussion

In this section of the paper, we introduce the main findings of the longitudinal observations of the adoption and use of Web 2.0 applications and tools in Mexican State sites. We start by showing the general trend of adoption of Web 2.0 tools and applications from 2008 to 2011. After this initial comparison, we focus more specifically on the evolution of the use of Facebook and Twitter, two of the more widely adopted Web 2.0 applications.

4.1 Web 2.0 adoption trends in Mexican State sites

The first observation was held in 2008, to identify the main features of Web 2.0 described in the first section of this paper. Table 2, presents a list of the sections where Web 2.0 tools were found. It is important to mention that many portals did not use Web 2.0 features. Regarding the frequency of use of Web 2.0 tools in the different sections of the sites, we found that tools located in the Citizens section generally received the most use, followed by those in the Government and Tourism sections. The most commonly used tool in the Citizens section was APIs, which suggests that states are interested in creating interactive applications in this section of the website. Also, the Government section demonstrates the greatest diversity of tool use, which reflects wide-ranging interest on the part of the states in terms of the type of communication they seek to create with their citizens in this section. The Tourism section showed a pattern for including multimedia information in audio and video formats. This same pattern was observed in the culture section, albeit with less frequency. It is interesting to note that only a couple of sites used content syndication services (RSS) in the press area.

Table 2: Sections where Web 2.0 tools were found in 2008

Tools/Sections	Government	Citizen	Tourism	Culture	Applications and Services	Transparency	Press	Others
Podcasts	1	1	6	2	1	0	0	2
RSS	3	4	0	1	0	0	2	0
Blogs	1	0	0	0	0	0	0	0
Forums	1	1	0	0	0	0	0	0
Videocasts	1	0	4	2	0	1	1	0
Chat	1	1	0	0	1	0	0	0
API	4	17	0	0	0	0	0	0
Red Social	0	1	0	0	0	0	0	1
TOTAL	12	25	10	5	2	1	3	3

Three years later, a completely different perspective on the use of Web 2.0 features was found, as displayed in Table 3. Clearly, there was a notable increase in the use of the different tools. Again, the Citizens sections of the local government websites have more features, followed by the Government sections. The use of social networks was the most common feature among the 32 states, and the least used were blogs and online forums. The use of podcast, videocast, and RSS were still important for most of the sample states. Finally, it is important to mention that the use of APIs is frequently found in the applications and services; for transparency purposes, social networking and videocasts were the most common for the Mexican websites.

Table 3: Sections where Web 2.0 tools were found in 2011

Tools/Section	Government	Citizen	Tourism	Culture	Applications and Services	Transparency	Press	Other
Podcasts	11	11	6	6	3	3	6	12
RSS	14	11	9	9	9	9	16	10
Blogs	4	4	1	1	0	0	2	4
Forums	2	3	3	3	3	3	2	3
Videocasts	21	23	21	19	12	12	16	21
Chat	8	7	2	2	6	3	3	6
API	9	14	9	6	14	7	1	9
Social Networks	23	22	12	13	12	11	11	21
Social Markers	3	3	2	2	2	1	2	2
TOTAL	95	98	65	61	61	49	59	88

A comparison between these two measures from 2008 and 2011 is presented in Figure 2, where the increase in the use of different tools on Web 2.0 is remarkable. Most of the features that showed growth were related to interaction – i.e., social networking, chat, videocast – and those that were reduced were one-way communication channels – blogs. This could be explained by the expansion of this kind of features among the users. In fact, potential users of government websites are interacting more and more with Web 2.0 tools and applications such as Facebook and Twitter.

As shown by Figure 2, the most commonly used tools were social networks, which rose from 6.3% in 2008 to 48.8% in 2011; almost half of all Mexican state government sites now use this tool to display dynamic content to users. The RSS and social markers maintain the same average of use. The least used mechanisms were forums, podcasts and APIS, which dramatically dropped from 2008 to 2011. According to this, it is clear that state government electronic sites focused mostly on displaying informative content in text, video and audio formats (podcasts, videocasts and RSS) in 2008; but this changed by 2011 with the use of applications that allow easy communication between public officials and citizens.

Another important comparison shown in Appendix 1 was the number of local websites with Twitter and Facebook accounts. Of the 32 states, in 2008, only 16 had both Twitter and Facebook accounts, three states (9%) had just a Facebook account, five states had just a Twitter account, and eight states

have neither account. In 2011, however, 20 states have both types of accounts; only two states (Chiapas and Colima) have just a Twitter account and eight states (25%) have no account with either social networking platform.

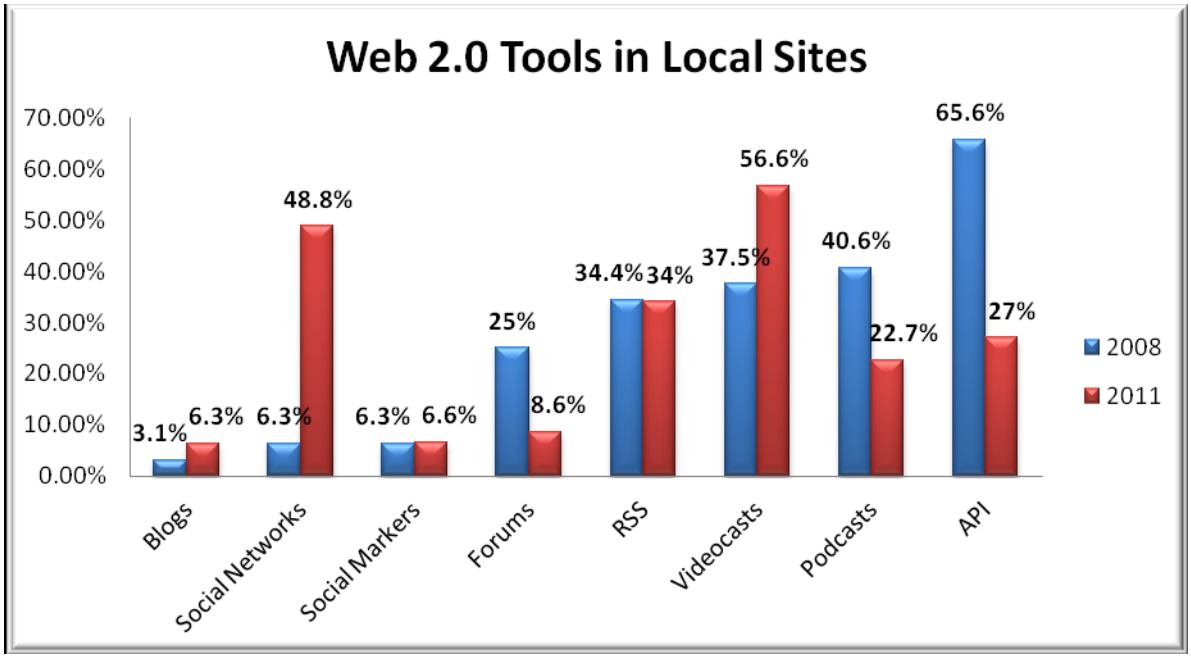

Figure 2: Percentage use of tools by state sites 2008

4.2 Facebook

The total percentage growth of the amount of friends on Facebook during 2008 to 2011 is 94.92%; however, several Mexican states show no potential growth in the number of registered friends (See Table 4). The figures for states like Colima, Sonora and Campeche, which had number of friends in some measurements, are reported as zero in the fifth column because the link was not available in the moment of the measurement. On the other hand, Queretaro, State of Mexico, and Veracruz stand out from the rest with more than ten thousand users each. States that have shown growth consistently in terms of the number of "friends" on this platform are Federal District, Guerrero, Guanajuato, Hidalgo, Michoacán, Nuevo León, Querétaro, and Morelos.

Table 4: Evolution of Facebook Friends on state websites

GOVERMENT	MARCH 2011	OCTOBER 2011	%	GOVERMENT	MARCH 2011	OCTOBER 2011	%
Baja California Sur	0	381	N/A	Nuevo Leon	5662	8521	50.49%
Chiapas	0	0	N/A	Sinaloa	2373	3529	48.71%
Nayarit	0	0	N/A	Queretaro	9056	12238	35.14%
San Luis Potosi	0	0	N/A	Hidalgo	2770	3719	34.26%
Tabasco	0	0	N/A	Michoacan	2160	2884	33.52%
Tamaulipas	0	848	N/A	Guerrero	3094	3996	29.15%
Tlaxcala	0	617	N/A	Veracruz	8592	10960	27.56%
Yucatan	0	42717	N/A	Durango	4988	4960	-0.56%
Quintana Roo	219	835	281.28%	Morelos	4996	3208	-35.79%
Zacatecas	2470	8874	259.27%	Campeche	311	0	-100.00%
Oaxaca	530	1764	232.83%	Chihuahua	2158	0	-100.00%
State of Mexico	3893	11391	192.60%	Coahuila	313	0	-100.00%
Guanajuato	633	1402	121.48%	Colima	4053	0	-100.00%
Aguascalientes	1097	2328	112.22%	Jalisco	4451	0	-100.00%
Baja California	1978	4070	105.76%	Puebla	74	0	-100.00%
Federal District	3744	7429	98.42%	Sonora	500	0	-100.00%
TOTAL					70115	136671	94.92%

4.3 Twitter

Twitter will be analyzed in terms of its main components – followers, following, lists and tweets – for 2011. The first component of Twitter is its followers. Undoubtedly, this is one of the most interesting categories as it relates to the number of individuals or institutions that want to have a connection with government through the use of this technological tool. Table 5 presents the results of followers. As can be seen, the states of Tamaulipas, Quintana Roo and Oaxaca stand out with a growth of more than 3 times. The number of followers for the rest of the states grew significantly. Other states experiencing more modest growth included the State of Mexico, Michoacan and Zacatecas.

Table 5: Twitter - followers on Mexican local government websites

GOVERMENT	MARCH 2011	OCTOBER 2011	%	GOVERMENT	MARCH 2011	OCTOBER 2011	%
Campeche	0	0	N/A	Hidalgo	14712	33463	127.45%
Chihuahua	0	0	N/A	Colima	10881	24234	122.72%
Coahuila	0	0	N/A	Queretaro	16953	36809	117.12%
San Luis Potosi	0	0	N/A	Morelos	1441	2989	107.43%
Tabasco	0	0	N/A	Nuevo Leon	13778	28184	104.56%
Tlaxcala	0	471	N/A	Guerrero	2671	5285	97.87%
Tamaulipas	409	3077	652.32%	Federal District	27120	49680	83.19%
Quintana roo	156	871	458.33%	Baja California	2361	4299	82.08%
Oaxaca	633	3019	376.94%	State of Mexico	8550	15547	81.84%
Yucatan	13308	41783	213.97%	Michoacan	2296	3951	72.08%
Chiapas	15355	36871	140.12%	Zacatecas	1236	2082	68.45%
Veracruz	5230	12375	136.62%	Baja California Sur	9531	0	-100.00%
Sinaloa	14070	32671	132.20%	Jalisco	5659	0	-100.00%
Aguascalientes	725	1679	131.59%	Nayarit	1584	0	-100.00%
Durango	11492	26446	130.13%	Puebla	724	0	-100.00%
Guanajuato	14341	32845	129.03%	Sonora	2162	0	-100.00%
TOTAL					197378	398631	101.96%

People following the Twitter account is another component (see Table 6). This is more meaningful in terms of website acceptance and the strategy of the government. For example, Nuevo Leon, Queretaro and Veracruz have an interesting consistent growth in the two-year sample. The State of Mexico and Guerrero show a small but consistent growth. The total percentage number of followers grows by 45.94% percent in both years.

Table 6: Twitter - following by Mexican local government websites

GOVERMENT	MARCH 2011	OCTOBER 2011	%	GOVERMENT	MARCH 2011	OCTOBER 2011	%
Zacatecas	0	1170	N/A	State of Mexico	4424	7094	60.35%
Tlaxcala	0	50	N/A	Michoacan	2	3	50.00%
Baja California Sur	0	0	N/A	Queretaro	15135	21409	41.45%
Campeche	0	0	N/A	Aguascalientes	125	152	21.60%
Chihuahua	0	0	N/A	Tamaulipas	395	467	18.23%
Coahuila	0	0	N/A	Morelos	870	1002	15.17%
San Luis Potosi	0	0	N/A	Chiapas	2827	2908	2.87%
Tabasco	0	0	N/A	Federal District	1774	1778	0.23%
Guanajuato	1	10	900.00%	Quintana Roo	19	19	0.00%
Baja California	37	209	464.86%	Guerrero	1487	1482	-0.34%
Oaxaca	657	3074	367.88%	Yucatan	441	296	-32.88%
Durango	41	112	173.17%	Colima	118	54	-54.24%
Sinaloa	28	65	132.14%	Jalisco	71	0	-100.00%
Hidalgo	16	37	131.25%	Nayarit	67	0	-100.00%
Nuevo Leon	3562	6838	91.97%	Puebla	487	0	-100.00%
Veracruz	2301	4068	76.79%	Sonora	949	0	-100.00%
TOTAL					35834	52297	45.94%

4.4 Twitter lists

The lists on Twitter is the component that makes it possible to organize followers, which could be meaningful if governments use it as a strategy to define certain profiles of people to send customized messages and proposals for different segments of people. In this case, according to data shown in Table 7, the behavior of the governments is very random: some states like Hidalgo, Veracruz, Colima and Morelos are increasing the number of their lists in order to have more defined profiles; others like Yucatan, Jalisco and Sonora are reducing the number of their lists; and finally some states like Nuevo Leon, Sinaloa, Durango, Queretaro, and Baja California have a consistently growing number of lists. The percentage total growth in the lists is 37.27%, but an important number of the local websites have a growth beyond 50% in the study period.

Table 7: Twitter Lists on Mexican local government websites

GOVERMENT	MARCH 2011	OCTOBER 2011	%	GOVERMENT	MARCH 2011	OCTOBER 2011	%
Tlaxcala	0	19	N/A	Chiapas	226	374	65.49%
Campeche	0	0	N/A	Queretaro	311	504	62.06%
Chihuahua	0	0	N/A	Veracruz	173	262	51.45%
Coahuila	0	0	N/A	Nuevo Leon	423	635	50.12%
San Luis Potosi	0	0	N/A	Guerrero	101	151	49.50%
Tabasco	0	0	N/A	Baja California	118	168	42.37%
Oaxaca	11	60	445.45%	Michoacan	87	121	39.08%
Tamaulipas	8	43	437.50%	Distrito Federal	1216	1674	37.66%
Quintana roo	9	32	255.56%	State of Mexico	310	419	35.16%
Aguascalientes	20	48	140.00%	Zacatecas	34	40	17.65%
Colima	105	230	119.05%	Baja California Sur	68	0	-100.00%
Durango	128	256	100.00%	Jalisco	214	0	-100.00%
Guanajuato	155	302	94.84%	Nayarit	50	0	-100.00%
Sinaloa	186	338	81.72%	Puebla	19	0	-100.00%
Hidalgo	163	282	73.01%	Sonora	83	0	-100.00%
Morelos	63	105	66.67%	Yucatan	136	0	-100.00%
TOTAL					4417	6063	37.27%

4.5 Tweets

The most important way of communication in Web 2.0 technologies is that of microblogging as represented by Twitter. These short messages of 140 characters are used to send information and links to different media – photos, audio and video – and are shared by people with a Twitter connection. The behavior of local government sites is to increase the number of messages sent to their recipients; but more messages does not necessarily mean that users will interact with the sender. On Twitter, that is another kind of measure – the retweet – which is not analyzed in this sample.

According to data presented in Table 8, the states that are more active in sending Twitter messages are Durango, Morelos, and the Federal District; those that are consistently growing in their number of messages are Zacatecas, Tlaxcala, Tamaulipas, Oaxaca, and Aguascalientes; and those that are not sending messages to their followers are Baja California Sur, Nayarit, Puebla, Sonora and Yucatan. The total percentage growth in the number of messages over the two-year sample was 82.13%.

The phenomenon related to increases in the number of followers is explained in the section on individual followers. Nevertheless, it should be added that the number of followers also depends upon the viral effect (Boynton, 2009), the replication and spreading of links among citizens and government officials who promote the page, which can lead to a significant explosion in the number of followers within just a few days.

5. Conclusions

Web 2.0 tools and applications seem to be an important alternative for governments and their websites in the not too distant future. The so-called Government 2.0 has the potential to bring governments and their citizens closer together in a simple and effective way. These types of tools will allow greater citizen participation and enable government dependencies to transmit more and better information; however, it is also clear that these tools and applications are currently receiving little use

on state government sites. This evaluation reveals some preliminary data on the use of Web 2.0 by state government sites in Mexico. Given the speed at which Web 2.0 tools change and their availability on the Internet, many sites could be using them already. Nevertheless, this initial data offers up a first look at this phenomenon and serves as the grounds for future studies on the topic.

Table 8: Amount of Tweets on Mexican local government websites

GOVERMENT	MARCH 2011	OCTOBER 2011	%	GOVERMENT	MARCH 2011	OCTOBER 2011	%
Zacatecas	0	1689	N/A	Hidalgo	1457	2989	105.15%
Tlaxcala	0	851	N/A	Nuevo Leon	3015	6072	101.39%
Campeche	0	0	N/A	Sinaloa	3916	7639	95.07%
Chihuahua	0	0	N/A	Chiapas	4181	6990	67.18%
Coahuila	0	0	N/A	Queretaro	3744	6111	63.22%
San Luis Potosi	0	0	N/A	Guerrero	3302	4827	46.18%
Tabasco	0	0	N/A	State of Mexico	5363	7748	44.47%
Tamaulipas	198	1987	903.54%	Guanajuato	720	967	34.31%
Oaxaca	415	2990	620.48%	Veracruz	1861	2171	16.66%
Aguascalientes	236	1111	370.76%	Michoacan	431	475	10.21%
Colima	1046	4638	343.40%	Baja California Sur	1	0	-100.00%
Morelos	3214	8844	175.17%	Jalisco	2699	0	-100.00%
Quintana roo	101	246	143.56%	Nayarit	4280	0	-100.00%
Durango	8844	20082	127.07%	Puebla	101	0	-100.00%
Distrito Federal	4625	9754	110.90%	Sonora	284	0	-100.00%
Baja California	964	2016	109.13%	Yucatan	17	0	-100.00%
TOTAL					55015	100197	82.13%

In regard to the implementation of Web 2.0 tools, progress on these sites is taking place slowly. It seems that site administrators are considering the use of these applications to achieve greater interaction and integration with the citizenry through the presence and functionality of these tools, but many have yet to be implemented. From a communications approach, Web 2.0 applications fulfill their purpose of communication according to the characteristics of each tool, although some of them also allow greater socialization, through social networks or social markers, between users and the government. A next stage for the Mexican states that have begun using these tools is to hold a dialog (Boyd et al., 2010) – an exchange of Tweets and retweets – between users to bring about a citizen-government collaboration (Honeycutt and Herring, 2009) using Facebook or Twitter.

In reality, Twitter can help to both exchange information and recommend news, data or relevant information (Phelan et al., 2009). In recent research into the impact of Twitter on the government, Wigand (2010) tried to analyze the participation of Twitter in the government using four theories – Diffusion of Innovation, Social Influence, Social Presence and Collective Intelligence Theories – through which social networking tools can interact with the government. In our case, we can conclude that the Mexican states we evaluated are beginning to use social networking tools in a rudimentary fashion. More research is needed to observe the level of interaction with the citizenry, their use to generate value within an organization – and that they are not simply a waste of time – as well as to determine whether these technologies are useful for improving local government practices and the relationship with citizens.

Future studies could focus on discovering users' opinions of the functionality and use of the site in order to complement and consider aspects of site functionality not included in this evaluation. This would provide a better view from a citizen's perspective of the suitability and usefulness of the communication channels at their disposal. Another line of research would be to evaluate the advantages and disadvantages for state governments of maintaining a website with Web 2.0 characteristics, due to the time and cost it may involve for some governments, in contrast to the benefits it could yield.

Finally, the use of Web 2.0 tools on electronic government sites is not just limited to posting the tool. Including tools and applications on the sites is just the first step; there needs to be a strategy and clear approach as to what these tools are expected to achieve. Government 2.0 has great potential to transform and improve relations between government, citizens, companies and other interest groups, but these tools must be combined with a clear vision and effective strategies if their effects are to be

valuable and meaningful to governments and citizens alike, as well as to society as a whole. We hope that this first look at the topic proves useful and arouses greater interest in these types of applications, and leads us in the near future to Internet sites that can truly be considered shining examples of Government 2.0.

6. Appendix 1: Mexican States' Facebook and Twitter account addresses

Government	URL Facebook	URL Twitter	Government	URL Facebook	URL Twitter
Aguascalientes	http://www.facebook.com/GobiernodeAguascalientes	http://twitter.com/#!/GobAgs	Morelos	http://www.facebook.com/pages/Gobierno-Estado-de-Morelos/112454552127355?sk=app_197936773558886	http://twitter.com/#!/GobiernoMorelos
Baja California	http://www.facebook.com/GobiernoBC	http://twitter.com/#!/GobiernoBC	Nayarit		
Baja California Sur	http://www.facebook.com/pages/BCS-CONTIGO/194928003877085		Nuevo León	http://www.facebook.com/gobiernonuevoleon	http://twitter.com/#!/nuevoleon
Campeche			Oaxaca	http://www.facebook.com/GobOax	http://twitter.com/#!/GobOax
Chiapas		http://twitter.com/#!/gobiernochiapas	Puebla		
Chihuahua			Querétaro	http://www.facebook.com/GobQro	http://twitter.com/#!/gobqro
Coahuila			Quintana Roo	http://www.facebook.com/pages/Gobierno-del-Estado-de-Quintana-Roo/132174546800498	http://twitter.com/#!/gobedoqroo
Colima		http://twitter.com/#!/gobiernocolima	San Luis Potosí		
D. F.	http://www.facebook.com/GobiernoDistritoFederal?v=wall	http://twitter.com/#!/GobiernoDF	Sinaloa	http://www.facebook.com/gobsinaloa	http://twitter.com/#!/gobsinaloa
Durango	https://www.facebook.com/gobdgo	http://twitter.com/#!/gobdgo	Sonora		
Estado de México	http://www.facebook.com/gobierno.edomex	http://twitter.com/#!/edomex	Tabasco		
Guanajuato	http://www.facebook.com/gobiernoguanajuato	http://twitter.com/#!/gobiernogto	Tamaulipas	http://www.facebook.com/pages/Gobierno-del-Estado-de-Tamaulipas/100739373337630	http://twitter.com/#!/gobtam/
Guerrero	http://www.facebook.com/portal.guerrero	http://twitter.com/#!/portalguerrero	Tlaxcala	http://www.facebook.com/GobiernodeleestadodeTlaxcala	http://twitter.com/#!/@GobTlaxcala
Hidalgo	http://es-la.facebook.com/gobhidalgo?v=app_2347471856	http://twitter.com/#!/gobiernohidalgo	Veracruz	http://www.facebook.com/GobiernodeVeracruz	http://twitter.com/#!/gobiernover
Jalisco	http://www.facebook.com/GobiernoJalisco?v=wall	http://twitter.com/#!/GobiernoJalisco	Yucatán	http://www.facebook.com/pages/Ivonne-Aracelly-Ortega-Pacheco/243488012999	http://twitter.com/intent/user?screen_name=IvonneOP
Michoacán	http://www.michoacan.gob.mx/	http://twitter.com/#!/gobmichoacan	Zacatecas	http://www.facebook.com/gobzac?v=page_getting_started&ref=sgm	http://twitter.com/#!/gobiernozac

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