

Still Wary of the Web? The Evolution of State Emergency Management Agency Websites 2008-2017.

New communication technologies bring both opportunities and challenges to emergency managers. Many remember the days when there was no Internet, all communications were analog and the only way to a wide audience was through mass circulation newspapers, radio and television. The emergence of the World Wide Web in the 1990s and social media in the 2000s made it easier for emergency managers to reach out to their important constituencies, including taxpayers, government officials and the media. However, in a post-9/11 world, there is a recognition that these same technologies can be used to facilitate the actions of terrorists and others with intent to do harm. With a growing dependence on these technological advances, failures of these systems create their own crises to which emergency managers must respond.

A 2008 study examined the effectiveness of the websites of the nation's 51 state emergency management agencies (EMAs). It did so by creating what was called a content richness index (CRI), a measure of the various features and hazards listed on each website. Websites with higher the CRIs were considered more content rich. The study found that emergency managers were underutilizing the Internet and did not seem to grasp its potential for improving communication with their stakeholders. The study concluded that the EMA websites tended to be focused more on internal audiences, such as employees and first responders. It also said that these websites needed to add more citizen-focused information and be more journalist-friendly if they are to reach their full potential.¹

The purpose of this study was two-fold. The first was to measure the evolution of the state EMA websites over the past decade. With the passage of time and with great experience in Internet use, has the content of these websites become more robust? It is important to note that the 2008 study was conducted when social media were relatively new. At that time, very few agencies used social media platforms. That is why the second

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purpose of this study is to learn the degree toward which state EMAs have embraced social media.

Literature Review

The discipline of emergency management – sometimes known as crisis management, disaster management or contingency planning – involves four phases: mitigation (an attempt to identify, minimize and eliminate potential hazards), preparedness (the planning phase, in which contingency plans are developed in anticipation of a variety of crisis scenarios), response (the execution of the crisis plan with the mobilization of necessary resources), and recovery, (the effort to return the situation to normalcy, to learn the lessons from the experience, and to mitigate future occurrences).² Another model mirroring this approach is Crisis and Emergency Risk Communication or CERC. It was proposed by health communicators concerned that the more traditional four-step model does not take into account the differences between risk communication, which focuses on “known probabilities of negative consequence and how they can be reduced,” and crisis communication, “messages regarding current state or conditions regarding a specific event.”² CERC is a five-step model: pre-crisis (risk messages, warnings and preparations), initial event (uncertainty reduction, self efficacy and reassurance), maintenance (ongoing uncertainty reduction, self efficacy and reassurance), resolution and evaluation.²

More than a quarter-century has passed since the introduction of the World Wide Web in 1990. From the very beginning, some urged emergency managers to use it for reaching out to the citizens they were tasked to protect. Dr. Ronald E. Rice, an expert in organizational communication and technologies, wrote that a variety of computer-mediated communication and information systems such as e-mail and voice mail could prove useful in overcoming “temporal, geographical, retrieval [and] distribution” changes during crises.³ R.L. Heath, a risk communication scholar, wrote in 1997 that the

Internet allows emergency managers “to supply information as well as elicit commentary and problem solution advice from stakeholders and stake-seekers.”⁴

Despite this encouragement, state emergency management agencies (EMA) were slow to embrace this new communication channel. A 2008 content analysis of the 51 state EMA websites (including the District of Columbia), found that emergency managers undervalued the web as a strategic communications tool. “This is especially true when communicating with the public and journalists during crises,” the study said. “While the public information officers who responded to the online survey indicated that the public was the primary focus of their agency’s web sites, the content analysis of those sites suggested that their focus was really directed toward internal publics, such as first responders and local emergency management officials.” Among the recommendations of that study was that emergency managers recognize that the Internet and social media are as important in public outreach as traditional media. It was also recommended that state EMA websites be made more accessible to the public and the news media.¹

Since that study, new communication channels in the form of social media have emerged and, in turn, presented emergency managers with new tools for social outreach. Facebook and Twitter were among the earliest and most popular of social media vehicles.⁵ While the earliest forms of social media, such as Six Degrees and MySpace appeared in the late 1990s and early 2000s, it was with the launching of Facebook and Twitter in 2006 that social media became widely popular.⁶ As was the case with the Internet, emergency managers appeared reticent in the use of social media. However, others, such as Kathleen Tierney, director of the Natural Hazards Research and Applications Information Center at the University of Colorado, saw the potential of social media for both gathering and distributing emergency information.⁷ George Washington University researcher Sabrina McCormick said the four biggest concerns they expressed had to do with the “difficulty verifying data collected through informal channels and the subjectivity that characterized that data.”⁸ By 2013, those fears appear to have eased. At that time, FEMA had three Facebook pages, 34 Twitter accounts and had created a rumor control process for verifying or debunking information passed through social media.⁹

“The rapid innovations in technology are transforming media and communication, altering how people interact with each other and relate to society and institutions,” said David Kaufman, director of FEMA’s Office of Policy and Program Analysis in a 2012

interview. “The role of social media in emergency management will likely increase in the future and its impact will create a more complex and sometimes challenging operating environment.”¹⁰

Twitter seems particularly well suited for the distribution of emergency information. Its original 140-word format allowed the rapid creation of emergency messages, while allowing the user to link the message to pictures, video or more detailed information on the Internet. Live streaming and geo-tagging on Twitter also enhanced its utility. However, as one study of Twitter use during Hurricane Sandy in 2012 noted, “relevant information became less prevalent as the crisis moved from the prodromal (preparedness) to acute (response) phase, and information concerning specific remedial behaviors was absent.”¹¹

Twitter’s decision to double its character count to 240 in November 2017 likely made its use by emergency managers more attractive. Tests of the new limits suggested that most people had not significantly increased the length of their tweets. However, the new limits allowed users to fire off messages faster with less agonizing over the composition of each tweet.¹²

While this paper focuses on the use of social media among emergency managers, the decentralized structure of social media also plays an important role outside of their control. A study of 142,756 geo-tagged tweets before and after Hurricane Sandy’s landfall chronicled citizen-citizen communication during the emergency. “The medium was used as a means of communal expression and as a mode of self-therapy,” the researchers wrote. “Rather than users abruptly jettisoning their social media practices and focusing on engaging with relief organizations and relief efforts, habits such as photo sharing and location check-ins characterized the response to Sandy, but with marked increases in frequency.” The same study also noted that Twitter was under-utilized by first responders, emergency managers and relief organizations, “often due to platform illiteracy.”¹³

In its *Social Media Update 2016*, the Pew Research Center said that 79 percent of online Americans used Facebook, a 7 percent increase from 2015. While young adults (18-29) represent the largest percentage of Facebook users, the service was also used by 62 percent of the small block of users, older Americans (65+). Pew reported that 32 percent of online adults use Instagram, 31 percent use Pinterest, 29 percent use LinkedIn,

and 24 percent use Twitter. “The vast majority of those who use other social media sites also use Facebook,” the report said. “For instance, 93 percent of Twitter users also use Facebook – as do 95 percent of Instagram users and 92 of Pinterest users.”¹⁴

Perhaps more to the point for emergency managers, the public they serve has transitioned from traditional media (radio, TV, newspapers) to digital media as sources for news. The Pew Research Center reported in 2017 that 93 percent of U.S. adults get their news online. This figure covers both legacy news organizations, such as newspapers that publish content on the web, and news outlets that are exclusive to the Internet.¹⁵ A separate Pew study showed that age is a major factor in who gets news from where: Older adults favor television as a news platform while younger adults prefer to get their news online.¹⁶ The takeaway is that social media have become critical platforms in which emergency managers inform and engage with the public.

Methodology

This study is the result of a content analysis of the nation’s 51 state EMAs. The design was based on a 2008 study.¹⁷ At that time, a *content richness index (CRI)* for each website was created by determining the presence of 23 website features (examples: newsroom, mission statement and training information) and information on 23 hazards (examples: flooding, tornadoes and hazardous material spills). The CRI indicators in the 2017 study were expanded to reflect subsequent changes in agency missions and advances in communication technology. For example, social media and disabilities were not measured in the 2008 study. (It should be noted that the new indicators represent features that were not in evidence on EMA websites during the 2008 study) The number of CRI indicators analyzed rose from 46 in 2008 to 75 in 2017 and represents statistically significant change. ($X^2 = 6.95$, $df = 1$, $p < .01$) *See Table 1.*

Neither that earlier study nor this one focused on the content issues that matter to information technology (IT) professionals, the standards for website coding and usability. The purpose of the research was to identify the nature of public information accessible to the constituents within the geographic areas served by each EMA. Specific compliance with standards established by the World Wide Web Consortium was not measured simply because accessibility did not emerge as an issue. On the few occasions that links were

nonfunctional, the cause was more related to website user maintenance than deficiencies within its software architecture. Along the same vein, compliance with Section 508 Standards under the federal acquisition regulations did not emerge as an issue during either study. While the technical issues relating to website architecture could provide an interesting line for future research, they were not the focus of these studies. These studies focused on EMA websites as critical points-of-contact between the government and its constituencies within the construct of a democratic society.

Several decision rules were created for the purpose of analyzing the website data. A website's newsroom was considered accessible if it was no more than one hyperlink from the site's home page. "Fresh" news referred to any news story/news release posted within one month of the day it was analyzed. This is a narrower definition than the three-month standard used in the 2008 study. That the decision rule was changed to accommodate a much higher volume of web activity is, in and of itself, a statistically significant indicator of the changing relationship between EMAs, the Internet and social media.

There may be a relationship between a state's population and the size and scope of its emergency management bureaucracy. Simply stated, a larger population may bring both greater tax-based funding and larger scale crises. To test whether the Internet and social media practices of presumably larger EMAs are different than those in less-populated jurisdictions, state/district population figures were based on a 2015 estimate of the U.S. Bureau of the Census. The jurisdictions ranked from 1-17 in population size were classified as high population states. Those in the second tier (18-34) were classified as medium population states. Those ranked from 35-51 were classified as low population states.

The relationship between Internet/social media activity and the EMA's placement within the state's command structure was explored. Some state agencies report directly to the governor while others report to a cabinet-level secretary. Those relationships are reflected in the architecture of EMA websites. The 29 EMA websites that required the

Table 1 – Content Richness Index

(*New to the 2017 study)

Website Features		
Director biography	Director photograph	Mission statement
Podcast	Vodcast	Video
Document downloads	Audio	Preparedness information *
Email links	Current weather	Kids/Youth information
National/state threat level	Disabilities information *	Training information
Pet/animal information *	Citizen Awareness (see/say) *	Newsroom
Email alerts *	Text alert *	Download app *
Search and rescue *	Amber alert *	Road conditions *
Flight delays *		
Hazard Information		
Terrorism	Tornadoes	Fire/wildfires
Biological/pandemic	Volcanic eruption *	Rockslide/landslides *
Power failure	Bomb/explosion	Nuclear/radiological
Hurricane	Earthquake	Flooding
Drought *	Snow avalanche *	Extreme heat
Active shooter	School emergency/safety	Extreme cold/ winter weather
Tsunami	Cybersecurity *	Dam failure
Construction/infrastructure	Severe storms/lightning	Gas/oil pipeline
Poisons *	Solar Storms *	Water safety *
Workplace safety *	Dust storms *	Radon *
Railroad incidents *	Aircraft incidents *	Mine safety
Air quality *	Scams and fraud *	Water/food safety *
Transportation emergencies *	Debris flow & removal *	Carbon monoxide *
Coastal erosion *	Business crime/theft *	
Social Media Links		
Facebook *	Twitter *	Snapchat *
Pintrest *	Instagram *	Flickr *
YouTube channel *	Blog *	RSS feed *

user to link to it from a home page of a parent agency were designated as “branch” websites. The remaining 22 independent websites were designated as “stand alone” websites.

Website Content

Whether measured in terms of raw numbers (CRI) or the differences of percentages over time, it is clear that, as a whole, the websites of the nation’s EMAs have become more content-rich during the past decade. The average EMA website’s CRI was 21.92 in 2017, compared to just 10.78 in 2007. ($X^2 = 5.452$, $df = 1$, $p = .0196$) Among individual states, the top six CRIs were found in Colorado (40), Utah (30), and Alabama, Massachusetts, North Carolina and Ohio (29). The greatest raw number increase in CRIs over the decade was registered in Colorado (+28), Ohio (+23) and Massachusetts (+22). At the bottom were Tennessee and Texas (15), Montana and South Dakota (13) and Arizona and Wyoming (12). Only one state, Montana saw its CRI drop from 15 in 2008 to 13 in 2017. *See Table 2.*

A more meaningful analysis tool is the comparative index (CI). In an effort to make the comparison between the 2008 and 2017 more relevant, each year’s CRI was divided by the number of features/hazards comprising that year’s index – 46 in 2007 and 75 in 2017. Doing so created a level playing field for comparing results.

The average CIs rose from 23.44 percent in 2007 to 29.31 percent in 2017 – which is not, in and of itself, statistically significant ($X^2=.0653$, $df=1$, $p=.4189$). However, the CI increased between 2008 and 2017 in 34 states with 12 of those increases considered statistically significant ($p \leq .05$). The CI fell between 2008 and 2017 in 17 states, with only one (Maine) considered statistically significant. *See Table 2.* At the top of the list was Colorado, where the CI rose from 26.09 percent in 2007 to 53.33 percent in 2017. The CRI increased on 34 EMA websites and decreased on 17 EMA websites. There were no statistically significant differences when analyzed by state population category. The same held true in the analysis of branch versus stand-alone websites. Nor were there significant differences when analyzed by FEMA regions.

Table 2:
State EMA Website CRI and CI Comparisons (2008 and 2017)

p values ≤ .05 are considered statistically significant

	CRI 2008	CI% 2008	CRI 2017	CI% 2017	p value		CRI 2008	CI% 2008	CRI 2017	CI% 2017	p value
AL	17	36.96	29	38.67	.5465	MT	15	32.61	13	17.33	.0237
AK	11	23.91	15	20.00	.8185	NE	10	21.74	25	33.33	.8788
AZ	9	19.57	12	16.00	.3961	NV	6	13.04	23	30.67	.0705
AR	10	21.74	21	28.00	.0505	NH	16	34.78	26	34.67	.8788
CA	16	34.78	28	37.33	.8137	NJ	13	28.26	26	34.67	.3778
CO	12	26.09	40	53.33	.0024	NM	6	13.04	23	30.67	.0067
CT	15	32.61	20	26.27	.4386	NY	16	34.78	21	28.00	.3738
DE	10	21.74	23	30.67	.6574	NC	9	19.57	29	38.67	.0134
DC	11	23.91	16	21.33	.2164	ND	6	13.04	18	24.00	.0705
FL	15	32.61	20	32.00	.9013	OH	6	13.04	29	38.67	.0005
GA	16	34.78	20	26.67	.3096	OK	8	17.39	22	29.33	.0768
HI	7	15.22	23	30.67	.0253	OR	9	19.57	17	22.67	.6473
ID	8	17.39	22	29.33	.0047	PA	17	36.96	26	34.67	.8137
IL	9	19.57	19	25.33	.0768	RI	9	19.57	27	36.00	.6473
IN	12	26.09	18	24.00	.3657	SC	16	34.78	25	33.33	.8084
IA	7	15.22	26	34.67	.7773	SD	4	8.70	13	17.33	.1167
KS	11	23.91	23	30.67	.3452	TN	12	26.09	15	20.00	.3763
KY	9	19.57	21	28.00	.2482	TX	13	28.26	15	20.00	.2482
LA	17	36.96	28	37.33	1.000	UT	12	26.09	30	40.00	.0848
ME	6	13.04	20	26.67	.0269	VT	9	19.57	16	21.33	.4669
MD	18	39.13	20	26.67	.1069	VA	17	36.96	23	30.67	.8759
MA	7	15.22	29	38.67	.0011	WA	13	28.26	28	37.33	.2643
MI	6	13.04	18	24.00	.0705	WV	3	6.52	16	21.33	.0082
MN	8	17.39	19	25.33	.2170	WI	9	19.57	28	37.33	.0243
MS	8	17.39	18	24.00	.2170	WY	11	23.91	12	16.00	.2059
MO	10	21.74	20	26.67	.4751	Avrg	10.8	23.44	22.0	24.44	.0196

When it comes to meeting the need of journalists, the numbers are contradictory. While the number of website with “fresh” or recent news increase from 58.82 percent in 2007 to 70.59 percent in 2017, the number of accessible newsrooms (on or directly linked to the home page), held steady at 80.04 percent. The percentage of websites with newsrooms dropped from 90.20 percent in 2007 to 76.47 percent in 2017. The number of websites where the agency’s public information officer (PIO) is identified by name has dropped from 30 (58.82 percent) in 2007 to 23 (45.10 percent) in 2017. State population appears to be a factor. *See Table 3.* The PIO is identified by name in 55.56 percent of the websites in high population states, compared to 43.75 percent in medium population states and 35.29 percent in the low population states. The PIO is identified by name in 50.00 percent of the stand-alone websites, compared to 41.38 percent in branch websites. When analyzed by FEMA region, there is a wide spread ranging from a low of 20.00 percent in Region 7 (Kansas, Montana, Missouri Nebraska and Iowa) to 66.67 percent in the aforementioned Region 2.

The Influence of Social Media

The growth of social media in the last decade is apparent when looking at the most common features on EMA websites. The top five features uncovered in the 2007 analysis were the website’s newsroom and training information (both 90.20 percent), downloadable documents (70.59 percent), the national threat level (62.75 percent) and current weather conditions (60.78 percent). Compare that to 2017, where the most common feature found on EMA websites were links to Twitter (100 percent) followed by links to Facebook (98.04 percent), links dedicated to preparedness activities (88.24 percent), information on flooding (80.39 percent) and training information (78.43 percent).

The degree toward which social media are embraced by the citizenry may be related to the size of each state’s population. The number of residents who follow state EMA social media platforms is 8.15 per 1,000 in the 17 states with the lowest populations. That compares to 5.57 per 1,000 in the middle 17 population states and 3.24 in the 17 states with the highest populations. Taking it one step further, a similar pattern

Table 3 – State EMA Website Content Analysis

Website analyzed May 25 –June 23, 2017

Hazards/Website Features					
Photo Gallery	15	29.41%	Terrorism	25	49.02%
Mission Statement	29	56.86%	Tornado	36	70.59%
Vodcasts	1	1.96%	Fire	32	62.75%
Document Downloads	39	76.47%	Biological Hazards	22	43.14%
E-mail Links	33	64.71%	Nuclear Power	27	52.94%
Video	31	60.78%	Hurricane	23	45.10%
Audio	3	5.88%	Earthquake	33	64.71%
Podcasts	1	1.96%	Flooding	41	80.39%
Threat Level	14	27.45%	Severe Winter Weather	37	72.55%
Current Weather Conditions	25	49.02%	Chemical Incidents	25	49.02%
Kids Page	20	39.22%	Tsunami	6	11.76%
Nonfunctional Links	15	29.41%	Drought	16	31.37%
Director Biography	28	54.90%	Cybersecurity	19	37.25%
Director Picture	26	50.98%	Avalanche (Snow)	3	5.88%
Newsroom	39	76.47%	Rockslides	8	15.69%
Training Information	40	78.43%	Volcanoes	3	5.88%
Disability Information	19	37.25%	Power Failure	15	29.41%
Pet Information	21	41.18%	Bomb/Explosion	7	13.73%
School Emergency	21	41.18%	Extreme Summer Heat	18	35.29%
Dam Failure	7	13.73%	Active Shooter	9	17.65%
Search and Rescue	8	15.69%	Preparedness Information	45	88.24%
Construction/Infrastructure	10	19.61%	See /Say Something	12	23.53%
Severe Thunderstorms	34	66.67%	PIOs identified by name	23	45.10%
Stand-Alone Website	22	43.14%	Branch Website	29	56.86%
Social Media Links					
Facebook	50	98.04%	Other Social Media	14	27.45%
Twitter	51	100.00%	E-mail Updates	10	19.61%
Pintrest	3	5.88%	Text Alerts	14	27.45%
Instagram	9	17.65%	RSS	14	27.45%
Flickr	10	19.61%	Blog	8	15.69%
YouTube	36	70.59%	Download App	12	23.53%

is revealed when factoring in governance (branch vs. stand alone agencies.) One possible explanation is that in states with fewer traditional mass circulation media, social media take on a greater role in the dissemination of public information. However, it is also noted that when the 50 states and the District of Columbia are ranked in terms of population density, the ratio of social media followers are almost identical among the low, medium and high population density categories. One possible explanation for this apparent contradiction is that budget considerations may be more of the determining factor. Logically, states with fewer taxpayers would have fewer resources dedicated to the emergency management than those with a large population. To determine whether there is a direct correlation between population density and budgetary considerations merits additional study.

Conclusions

The learning curve may have been a bit longer than one might like, but state EMAs have warmed up to the idea of using the Internet and social media to communicate with their constituencies. In the decade since the last analysis of EMA websites, 50 of the 51 websites analyzed have become more robust – at least in a numerical sense – with a greater level of content. It also bears noting that the change in CRIs of the 51 combined jurisdictions is marginally significant ($p = .0556$). However, a limitation of this research is that it measures the quantity, not the quality of information on an EMA website. (That is, perhaps, another line of future research.) The prominence of terrorism-related content has lessened. While terrorism was specifically mentioned on approximately half of the websites in both 2008 and 2017, the posting the current national threat level dropped from 62.75 percent in 2008 to 27.45 percent in 2017. Instead, EMA websites now focus on a broader range of potential hazards. Twenty-nine more hazards and website features were added to the 2017 CRI because those hazards/features were absent in 2008. The additions included email alerts, app downloads and all social media. As the people of the United States have become more multimedia savvy, so have emergency managers.

The adoption of social media by state EMAs is impressive. All 51 state EMAs use Twitter to communicate with their citizens. Only one does not have a Facebook page. Seven out of 10 post videos to their own YouTube channel. However, the presence of

subscriptions for e-mail alerts (19.61 percent) and text alerts (27.45 percent) are significantly lower. And while the social media numbers are encouraging, it is important to remember that only 11 out of every 1,000 Americans are connected to state EMAs through social media. This suggests a need to do a better job of promoting these platforms.

The relatively low penetration of social media also suggests a continued need for state EMAs to foster relationships with the traditional media outlets, such as newspapers, radio and television. As already discussed, the EMA websites today are stronger in some ways and weaker in others in providing journalists content than a decade ago. For example, the volume of online news releases/features has increased, while the number of websites that identify by name the agency's public information office has declined. It is also important to note that the concept of journalism has been transformed in the past decade. In addition to the traditional beat reporters, emergency managers most also deal with so-called "citizen journalists" and bloggers who use ready access to social media platforms to spread information – and occasionally misinformation.

The staggering growth of communication technologies poses many challenges for 21st century emergency managers. The decentralized flow of information to the public makes it harder to disseminate emergency information to an EMA's many stakeholders. However, lest we forget, these challenges also provide great opportunities. And isn't that the essence of emergency management?

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