WHEN THE LIGHTS GO OUT

How to use web maps for outage communications

BY BRIAN BELL, Esri Canada

The occurrence of severe weather events is on the rise at an alarming rate. According to the Insurance Bureau of Canada, extreme weather events that used to happen once every 40 years now occur as frequently as every six years in some regions; severe weather is expected to become even more frequent over the next four decades due to the effects of climate change.

These events often leave a massive trail of devastation and loss affecting thousands, if not millions, of people. In 2013 alone, the year-end severe weather insured loss in Canada amounted to $3.2 billion, primarily as a result of the December ice storm that battered southern Ontario and eastern Canada.

Due to its broad impact, severe weather often dominates the news. Without a single, credible source of real-time outage information, it could be very easy for media outlets to misconstrue information about power failures and deliver news that is counter to the truth, to the detriment of utilities.

Therefore, the question becomes, "how can utilities communicate outages effectively and promote a more informed and knowledgeable public, rather than simply a more opinionated one?"

Maps are an obvious solution because geography is a key element of how utilities manage their electric network and the field operations that support it. Furthermore, maps are a logical way of presenting the status of a utility system. Historically, utilities provided outage maps by scripting back-office processes to create static images of outage areas, which are then pushed to their website periodically.

However, this traditional static and significantly delayed outage map workflow misses the mark in providing context for the power outage (for example, route, destination of storm, possible areas affected by outages, and list of locations with restored power). Additionally, the presented information is often outdated by the time the static maps go live on the utility's website, which, consequently, could further reinforce inaccurate or out-of-date messaging to the public.

$3.2 BILLION

Amount of year-end severe weather insured losses in 2013, primarily due to the December ice storm that battered southern Ontario and eastern Canada.

Photo credit (iced power lines): Robert Lawton

Advances in geographic information system (GIS) technology now make it possible to disseminate up-to-the-minute information on power outages using dynamic web maps, which are easily accessible to utility staff and the public through their smartphones, tablets, and desktop computers. Web maps allow the utility to convey more accurate, timely, and compelling information.

CLOUD COMPUTING CAPABILITIES

Typically, customer inquiries to utilities increase exponentially during times of severe weather. This occurrence can be costly if utilities rely primarily on call centers to answer customer questions about outages. Call centers charge an average of $2 to 4 per call received during the day and in some cases, up to $15 per call at night. These charges could result in thousands of dollars in call center costs during a major outage.

Web maps are a cost-effective outage communications tool and it is critical that

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they perform consistently—especially during major outages. A cloud network offers virtually unlimited scaling, reliability and redundancy for hosting an outage mapping solution. When web maps are managed in the cloud, the technology infrastructure behind that system is managed for the utility across tens—or hundreds—of servers. As usage of web maps increases, additional infrastructure is applied seamlessly. Single points of failure are eliminated by automatically sharing processing tasks among a cluster of systems, ensuring a consistent end-user experience, which aligns with the public's expectations.

A large utility in Atlantic Canada realized these advantages when it implemented a cloud GIS-based outage map in the fall of 2014. When the year's biggest and most violent winter storm hit in November, the storm dropped over 35 centimetres of snow across a very large geographic area and caused extensive damage that left more than 50,000 customers in the region without power.

During the three-hour peak of the storm, visits to the outage map on the utility's public website rocketed to an average of 23 inquiries per second. In the end, the outage map effectively handled 1.2 million inquiries over the 24 hours immediately following the storm's arrival.

Extreme weather events that happen once every 40 years now occur as frequently as every six years in some regions

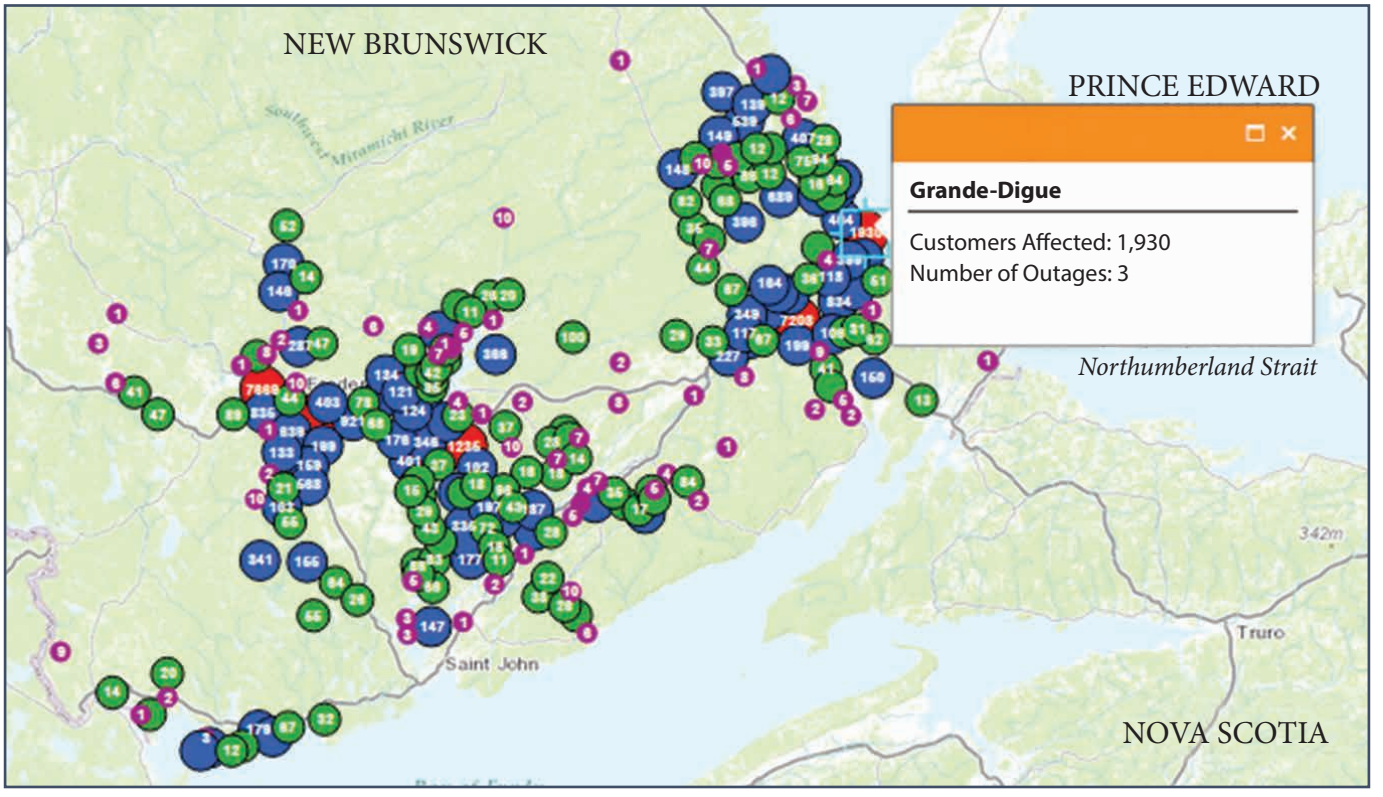
Source: Insurance Bureau of Canada

The cloud-based infrastructure that was hosting the solution provided additional processing capacity to accommodate the increased traffic without placing any strain on the utility's servers; the public outage map operated independently of its in-house information technology (IT) infrastructure. Consequently, the outage map maintained 100 percent uptime, performed consistently and delivered a positive end-user experience throughout the storm.

The utility also avoided the costs of purchasing and installing additional servers to achieve the scalability that the cloud GIS environment provided to manage the sudden surge in map visits during the storm. In addition, communicating outage information through the easy-to-interpret web map resulted in fewer calls to the utility's call center and helped the public gain a clearer understanding of the scope of the power outage.

This level of seamless, simplified positive interaction between the public and the utility's complex outage management systems and processes has not always been easy to achieve. Some utilities have implemented outage mapping processes prior to the establishment of industry best practices and have lived through various challenges as a result. One of the most detrimental obstacles some utilities have faced has come from improperly safeguarding their outage

Figure 1: During severe storms, utilities can use a dynamic web map to efficiently communicate outage reports to the public. Hosting the map in the cloud ensures that it can support sudden surges and spikes in customer inquiries.



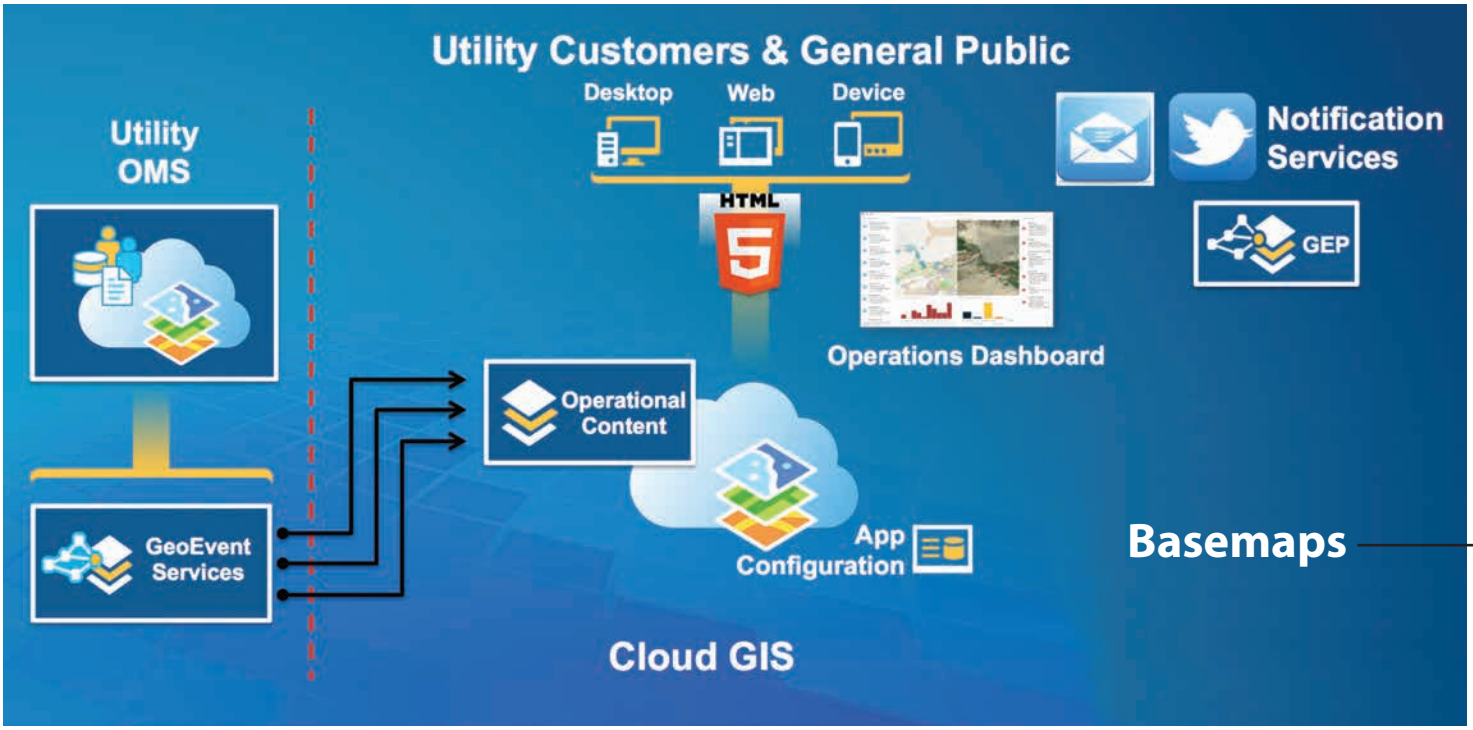


Figure 2: The ideal outage communications framework integrates key operational systems with cloud-based GIS capabilities to support automated mapping, publishing, and information distribution workflows.

management or distribution management systems from their public outage mapping and communications tools. Failure to properly address this risk can expose a utility's critical operational systems to uncontrollable and unanticipated stresses, as extensive public or internal interaction with that information can drain the systems' processing capabilities. Several utilities have unfortunately experienced this avoidable effect in recent years.

Another key risk to consider is the drive towards elaborate, heavily customized applications and processes. Outage maps can be easily customized and extended to support the specific requests of each utility. However, the full impact of those choices is not always fully considered at the time the decisions are made. These kinds of deviations from best practices can strip the utility of the many benefits it would realize from an outage mapping solution and actually introduce risk to its processes instead of mitigating it. This occurrence has happened often as the desire for creating a unique end-user experience has usurped the utility's fundamental goal of providing a clear, comprehensive outage communication channel.

PROACTIVE OUTAGE COMMUNICATIONS

While this dynamic outage map may seem a significant improvement from the traditional static maps, automated voice-

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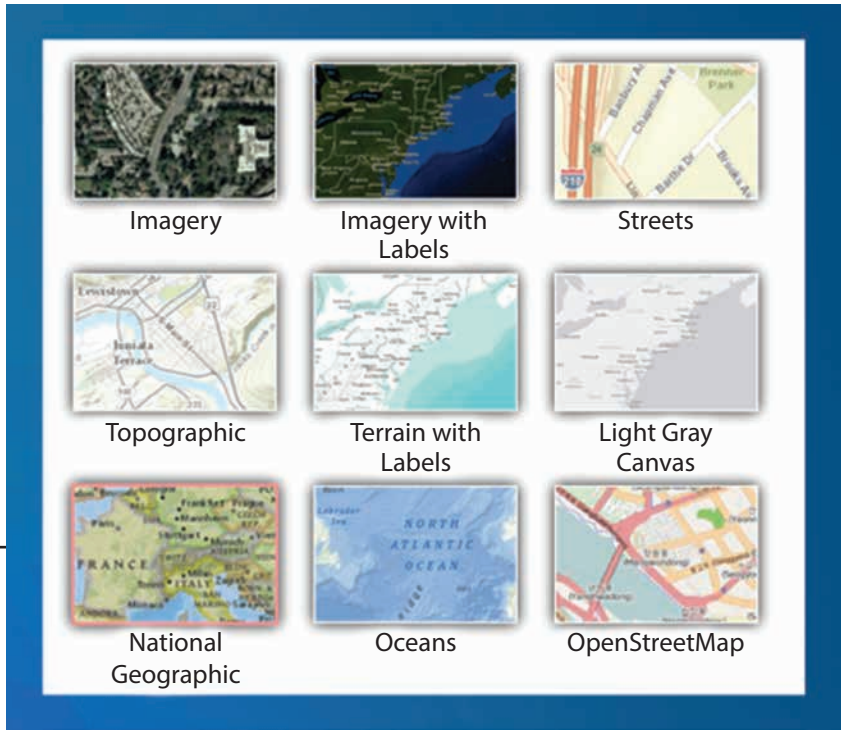

recorded updates and call center support that many utilities currently provide, the ideal outage map delivers a more proactive approach that incorporates an array of notification services.

A proactive outage communications framework has a number of characteristics. The ideal outage communications framework integrates key operational systems with cloud-based GIS capabilities to support automated mapping, publishing, and information distribution workflows (refer to Figure 2). Furthermore, the ideal outage communications framework enables utilities to disseminate real-time information to both internal and external stakeholders so that both groups can make effective decisions. This outage framework includes the following six components: a public outage map, an internal outage map, an internal operations dashboard, real-time integration with key operational business systems, automatic notification services, and continuously updated basemaps.

1 Public outage map

A robust framework that is based on a cloud GIS platform allows utilities to quickly create and publish a public outage map accessible through desktops and mobile devices. The map provides timely updates on outage locations, outage causes, number of impacted customers, restoration progress and expected restoration time, and ideally incorporates live weather feeds. Information presented through this map is also 'regionalized' to provide insight for the public at both small and large-scale views.

2 Internal outage map

Utilities would be able to deploy a more detailed version of the public-facing map for use by staff. This map displays information including grid infrastructure and assets such as wires, poles, and transformers to provide a broader operational perspective. Information not normally shown to the public, such as live crew locations, affected key accounts and incident prioritization, is available using internal outage maps to provide additional decision support to the utility.

3 Internal operations dashboard

In order to manage internal workflows, a well-designed framework includes an internal dashboard for monitoring outages and restoration activities that enables the utility's operation center to prioritize work and the allocation of crews and resources. An interactive, live operational dashboard enables insight beyond that of an internal or external outage map, providing direct answers to questions about regional effects, impacts to key performance and macro-scale indicators.

4 Real-time integration with key operational business systems

For communication to be timely and accurate, the web maps display content from the utility's distribution and outage

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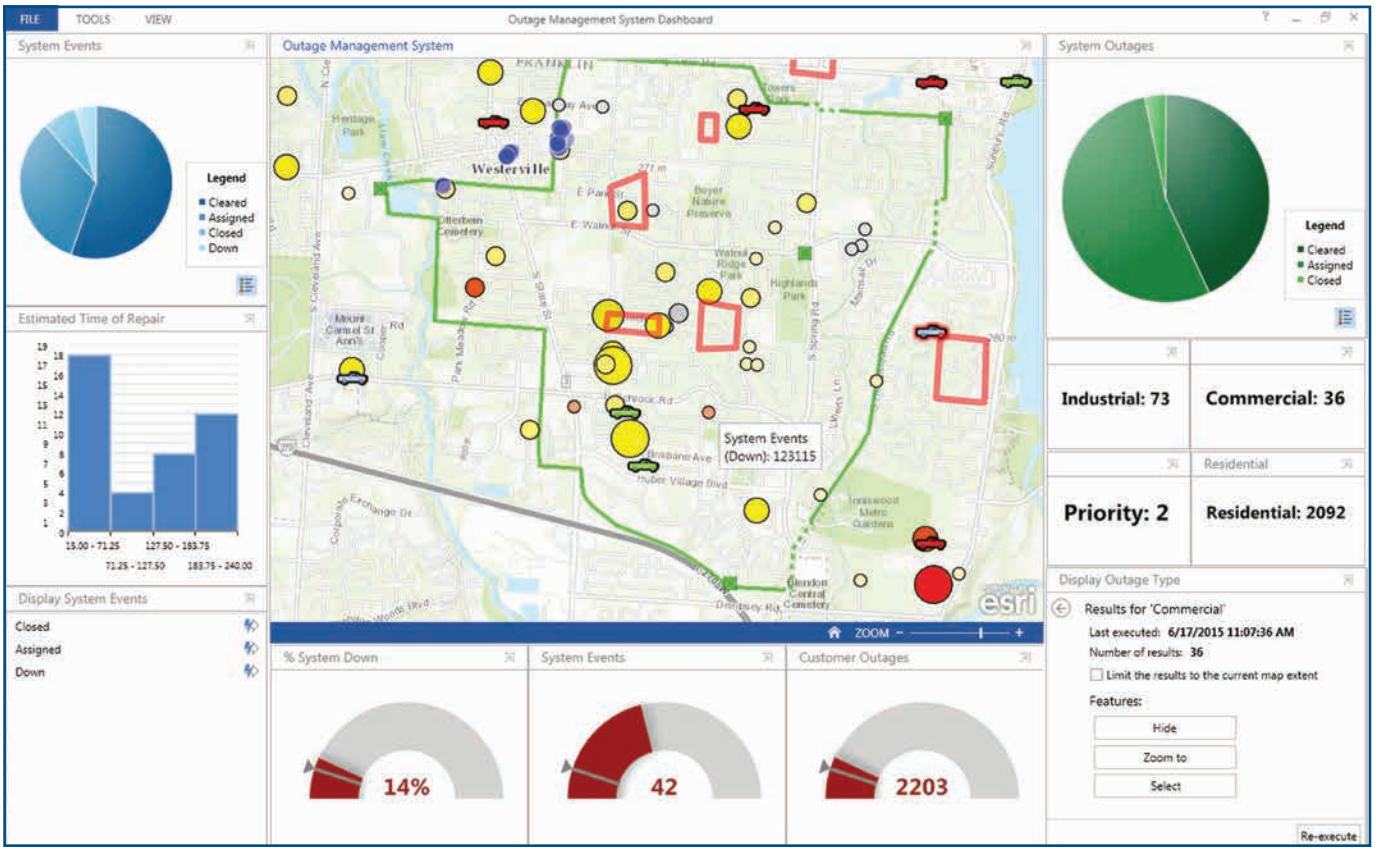

Figure 3: The internal operations dashboard provides a holistic view and richer context for operational decision-making by displaying critical information including asset and equipment locations, types, incident classification and priority. If customers lose power during a storm, cluster bubbles on the map change in color and size to indicate areas where crews should be dispatched.

management systems integrated with its GIS, or in the absence of those systems, provide a direct view into the operational monitoring systems such as AMI (advanced metering infrastructure) and SCADA (supervisory control and data acquisition). Additionally, web maps connect to a utility's customer information system to enable the delivery of text and e-mail outage alerts.

5 Automatic notification services

A proactive outage communications framework provides the capacity to push out notifications to customers via e-mail, text or through the utility's social media channels such as Twitter, Facebook, Flickr, YouTube, and Instagram. This capability allows the utility to provide proactive customer communications through opt-in programs. Automatic notification services are one of the most powerful methods that a utility can use to strengthen a corporate brand and build a positive relationship with customers.

6 Continuously updated basemaps

The cloud GIS platform provides continuously updated basemaps from authoritative sources. This capability reduces the utility's costs of creating and maintaining its own basemaps and allows it to focus on the operational information that the maps should display.

FAMOUS LAST WORDS

When an outage occurs, utilities must move beyond solely restoring service; providing status updates to customers through the channels and devices they use in their daily lives is equally essential. By establishing this framework for proactive outage communications, utilities will be able to effectively communicate with customers before, during and after power outages and ultimately enhance customer service, improve operational transparency, and provide significantly improved value to their shareholders and customers. ET

Brian Bell is the utilities industry manager for Esri Canada and has more than 15 years of experience in GIS design, development and implementation. He is a recognized Project Management Professional and certified instructor for Esri and Schneider Electric Utility GIS courses.

COMMENTS: bbell@esri.ca