

Biographical Information

Thomas G. Counts

President

3-GIS

Specific Responsibilities

As President and Chief Executive Officer, Tom has helped create and launch 3-GIS from its first day of inception. Tom is responsible for all aspects of the organization with a focus on sales, marketing, and channel development. Since launching the company in 2006, 3-GIS has grown to 19 employees with over 20 different GIS-involved customers ranging from emergency response to electric transmission to telecom services. 3-GIS is now in the process of launching its Express Suite of products; offering a thin-client approach to enterprise GIS.

Past Experience

2001 – 2006 Telcordia Technologies; Vice-President of Product Management of \$60M Geospatial Engineering Product Line. Responsible for overall product performance of corporate geospatial products; Network Engineer Suite, Force Suite, and GIS Consulting Services.

1996 – 2001 Mesa Solutions; President and co-founder of Mesa Solutions. Designed, launched, and delivered Network Engineer suite to the telecom industry along with broad utility consulting group. Merged with Telcordia Technologies (Bellcore) in 2001.

1986 – 1996 Intergraph Corporation; Senior Engineer; Electronics division.

Educational Experience

1985 B.S. – Chemistry and Biology, University of Alabama at Huntsville; Cum Laude

1986 Graduate Studies – Crystal Growth in Microgravity Environment, UAH

1987 Graduate Studies – Environmental Management, UAH

1997 Advanced Program Management, UAH

2000 Technology Product Management, Pragmatic Marketing

Professional Memberships

GITA

Small Business Incubator Mentor

Huntsville & Decatur, AL - Chambers of Commerce

American Society of Quality Control

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TRANSFORMING THE EMERGENCY OPERATIONS CENTER WITH GIS

Abstract:

The Emergency Operations Center has long been the center of the storm after the storm has passed. The key to the EOC is to receive, process, aggregate, organize, and communicate incoming incident data to event managers to consume and create a timely and educated response. Unfortunately, data latency from the “edge of the network” has often resulted in incomplete, conflicting, and/or poorly translated information. By deploying and utilizing mobile GIS devices enabled-by and embedded-in today’s cellular devices, the ability to create an accurate Common Operational Picture in real-time is no longer a dream of the future. A long concern has been the utilization of high-technology (read delicate and complicated) in the field during times of extremely high stress and confusion. By deploying enabling GIS technology in a modern cellular telephone, the extraordinary event can be responded to using ordinary technology. With the advent of this enabling convergence, the first responder can actually reduce the number of disparate devices in his toolbox to a single, GIS-enabled, cell phone. With this device he can identify (or dispatch to) his location, pinpoint an incident, notate the incident, photograph the incident, call in the incident, and share critical information regarding the incident from a single device.

The Emergency Operations Center

The Emergency Operations Center (EOC) can be considered one of the single-busiest data management centers during a time of crisis. The charter of the EOC is to receive, process, aggregate, organize, and communicate incoming incident data to event managers. It is up to those managers to consume that information and create a timely and educated response to those events and conversely communicate that response back to the correct personnel to save lives, property, and maintain order. Key components in this scenario are not trivial; receiving information must be **timely**, the information must be **aggregated** to overlay common threads and avoid multiple responses to common events, the events must be **organized** and **prioritized** in order of precedence for maintaining life, community, and property, and the response must be **measured** and **adequate** to achieve the most **efficient** results without wasted effort or resources. At the end of the day, few will congratulate the EOC when all the parts come together, but legions will queue to point out blame when the results aren't favorable.

Knowledge at the Edge

The initial key to the efficient EOC is that timely accurate information be fed into the process. There are many colloquialisms that fit this challenge: garbage-in/garbage-out, error is a function of time, spoken from the horse's mouth – it all boils down to knowledge being at the edge of the network. Key information, the information needed in the EOC, is gathered at the edge, or in the hands of the first responder. The faster that information can be relayed from the edge to the center, the more likely it is to be accurate (positionally and situationally) and the better chance the EOC manager has to properly process the information into actionable response tasks.

Two-Way Radios, Push-Pins, and Post-It Notes



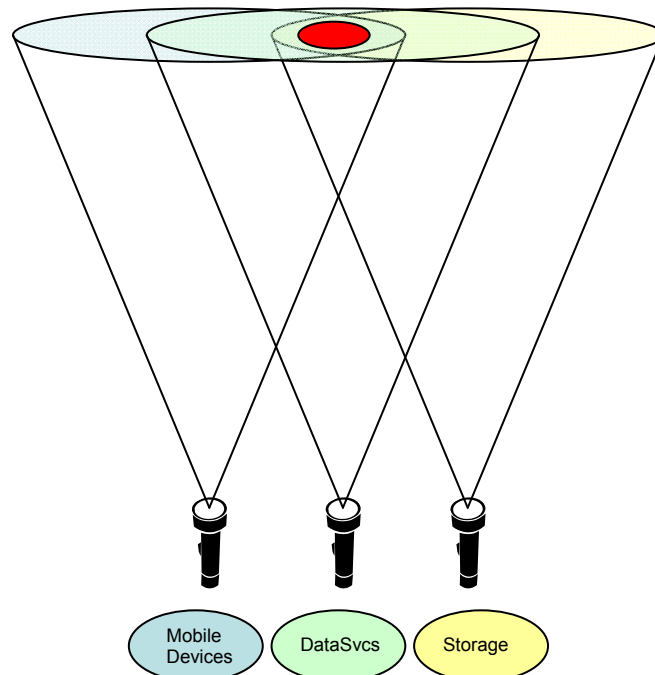
The EOC is not a new concept. It is, however, an evolving concept that continues to embrace change and technology. In the beginning, there were banks of telephones and

radios to intercept conversations and receive status calls. Those intercepts were captured on notes and often directly placed on paper maps hung on the wall, on pre-configured information boards, or identified via push-pins in static displays. Either way, it was confusing, inaccurate, inefficient, but, for the time, as effective as technology could allow. The EOC, was for all intents and purposes a gathering post of often old and conflicting *data* - not necessarily actionable *information*. Although far better than no central repository of incident information, it had a long way to go to become truly effective during times of large incident responses simply due to the inability to aggregate large quantities of detailed information - quickly.

Bridging the Gap with Converging Technology

One of the greatest benefactors of much of today's converging technology happens to be the EOC. As a technologist, this provides a great opportunity now to use acronyms in wreckless abandon. The convergence of mobile computing (550Mhz processors w/ 8GB of RAM!) with GPS, over 2.5 – 3G networks, utilizing SOA, and providing LBS greatly enhances the potential of the EOC. What did we really say here? One can use an ordinary smartphones to provide timely, positionally correct location-based data in an instantaneous fashion to the EOC from the first responder or real-time data providers. In other words, you can get it faster, louder, and clearer, from the horse's mouth.

A real key here is the use of ordinary, or readily accepted, technology. During the stress, confusion, distraction, noise, rain, wind, and torment (extraordinary conditions) of a potential threat situation, it is unrealistic to depend on your first responders to use extraordinary technology. Having to do so would surely result in errors in operation, delays in transmission, and potentially 100% failure of the response loop. To use ordinary technology in an extraordinary situation is the safest way to ensure successful completion of the response loop. What better example of ordinary technology than the standard cellular telephone? By extending the capabilities of this device, we extend the capabilities of the edge of our network (or first responder) and greatly improve the performance and reliability of the information coming in from that individual.



To facilitate transmitting that collected data from the Smartphone is the next rapidly expanding technology; wireless broadband coverage. We are experiencing the next jump from 2G (Digital) to 2.5 & 3G (GPRS – EVDO) cellular networks with theoretical through-put of 3Mbps with near-term promises of 10+Mbps. This is approaching office LAN speeds and supporting greater and greater data demands of the field technician.

Add to that WiFi and WiMAX coverage zones and the ability to transmit and manage large amounts of temporal data becomes much less daunting.

The final, and key component, is the ability to aggregate the multitude of inputs from the edge and present it into a single medium to coalesce the data for a clear picture of situational awareness. Evolving Online Analytical Processing technologies (OLAP) is the final component that brings the solution together providing mechanisms for data management and presentation. Databases configured for OLAP employ a multidimensional data model (including mash-ups of web-service data) allowing for complex analytical and ad-hoc queries with extremely rapid execution time. The output display of OLAP into a geospatial medium is the final brush stroke that brings the picture to life.

Once you deploy the converging technologies outlined above, you have all the tools to create the....

Modern Common Operational Picture

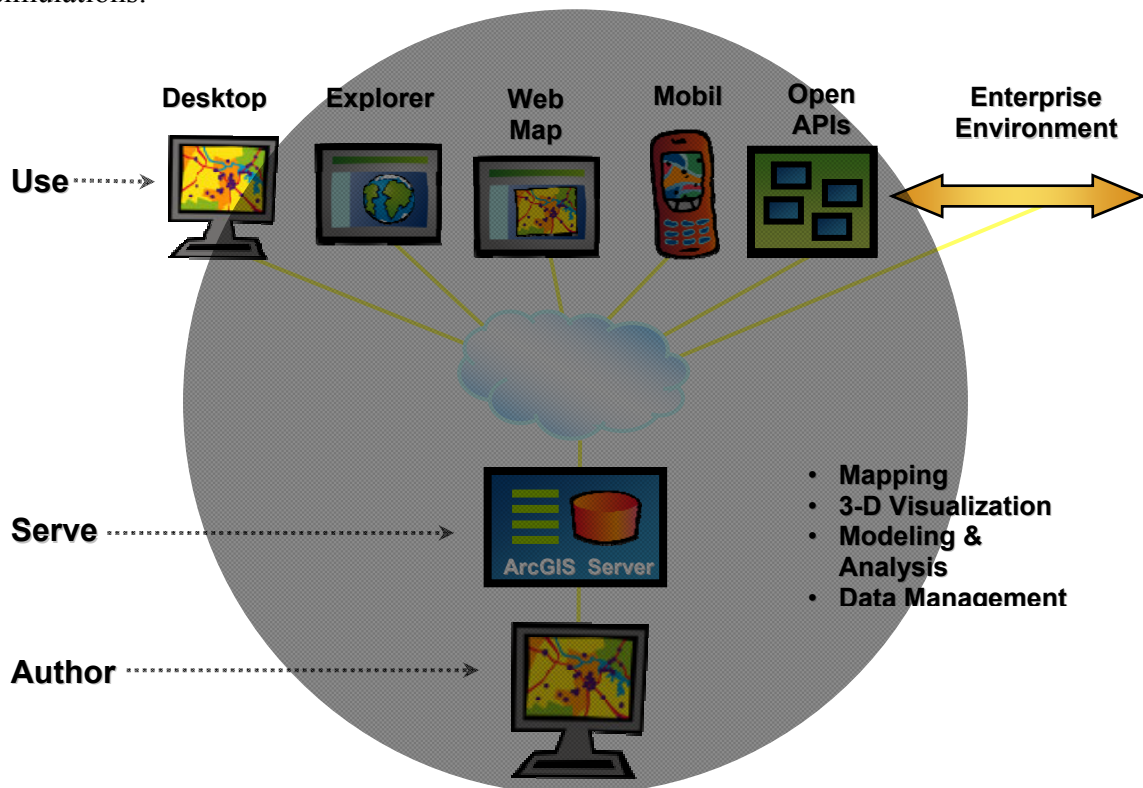


Virtually every incident in the Common Operational Picture (COP) has a positional component to it. Resources, shelters, vehicles, incidents, plumes, traffic, wind, floodwaters, fire-lines all have a common thread; their impact to life, community, and property is attenuated, or amplified, by position. That amplification and attenuation is also temporal in nature. So not only is positional accuracy important but also the ability to predict where it will be in space by virtue of where it's been in space coupled with external (also positionally important) pressures. The multivariate non-linear math of this predictive model is staggering and complex. Although the numbers can be calculated using today's impressive multi-processor machines, the results are meaningless if the output cannot be communicated in a person-readable and actionable method. This is the perfect opportunity to abuse another colloquialism; a picture is worth a thousand words. That picture is best presented in the format of a dynamic map aggregating inputs from the edge of the network along with a multitude of available web services provided by many public and private providers. Examples and applications of those web services include

live weather models over spatially correct population density, terrain, and transportation models – each component from disparate providers delivering best-of-breed data. Once that data is aggregated, you create a brilliant view of information. Examples of these data services can be found at Weatherbug.com, GeoData.gov, GeographyNetwork.com, and ArcWebServices.com. The final “God’s-eye view” of the situation is truly a Common Operational Picture reflective of a fluid environment that can best be called a real *System of Geographic Information*. This GIS not only provides the ability to see the path(s) of impact but also provides a means to predict incidents and deploy assets in advance of those incidents.

The transformation of the EOC with Server-based GIS

Above we have outlined various technologies that have the potential to truly transform the EOC to a modern data aggregation decision making machine. The move from theoretical to practical has been enabled by many of the capabilities presented by ESRI’s ArcGIS Server 9.2 technology. ArcGIS Server provides the opportunity to manage mobile inputs via ArcGIS Server Mobile, the ability to design and aggregate the mash-ups with ArcGIS Editor, the ability to store, index, and quickly retrieve the data with ArcSDE, the OLAP tool with the ability to publish the aggregated data with ArcGIS Server, and the ability to use the data with web-based explorers and application friendly API’s. These API’s are utilized in various impact analysis tools including plume modeling, flood plane analysis, statistical prediction modelers, and environmental impact simulations.



Summary

This technology we have reviewed in this paper; smartphones (with faster processors and incredible amounts of storage capacity) at the edge of the network, high-bandwidth public communication channels, geospatial OLAP data processing engines, and mash-ups of aggregated data, outline the transformation that is possible in the EOC today. This convergence of enterprise-wide geospatial technology has brought us to the tipping point of fully GIS-enabling the EOC. We have GIS-enabled cellular telephones capable of detailed data management, we have applications that can aggregate the input from these devices, we have a broad array of web-services accessible for little to no-cost, we have GIS computing architectures that tie all this together into a seamless view of a complex, changing, fluid world. We have the ability to see the past clearly, but we also have the tools to predict the future - even if the future is only seconds away. We not only have the opportunity, we have the obligation to leverage the technologies presented in this document to provide the best tools to protect and preserve life, our community, and our property.