

The Pen & Paper Solution

SoCal department uses digital pen to capture vital fire information

By Michael Hoose

Like many departments in California, the Santa Barbara City Fire Department (SBCFD) is often called to fight large wildland/urban interface (WUI) fires throughout the state, the county of Santa Barbara and even in my own first-in, which battled through conflagrations such as the 2008 Tea Fire and this year's Jesusita Fire (who would've believed 9,000 acres burned in the first week of May?).

With a large geographic area to cover—including a range of environments and terrains throughout the state—the SBCFD constantly seeks to improve its skills and processes for collecting and distributing fire intelligence so that we can effectively manage resources and ultimately keep firefighters safe out on the line.

One key part of our strategy includes quickly collecting and sharing field information about rapidly changing fire situations via sophisticated GIS systems. Recently, we adopted a unique type of technology in the form of a digital pen, which allows firefighters to collect data on paper maps in the field and automatically integrate that data into GIS systems to expedite information sharing and decisions made by command. And as sophisticated as it may sound, it's really all about one very cool pen.

WHY GO DIGITAL?

Life safety, property conservation and environmental protection are three core missions of the SBCFD. Each of these requires a quick response with tools at the ready and an eye toward pre-planning.

Often, with a short amount of time to react and unpredictable locations in which to work (think environment and terrain), we need reliable, intuitive tools that are easily transported and easy to work with, whether we're at the incident command post (ICP) or in the field.

Accumulating and disseminating timely, vital incident information is a top priority for incident commanders (ICs) who coordinate firefighting efforts and resources, which can include hundreds of firefighters and a range of resources aiding them. Intel about current conditions therefore needs to

flow easily from the field to the ICP, where decisions can be made and updated plans can be shared with crews on the line. To be effective, the data must be timely, easy to understand and accessible to all. But we also need something that gets the job done without unnecessary



PHOTO KEITH GULLOW

Firefighters have traditionally used paper maps to track crew locations, fire spread, etc. But we've often got a short amount of time to react and unpredictable locations in which to work, so we need tools that are easily transported and easy to work with, whether we're at the incident command post (ICP) or in the field.

expense, training, support or worries about performance in harsh environments.

HOW IT WORKS

With all of this in mind, we selected a solution from Seattle software company Adapx. The company's Capturx for ArcGIS desktop extension enables field crews to continue working reliably and comfortably with paper maps in the field while also automatically

integrating data into the GIS through a digital pen.

The system uses maps printed with ArcGIS, a digital watermark, in addition to all the regular information you'd expect to find on a map. When users write on the map with the digital pen, they not only get normal ink strokes, but also get their data digitized—instantly.

Each stroke of the pen on the paper map creates a new feature or red-line annotation, which is geospatially referenced. When the pen is brought back to the office or ICP and docked into its USB port on a PC or laptop, the field data automatically (and near instantaneously) appears in ArcGIS.

Since the basic workflow and the form of the tools (map and pen) haven't changed, we were able to quickly implement the digital pen into our regular procedures and begin sharing data about fires.

And since it's just an advanced version of old-fashioned pen and paper, we didn't have to purchase, support or carry expensive equipment into the field. Data collection and upload are fast and can be performed by nearly anyone. By decreasing the time between data collection and data upload—and eliminating the manual transcription process—those who make fireground decisions can now more quickly and accurately determine the next steps in battling any fire.

WHEN TO USE IT

There are many situations in which the simplicity of capturing data with pen and paper makes sense.

- Pre-fire surveys: My engine company performed pre-fire surveys prior to the Tea Fire last year. These drive-by surveys were done to determine areas or structures that were defensible, indefensible or possibly "stand-alone." Other pre-fire surveys involve collecting geographic data that will be critical in the protection of citizens, property and fire crews during the course of initial or extended attacks on fires. Adapx also includes an Excel utility (which works perfectly with the ICS forms we have to fill out) so you can create customized tables that can be converted into ArcGIS.
- Fire operations: Multiple teams may be tasked with monitoring and documenting changing conditions and fire progress on the ground. If multiple teams are working a large incident, it's critical that everyone has access to the most current fire information available. I had the opportunity to introduce this technology to the GIS Unit of Central Coast Incident Management Team 7 and to Jim Smith, IC on the Chalk Fire last year. The Type 2 Team is currently working on obtaining this technology.
- Post-fire assessments: During post-fire surveys, we inspect and assess damage, as well as the safety impact of fires upon structures, roadways and other important sites. Similar to the other data-collection activities, walking the fire-damaged areas and documenting the destruction is easily accomplished with pen and paper. On the Tea Fire, we were quickly able to produce structure damage assessment maps.

KEEP IT SIMPLE

One key benefit of using the digital pen: its simplicity. The firefighter collecting data in the field doesn't have to be a GIS expert. The information written on the paper map automatically converts to GIS data. And if there's some sort of failure, we still have the mark-ups on our maps.

With the natural pen interface and direct integration into ArcGIS, virtually any firefighter can immediately begin using the digital pen



PHOTO COURTESY, JIM MCCOY

Multiple teams may be tasked with monitoring and documenting changing conditions and fire progress on the ground. If multiple teams are working a large incident, it's critical that everyone has access to the most current fire information available. By using the digital pen, incident commanders can more quickly and easily store and disseminate vital information to crews in the field.

to speed data collection without any extensive training.

Unlike mobile computers, if the digital pen is lost during the course of firefighting, teams retain paper copies of the data, which can be brought back to the unit at the ICP. Firefighters don't have to re-survey and re-acquire lost data, which may not even be possible during a fast-moving fire.

The pens are also interchangeable and can easily be replaced at a fraction of the cost of ruggedized mobile computers.

SAVING TIME & MONEY

The SBCFD has presented this technology to the Santa Barbara Emergency Operations Center (EOC) for possible inclusion in their data-collecting procedures. If accepted, fire crews will be able share data/intel with those in the EOC on any type of incident.

Cost savings from using digital pen technology compared to traditional pen-and-paper mark-ups or other mobile solutions are immediate. Decision-making is quicker and performed with fewer resources. Our firefighters are able to spend more time and resources fighting fires instead of waiting for paper, manually re-entering data or tying up their teams with supporting expensive mobile computers in unpredictable field situations.

It's a pen-and-paper solution, though it's really the wizard (technology) behind the curtain that does the magic. Great—what could be more firefighter-proof than that?

Michael Hoose has been with the Santa Barbara City Fire Department for 15 years and currently serves as a fire captain assigned to a Type III engine. Hoose is red-carded in various positions and is involved with the Fire Location and Incident Reporting (FLAIR) program, a near-real-time fireline GPS photo program. He's been published in the American Congress on Surveying and Mapping's bulletin, as well as other fire service publications. Contact Hoose at mikehoose@verizon.net.



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