New mobile computing devices have expanded the reach of mobile GIS (geographical information system).

Mobile GIS
Improves Field Applications

The convergence of easy-to-deploy GIS solutions and low-cost mobile computing devices with GPS functionality has created new opportunities for businesses and government agencies to leverage advanced mapping and location data in a number of applications. The market for GIS solutions is expected to grow 50% over the next five years, according to industry analyst ARC Advisory Group, and a significant amount of that growth has been spurred by new mobile GIS solutions, as well as cloud computing and SaaS (Software as a Service) delivery models that have made utilizing GIS in disparate locations easier and more cost-effective.

The ability to access location information via mobile devices is increasingly important to consumer and enterprise users. "In the past, workers routinely conducted field mapping, data collection, asset management, and damage assessment/inspection activities using only paper-based systems," says Martin Copping, ArcGIS mobile product manager at ESRI. "New mobile workflows are replacing paper, allowing field staff to more accurately collect critical business information and increase their field productivity."

Utilities, municipalities, and public safety organizations can now utilize mobile GIS solutions to map physical assets, direct repair and maintenance efforts, provide critical information for emergency response personnel, design networks, and map out new utility grids. "Mobile GIS is evolving to become one of three legs of communication for mobile workers," says Dominic McNeillis, product marketing manager for Pitney Bowes Business Insight's Confirm solution. "They need to know where it is, what it looks like, and some information about it. This is location, picture, and words. Mobile GIS will evolve to become part of everyday communication for the purpose of communicating location. Therein lies its true value." According to McNeillis, mobile GIS solutions are becoming more common in "blue collar" service applications, as well as for specialist users like bridge engineers. "With the latter, it is more about the user interface and link with the back office system than the map, although the map is acting as a seamless [often taken for granted] technology," he says.

Advanced Mobile Devices Bring GIS To The Field

The availability of mobile computing devices with advanced processing capabilities, as well as the integration of GPS technology in consumer PDAs and mobile phones, has greatly expanded the potential value of mobile GIS solutions. Because location data can be collected using relatively low-cost devices like smartphones, field staff can col-

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Martin Copping, ESRI

lect geographic information using mobile GIS solutions without the added expense of purpose-built mobile hardware. For more advanced GIS users, the adoption of tablet PCs and UMPCs (ultra-mobile personal computers) has provided greater computing power in the field, allowing staff to access, edit, and manipulate GIS data on site. "We continue to see increased competition in the device market," Copping says. "The wide variety of mobile devices available today, along with the explosion and rapid adoption of new mobile platforms [i.e. Android, iPhone, etc.], is driving mobile GIS software development into areas that we hadn't originally expected."

Since users can deploy a common computing platform across a wider array of devices (both desktop and mobile), it is easier to expand the use of GIS across the organization. "The smaller form factors have virtually the same capabilities as the larger devices, so users expect to just choose the size of device that best suits their needs and for all of the software to be available," says John Gomersall, chief product architect for Confirm.

By deploying mobile devices that can handle a variety of functions (voice, data, GIS, digital cameras, etc.), enterprises can lower their TCO (total cost of ownership). And because consumer devices now have many of the same capabilities, organizations can allow their own customers to participate in the GIS ecosystem. "The advent of mobile GIS also enables future participation, with greater accuracy, of crowd sourcing of data," McNeillis says. "In this case you would have citizens collecting and reporting from their mobile phones using a mobile GIS interface, reducing validation requirements." For instance, citizens could use the GPS capabilities in their mobile phones to provide location data when reporting potholes or down power lines to a municipality or utility company.

Mobile GIS Transformation Continues

End users are increasingly asking for field collaboration and real-time capabilities in their GIS solutions. Collecting, editing, and analyzing mobile GIS data seamlessly in an "always connected" environment, and integrating data with back end applications such as ERP (enterprise resource planning), CRM (customer relationship management), and field service automation systems have become "must have" features for mobile GIS systems.

IT departments, meanwhile, have been tasked with maintaining network security while enabling users to connect to these solutions using a variety of wireless communications technologies. Web-based applications and cloud computing environments have aided in making GIS data available to mobile users with fewer integration headaches and a lower cost. Gomersall says another important advance will be the ability for users to access mapping offline using some sort of predictive caching based on their planned route, for example. "We believe the distinction between a mobile application and a Web application will narrow over the next year," Copping says. "Augmented reality (AR) — the overlaying of digital data on the real world — will add to this. AR applications are quickly gaining momentum, especially on the iPhone."

Eventually, McNeillis says, GIS technology will fade into the background as users focus more on business benefits. "I see maps becoming a taken-for-granted enabling technology, and the focus shifting to operational efficiency, relevance to role, connection with back office applications and functions, and, finally, the provable ROI." •