# Parcel Mapping Technology for Growing Counties

**By**
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**Abstract**
Often when a county experiences rapid growth it has a hard time keeping up with parcel edits. This can be a serious problem as an accurate parcel layer is important for planning decisions. Some of the fastest growing counties rely on text-to-vector software for increasing parcel mapping productivity. This presentation will discuss and demonstrate the latest in text-to-vector, COGO, and other parcel mapping technologies.

**Introduction**
Why is it important to reduce the costs of parcel data entry in GIS? Because data entry costs can account for up to 90% of the total project budget.[i] This paper and presentation address the new options available for speeding up the GIS data entry process, specifically for those creating and editing parcel data.

**Sources of GIS Data**
There are three primary sources of GIS data. Field data which is gathered today using various automated means such as data collectors, handheld devices, and tablet PC's. Secondly is electronic data. This is in the format of existing CAD drawings, databases, aerial imagery, satellite imagery, or various other data files. Lastly there is paper data, or paper based data. This could be scanned images of paper documents, text files, word processor documents, or good old-fashioned paper. Examples would include property descriptions and deeds, field cards or notes, published reports, and maps or plans. Of these three types, the one that carries the highest conversion costs by far is the paper based data. It is this data type that this paper will address because that nets the largest return.

**Creating Data from Paper Documents**
There are two types of GIS data, features and attributes. Features are the graphical entities of the GIS system; they are made up of lines, curves, or points and are mathematical in nature. Examples of features in parcel related GIS systems could be parcels, easements, roadway alignments, or Right of Way's. Attributes are just additional database fields that further define or describe features. These can be anything, but examples would be parcel identification number, owner name, mailing address, property value, or zoning information.

Lets first look at the methods for creating GIS features from paper based documents. The most common method used is rasterization. This is not very accurate but it is fast. Typical raster

conversion applications are ESRI's ArcScan or the Hitachi Image Series. Digitizing is another method. This is similar to rasterization since they both involve line tracing. With digitizing the line tracing is done by hand on a tablet using a mouse or pointer type device. Digitizing is slower than rasterization and may be slightly more accurate, but neither of them are accurate enough for doing any serious analysis or calculations. Keyboard entry is a very accurate means for creating GIS features. The only problem is that it is extremely slow and tedious, making it very expensive. Later on we will look at tools that can be used to give the accuracy of keyboard entry while significantly reducing the amount of keying involved.

Next we will examine the methods for creating GIS attributes from paper based documents. Again, keyboard entry is really the only true choice. But as I mentioned before, it is painstakingly slow. Another common approach I have seen used is the "do nothing" approach. Instead of keying the data, some will only work with data entry from this point forward, since they can design electronic forms that will automatically feed the data into the GIS system as attributes. But this solution is not good enough. You can't query or analyze data that isn't there. Without that data, you do not get the full picture.

**The Solution**

We have presented all the challenges, so what are the solutions for accurate GIS data entry from paper documents? One solution typically used today is to outsource the keying to a third world country. Good for the third world country, but this is now frowned upon by many government agencies.

There are really two valid solutions. The first is to use drawing tools, especially handy for creating feature data. There are tools that make the keyboard entry faster by offering pull down boxes, shortcut keys, and spreadsheet windows. These give you modest improvements but only in the 5-10% timesavings range. Secondly there are OCR tools. While OCR tools are not going to work on everything, they will increase productivity so greatly on the documents they can be used with that the overall gain is still substantial. The efficiency improvement here is often 80% or greater. There are OCR tools that work on structured documents such as business forms, but most GIS documents are unstructured, such as maps. So there are new OCR tools that work with unstructured documents to ease the burden of data entry in creating both features and attributes.

**IcoMap & Swipe It!**

UCLID Software has developed two ArcGIS extensions. IcoMap is an extension to ArcMap that speeds the creation of parcels or related features. A survey of customers found they averaged 84% faster parcel mapping with IcoMap. Swipe It! is an extension that is used to reduce typing when creating or editing attributes in ArcGIS. It uses an electronic highlighter to capture text from scanned images and places inside the ESRI attribute window. Let's take a look at some real world examples of how a couple of the nation's fastest growing counties use these tools to keep

up with the pace of growth.

**Summit County**

Rich Ferris of Summit County Colorado knows what its like to face an avalanche of parcel updates. As the Assistant Director of the Information Systems department, he oversees the GIS efforts of the fifteenth fastest growing county in the US.

Summit County's Information Systems department is responsible for data management and the GIS. Rich Ferris has been the County Surveyor since 1987 and involved in the county's GIS since the early planning stages in 1992. Ferris feels it's crucial to have a P.L.S. involved with the parcel data and building an accurate parcel layer has been a high priority from the beginning. But when providing that accuracy requires a time-consuming process, it can be difficult to keep up with edits. Summit County used a "hybrid" mapping approach. When new subdivisions came in, the mapper would COGO the boundaries and road centerlines then digitize the lot lines. Estimating that the county would process nearly 1,500 parcel edits on top of all the new parcels created, updating the land base was a full-time job for one individual. With only four GIS people on staff, the department's resources were strained so Ferris decided to look for a better solution. The county needed technology that would provide accuracy and also increase mapping productivity.

Ferris found his answer when he started using the IcoMap extension. "Depending on the complexity of the plat, we're able to map parcels with IcoMap up to twice as fast as before," says Ferris. Changes in the Recorder's Office are also going to improve the parcel layer mapping process. As legal descriptions and subdivision plats are received, the Recorder's Office scans them and saves the digital images. This allows the mapper to use IcoMap's OCR features to convert the scanned images into vector linework. "I really like that IcoMap has the ability to link the scans, otherwise we would have written code to handle it," comments Ferris. "Its so important to have access to the source document."

Being more productive definitely has its benefits. As the department spends less time on parcel maintenance there is more time to devote to supporting other county agencies. Of the 30 agencies supported by the IS department, 9 of them currently use GIS applications. Now Ferris can devote more resources to developing GIS applications and training county staff to use GIS software. By using the latest in parcel mapping technology, this rapidly growing county can now make the most of its GIS resources.[ii]

**Forsyth County**

Located just north of Atlanta, Forsyth County offers small-town charm to 98,000 residents. With a healthy economy and close proximity to Atlanta, Forsyth County has also enjoyed consistent

economic growth. As a result, this county has been the fastest growing county in the nation three years in a row. With 51,000 parcels, an additional 16,000 were re-zoned for development in 2002.

With so much growth, its no surprise that the Planning and Development Department would be looking for an easier way to process all the permitting activity. The office handles a steady stream of requests from builders for permits, inspections and business licenses. To assist with the permitting process, the department provides a public workstation, located in the department's conference room. The workstation features a touch screen map to facilitate queries on parcel data. This great idea was difficult to manage because the department was overwhelmed with parcel changes. GIS Manager Anthony Chalfant and GIS Analyst Dawn Hamby form the Property Management Department, a new division of Planning and Development. Chalfant describes the situation. "We averaged 50 parcel edits a week, but were still backlogged. When a large subdivision would come in, we'd send it to the Property Evaluation Department. But that could take 6-8 months. The builders would be done with the subdivision before the parcels were added." For parcels that weren't available online, the builder would have to visit the Tax office to get the necessary information before the permit could be approved. Not only was this inconvenient for the builder, but it was disruptive to the Tax office. On an average morning 20 people would line up to run queries on the public workstation. Planning and Development realized they had to get caught up and keep the online map up to date.

To get caught up, Chalfant began parcel mapping with the IcoMap extension. "I don't have time to load other applications, import, export, or do adjustments. I just want to get it done." Because IcoMap was easy to learn, GIS Analyst Dawn Hamby was up and running in one hour. But what really impressed Chalfant were the results. The first week they were able to map, address and re-zone 500 parcels with IcoMap - a dramatic increase over their average of 50 a week. At this rate, the department was able to quickly map the backlog and now they use IcoMap for splits and changes as they are submitted.[iii]

Chalfant has realized his goal of 24-hour turnaround for parcel edits. Keeping the parcel layer up to date and having a single source of information benefits everyone in this bustling office. And area builders definitely appreciate the convenience of an online map for public queries and the time it saves with the permit approvals.[iv]

**Summary**

Getting data into a GIS from paper documents or scanned images is the most costly portion of any GIS project. There are new OCR tools available that can greatly improve the speed of this and save a lot of money in the process. OCR tools can be applied to the unstructured documents used in GIS for creating both features and attributes. With productivity improvements averaging 80% or higher, these tools can pay for themselves very quickly. To learn more about some of

these tools or to try them out, go to www.uclid.com or write to me directly by sending mailto: joe_hanousek@uclid.com.

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[iv] Medlin, Paige. Counties Discover Many Surprise Benefits of Accurate Parcel Mapping, Government Matters, Spring 2003: ESRI Press

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