

# Esri News

## for State & Local Government

Fall 2012

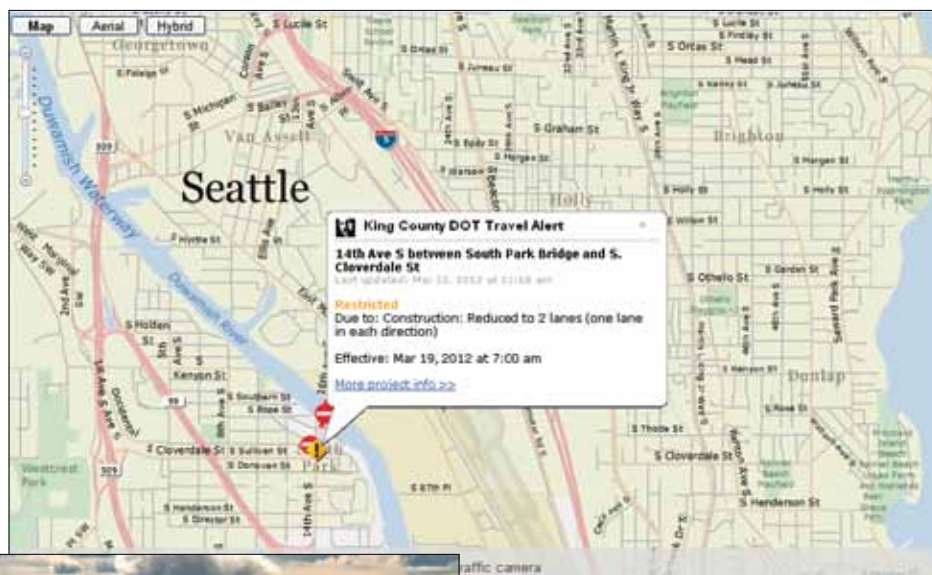
## King County Documents ROI of GIS

\$776 Million Saved during 18 Years

By Emily Pierce, Esri Writer

Home to Microsoft, Amazon.com, and Starbucks, King County, Washington, has a population close to two million people. GIS is critical to serving these citizens. Today, King County's GIS program supports an estimated 1,000 county employees in 42 agencies who use GIS data and applications in their daily work.

An economist at the University of Washington (UW) recently conducted a study measuring the return on investment (ROI) of the enterprise GIS program, which the county has operated for the past two decades. The study indicated that the county has accrued net benefits between \$776 million and \$1.7 billion during an 18-year period, with costs of about \$200 million.



↑ This simulated aerial view over Seattle can provide King County planners with an eye in the sky wherever they need one. (Created by Victor High, senior GIS analyst)

↑ King County's My Commute map keeps citizens up-to-date on road closures and traffic conditions.

GIS applications help staff improve operations in a wide range of departments, including the Department of Natural Resources and Parks (DNRP) and the Department of Community and Human Services. Citizens also use GIS frequently through public-facing maps like My Commute, which shows road closures and traffic conditions. The county estimates that its popular iMap, which allows users to create customized views of spatial information, receives almost 15 million hits a month from 150,000 user sessions.

In addition to traditional GIS applications, the county uses GIS to support key campaigns like the Equity and Social Justice initiative. This agenda aims to ensure that

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# Is Microsoft Office the Key to a New Wave of Enterprise GIS Users?

## Introducing Esri Maps for Office



Christopher Thomas,  
Director, Government  
Markets  
Federal, State, and  
Local  
@GIS\_Advocate

In my early days as a GIS administrator, one of my number one priorities was to build an enterprise, or organization-wide, GIS program. I worked hard to figure out how to get GIS software directly into the hands of people in fire, planning, building and safety, engineering, public works, finance, parks and recreation, economic development, airports, code enforcement, housing, and any other discipline that would take a moment to listen to the benefits of GIS.

As the Esri tools and supporting technologies progressed, the GIS team was able to achieve a vision of “no department left behind.” We went from mainframe applications, extended through emulation software on dumb terminals, to stand-alone and networked desktop software and eventually to Internet and mobile devices. My team and I moved closer and closer to this vision each and every day. And along the way came a lot of firsts: from GIS use on fire trucks to non-survey uses of GPS for public works asset data collection, from public access to GIS via the public library to the use of GIS for 3D statistical modeling, and from using GIS for revenue auditing to being one of the first local governments to use GIS on the Internet. The journey we took led us to a greater understanding of the return on investment of GIS, and we realized a lot of innovation by becoming creative as we sought to reinvent government.

Some of my peers in information systems and GIS, both inside and outside the organization, openly and critically questioned why I would want to encourage others to use the technology themselves. I was puzzled by this question. These peers would go on to ask, If everyone else was able to use the power of

GIS, what would we do? These were the same peers who could not understand why the GIS profession could not gain significant traction inside their own organizations.

I simply did not see the logic in this line of thought. After all, there were so many other things we could work on: creating new datasets, developing data repositories, integrating GIS into mainstream applications like 911 and permitting systems, building kiosks and front counter applications, building citizen engagement websites, increasing operational efficiency through in-vehicle and mobile applications, and developing regional cooperatives, to name a few. There was just so much more to do. And the more GIS was embraced by the various departments and the public, the more GIS became mission critical to the organization, the more important we became to the organization.

While the question my peers asked so many years ago still exists, we have been presented with an even greater opportunity to extend the power of GIS to every discipline in government. More important, there’s an opportunity for GIS personnel to become even more mission critical to their organizations. The key today just might be Microsoft Office 2010.

Think about the number of individuals who use Excel spreadsheets and PowerPoint presentations in your organization. There are millions of Microsoft Office users worldwide. What if you could harness their work to extend GIS through a tool they are already familiar with?

With respect to Microsoft Excel, what if instead of performing analysis through pie charts or scatter diagrams, people could show their information on a map by clicking an Esri Map button on the toolbar? Well, that’s exactly the opportunity that exists via Esri Maps for Office.

Esri Maps for Office is a simple plug-in for Microsoft Office. The power of mapping comes through an ArcGIS Online subscription extended through the add-in. Microsoft Office draws from basemaps and leverages the data you and your colleagues have been

developing and maintaining for decades.

Public works professionals could take spreadsheets of capital projects and create interactive maps of the locations of those projects ranked by cost, time to completion, or any other factor and perform their own analyses. Finance directors could take spreadsheets of delinquent payments by billing route or by month and build heat maps of the patterns to better understand their businesses and citizens’ payment habits and set course corrections. Or the same department could show where money was being allocated across a community. These maps and analyses could be used for internal review or, with the click of a button, turned into web maps that could be embedded in public-facing accountability and transparency websites.

Consider the hundreds of PowerPoint presentations created each year. While these presentations are impactful and professional, what do you do if someone asks a question about the information in a map image and the map itself doesn’t contain the answer? You may come off as unprepared, or you may have to have another meeting. With Esri Maps for Office and ArcGIS Online, you can create presentations with live maps embedded in them. When an elected official raises a question, you simply click on the live map inserted into the PowerPoint to navigate to the answer. You move from presentation to interaction.

True, these are simple routines that GIS professionals have performed on behalf of other disciplines for years. And the question asked by our peers in the past may come back even louder. If everyone can make his own maps, what will we do? Really, do we have to ask?

Try ArcGIS Online and Esri Maps for Office yourself. Or better yet, show them to the finance director. See [esri.com/maps4office](http://esri.com/maps4office).



# Study Ranks Esri's Demographic Data Most Accurate

When work proceeds on a GIS project, incorrect data can have a dramatic negative impact on analysis and dire consequences for affected populations. Data inaccuracies may occur by either over- or underestimating populations or households. What are some implications of governments using inaccurate data?

Public health departments could underestimate the population and miss vaccinating vulnerable people or waste doses by overestimating numbers. Economic development departments that promote a new store based on overestimated population data risk losing sales tax revenue and employment opportunities for area residents. Local officials could lose grant funds if inaccurate data is used to calculate the area population. Cash-strapped agencies could waste resources by placing services in the wrong locations. Public safety and risk management departments could overlook special needs populations before, during, and after a disaster. Does data accuracy matter? Indeed it does, in terms of dollars, health, grants, services—and perhaps life itself.

## How Do Data Providers Verify Accuracy?

The release of each decennial census enables data vendors to evaluate the accuracy of their annual demographic estimates. These estimates are benchmarked against census results. Vendors can also compare their estimates to those of other providers to determine the accuracy of their own demographic data. In 2011, Esri took advantage of this once-a-decade opportunity and commissioned an independent study to obtain an unbiased answer to the question of its data accuracy. Esri's motivation for the study was twofold:

(1) to test the accuracy of Esri's demographic data to identify areas where update methodologies could be improved and (2) to ensure that Esri is providing the most accurate data to its users.

## Research Team

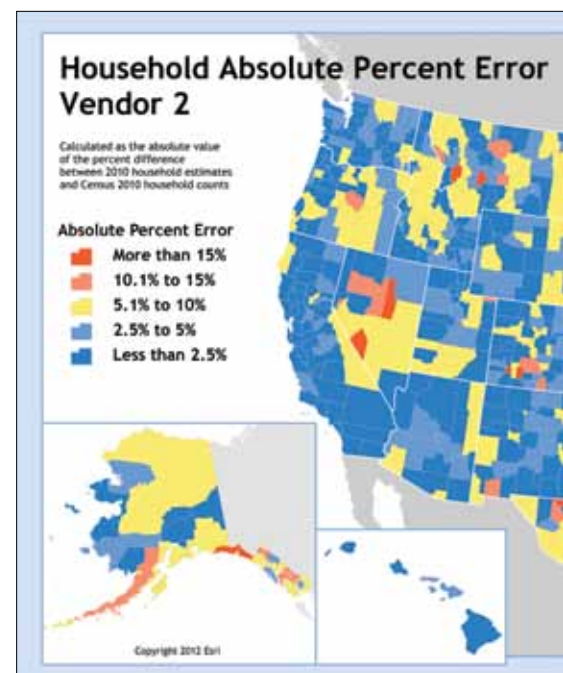
The eminent research team of Matthew Cropper, GISP, of Cropper GIS; Jerome N. McKibben, PhD, McKibben Demographic Research; David A. Swanson, PhD, University of California, Riverside; and Jeff Tayman, PhD, University of California, San Diego, conducted the study. Cropper has a broad background in GIS and demographic analysis. McKibben, Swanson, and Tayman are noted authorities on small-area forecasts and measures of forecast accuracy. They have all written extensively and presented papers frequently on these subjects.

## How the Study Was Conducted

Data was provided to the research team without identifying the individual vendors, so the study was completely blind. The researchers had no idea which data belonged to which vendor or which methodology each vendor used.

The researchers compared the Total Population and Total Households data variables from Esri and four other major data vendors. The team conducted the study for the entire United States at the state, county, census tract, and block group geographies. All the vendors, including Esri, had created their forecasts using 2000 Census geography. To analyze the accuracy of vendor forecasts without modifying their data or compromising the original results, the researchers assigned 2010 Census counts to 2000 Census geography.

The research team investigated and



evaluated a range of direct and supporting measures to assess vendor accuracy and reported the results as a scorecard. The scorecard was then used to measure forecast accuracy across three dimensions of accuracy—precision, bias, and allocation—to obtain a total (unweighted) score. The lowest score denoted the highest accuracy.

Precision measures the percent difference between a forecast and a census count and is particularly accurate at measuring small-area forecasts. Since precision is the best single measurement of accuracy, it is discussed in the excerpted study report on [esri.com/accuracy](http://esri.com/accuracy).

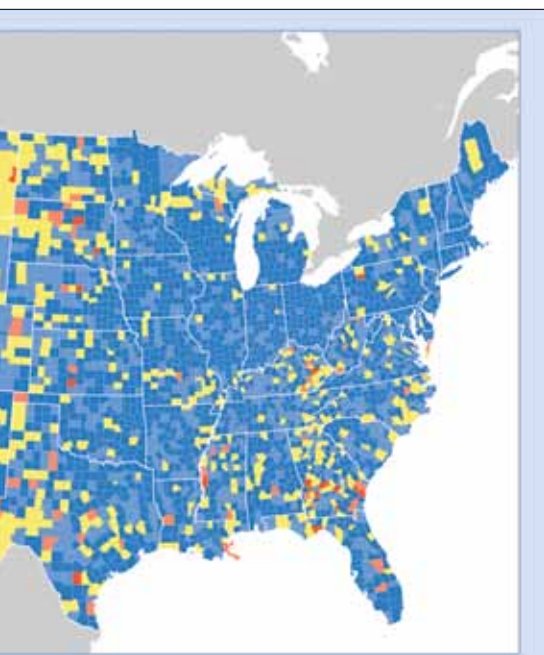
## Precise and Accurate Data

Esri ranked first for precision among the five vendors at each geography level. Esri's estimates were closest to the Census 2010 estimates, and Esri data was also identified as the most accurate overall.

The researchers noted in their study summary: "After reviewing the results for all quartiles at all levels of geography, it is concluded that Esri had the lowest precision error total for both population and households. The results also show that at smaller levels of geography, which are more difficult

Geography	Vendor 1	Esri	Vendor 3	Vendor 4	Vendor 5
Total US	315.9	247.7	276.7	295.7	304.7
State	21.4	12.6	17.9	19.3	29.7
County	49.2	39.8	52.1	46.5	55.7
Census Tract	106.6	89.5	93.3	106	99.6
Block Group	138.7	105.8	113.4	123.9	119.7

↑ This chart illustrates precision scores for each data vendor by geography. The lowest score indicates the highest accuracy.



to forecast, Esri tends to perform even better, particularly for households.”

### What Does This Accomplishment Mean to Data Users?

The study proves that Esri’s update methodologies produce the industry’s most accurate demographic data. Users can be confident that Esri’s Updated Demographics data will provide them with the best possible analysis results.

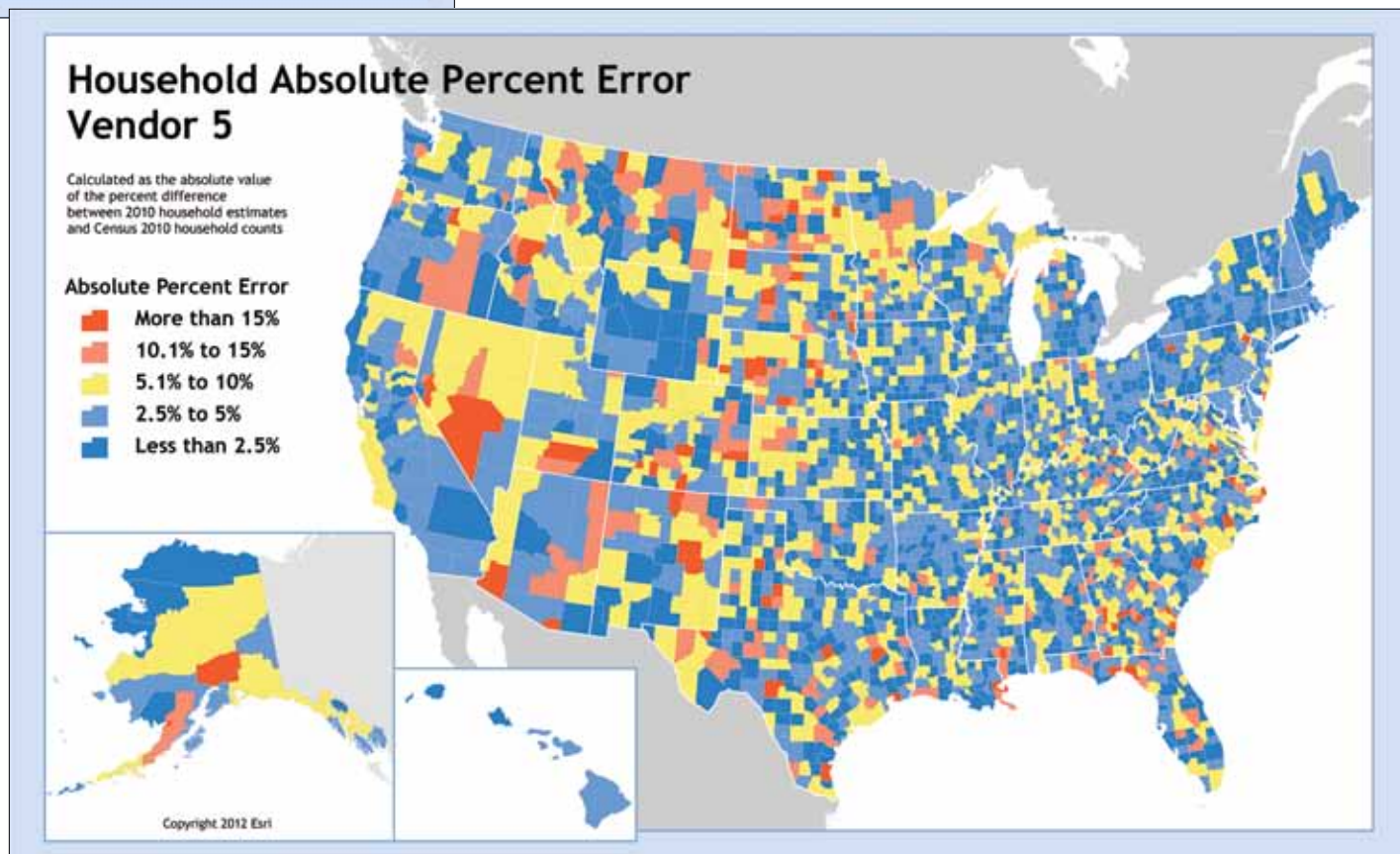
### Esri’s Data Development Team

With more than a century of combined experience, Esri’s data development team comprises geographers, demographers, statisticians, economists, and programmers. The team has compiled a distinguished record of producing innovations to Esri’s demographic update methodology in order to continually improve the accuracy of the data.

### How to Access Esri’s Updated Demographics Data

Esri’s Updated Demographics data is available as a database in a variety of formats including shapefile, file geodatabase, and Microsoft Excel. Updated Demographics is also available in Esri’s Business Analyst Online, Community Analyst, Business Analyst for Desktop, and Business Analyst for Server, as well as the Business Analyst Online APIs and Community Analyst APIs.

To learn more about Esri’s Updated Demographics data, visit [esri.com/demographicdata](http://esri.com/demographicdata).



↑ A comparison of these two maps shows the accuracy of Esri data (vendor 2) versus vendor 5 in the blind study. The study included variables from five major data vendors.

## Esri Online

### Learn about ArcGIS for Local Government

Esri staff explains various aspects of the ArcGIS for Local Government program in a new series of podcasts:

- ArcGIS for Land Records Eases Land Information Management
- Overview of ArcGIS for Local Government
- ArcGIS for Local Government Simplifies Government Workflows
- The Value of ArcGIS for Local Government

[esri.com/podcasts](http://esri.com/podcasts)

### Find a Good Read

*Measuring Up: The Business Case for GIS*, Volume 2, is a collection of real-world stories from government agencies that have successfully used GIS technology to meet business goals.

*Geodesign: Case Studies in Regional and Urban Planning* features case studies in geodesign—an emerging concept in landscape and land planning in which designers use geospatial tools that support the rapid evaluation of design alternatives against the probable impacts of those designs. [esri.com/esripress](http://esri.com/esripress)

### Apply for an Imagery Grant

Propose a natural resources project that combines GIS, image processing, and remote-sensing technologies

using ArcGIS and PCI software with synthetic aperture radar (SAR) and multispectral imagery. The Esri and PCI Natural Resources Imagery Grant awards are valued at \$100,000 each.

[esri.com/imagerygrant](http://esri.com/imagerygrant)



### Register for the GeoDesign Summit

Geodesign unites geospatial technologies and design processes to create inspired outcomes. Attend the GeoDesign Summit to learn about methods and implementations of geodesign for architectural design, land-use and urban planning, and more.

[geodesignsummit.com](http://geodesignsummit.com)

## New and Noteworthy

### PublicStuff

New Esri partner PublicStuff offers an innovative customer relationship management (CRM) software platform that enables local municipalities to deliver public services more efficiently, saving both time and money. Utilizing web and mobile tools, PublicStuff allows city staff to receive service requests from residents in real time from any location. City staff members are then able to have control over their work, keeping useful information such as workflow, communications, performance reports, and Esri GIS data at their fingertips. The dual-natured product enhances both the resident user experience and city productivity.

Visit [www.publicstuff.com/tour](http://www.publicstuff.com/tour) to learn more.



↑ PublicStuff is a voice for citizens and a resource for governments to deliver services and improve communities.



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# City's Mobile Application Engages Citizens on the Go

By Emily Pierce, Esri Writer

In Rancho Cucamonga, California, citizens have one place where they can find out everything they need to know about resources in the community. A new iPhone and iPad application called RC2GO, based on ArcGIS, provides a comprehensive map of shops, restaurants, libraries, schools, and city facilities, among other places. Citizens can also use the application to report graffiti and street issues and to make service requests.

"RC2GO creates a wonderful citizen engagement tool," said Francie Palmer, marketing manager, Rancho Cucamonga Community Services Department. "We want to be able to provide a resource for residents to have at their fingertips when they make dining and shopping decisions, plus it is a communication tool to let us know when they see a pothole or other issue they want to report."

This Southern California city has approximately 168,000 residents and amenities that include the RC Quakes minor league baseball team; Victoria Gardens, a 1.5 million square foot open air shopping center; and more than 150 miles of hiking trails. RC2GO helps people find out exactly what is around them wherever they are in the community. More than 2,017 people have downloaded the application.

## A Natural Fit

All the information in the RC2GO application comes directly from the city's GIS. When the business licensing section adds a new restaurant to its list of businesses, the change is reflected in the application. Parks and amenities data comes from the Community Services Department, and locations for recycling come from the Environmental Programs section. Many other departments also contribute data for the application.

"Using this approach, we are able to update data like business telephone numbers and create new report incidents easily, without resubmitting the application," said Ingrid Bruce, GIS/Special Districts manager, City of Rancho Cucamonga. "Most of the information showing up in the application is coming from our ArcGIS for Server map services. Changes

made in the GIS map services are automatically pushed to the mobile application."

Tying the application to the GIS saves staff time and ensures that citizens have the most up-to-date information available. Providing information in a map empowers citizens with information about how to get where they want to go and clear pictures of the resources available around them.

"The data is housed in GIS, so it makes sense to make the app map based," said Bruce. "Also, it helps people find out where things are better than they could if they just saw an address."

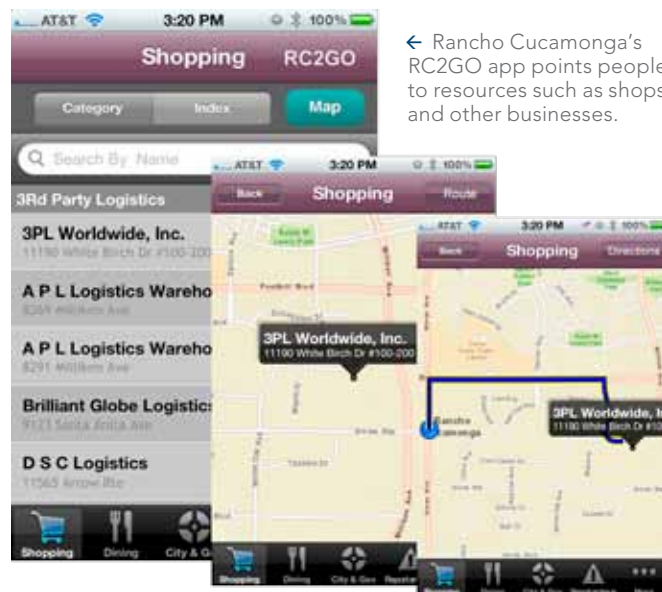
In addition to helping residents and visitors in Rancho, as it's known to locals, the reporting feature helps the city do its work better.

"We are able to tap into our residents' knowledge of their communities by utilizing them as our eyes and ears in reporting streetlight, graffiti, potholes, or other issues we haven't seen," said Palmer.

## Getting the Word Out

When city staff thought about how to make the most of its small outreach budget, conversations quickly turned to partnerships. Working with prominent organizations in the city would get the most exposure for RC2GO. "The key was to utilize communication avenues already in existence," Palmer noted.

Victoria Gardens, which has stores like Crate & Barrel, Macy's, Banana Republic, and Apple Store, was at the top of the list. The shopping center attracts crowds of shoppers in stores and online. Promoting the application to its more than 26,000 Facebook followers created buzz. Victoria Gardens also displayed posters with a quick reference (QR) code that people could scan with their



← Rancho Cucamonga's RC2GO app points people to resources such as shops and other businesses.

smartphones to quickly access the application. During Quakes games, the city made announcements at the stadium promoting the application and distributed bookmarks with a QR code. Hotels in the area have handed out bookmarks and displayed posters.

The city also partnered with a nonprofit organization hosting a chocolate and wine festival to promote RC2GO on one side of the festival's chocolate bar wrappers. Through an arrangement with local billboard owners, the city promoted the application on billboards in highly trafficked areas.

"Feedback from residents and businesses has been great," said Palmer. "They have shared their excitement about the app and how proud they are to live in such an innovative city."

For more information about RC2GO, contact Francie Palmer, marketing manager, Rancho Cucamonga Community Services Department: [Francie.Palmer@CityofRC.us](mailto:Francie.Palmer@CityofRC.us).





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- Road Condition Forecasting
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**PAVEMENT MANAGEMENT**

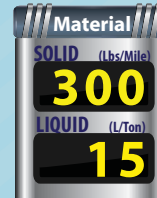
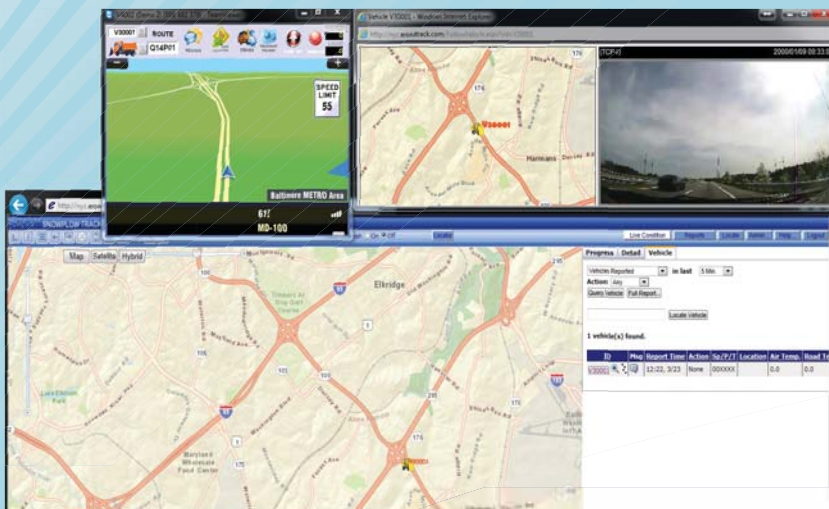


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# Collaboration Is Easier in Sussex County, New Jersey

## ArcGIS Online Facilitates Effortless Data and Map Sharing

By Emily Pierce, Esri Writer

Sussex County, New Jersey, in the northwest corner of the state, is a rural place with 40 miles of the Appalachian Trail, 80 lakes and streams, and historic one-room schoolhouses. Though its character is unique, the county is like most across the United States in its desire to improve communication inside the organization and with partners and citizens.

Historically, when a county division, such as engineering, wanted to make citizens aware of activities (e.g., road or bridge closures), someone in the division would request a map from the GIS department. Then a PDF of a map, which was often outdated soon after it was created, would be posted on the county website—standard operating procedure for many governments.

When GIS manager David Kunz discovered he could use ArcGIS Online to post current, dynamic maps with information like bridge closures, he began taking advantage of the technology to improve workflows.

"ArcGIS Online provides us with an easy-to-use way to distribute our data out to the public," says Kunz. "They are able to view applications, like our polling place app and the bridge and road closures, so they're able to access information in a way that's easy to understand, up-to-date, and available 24/7."

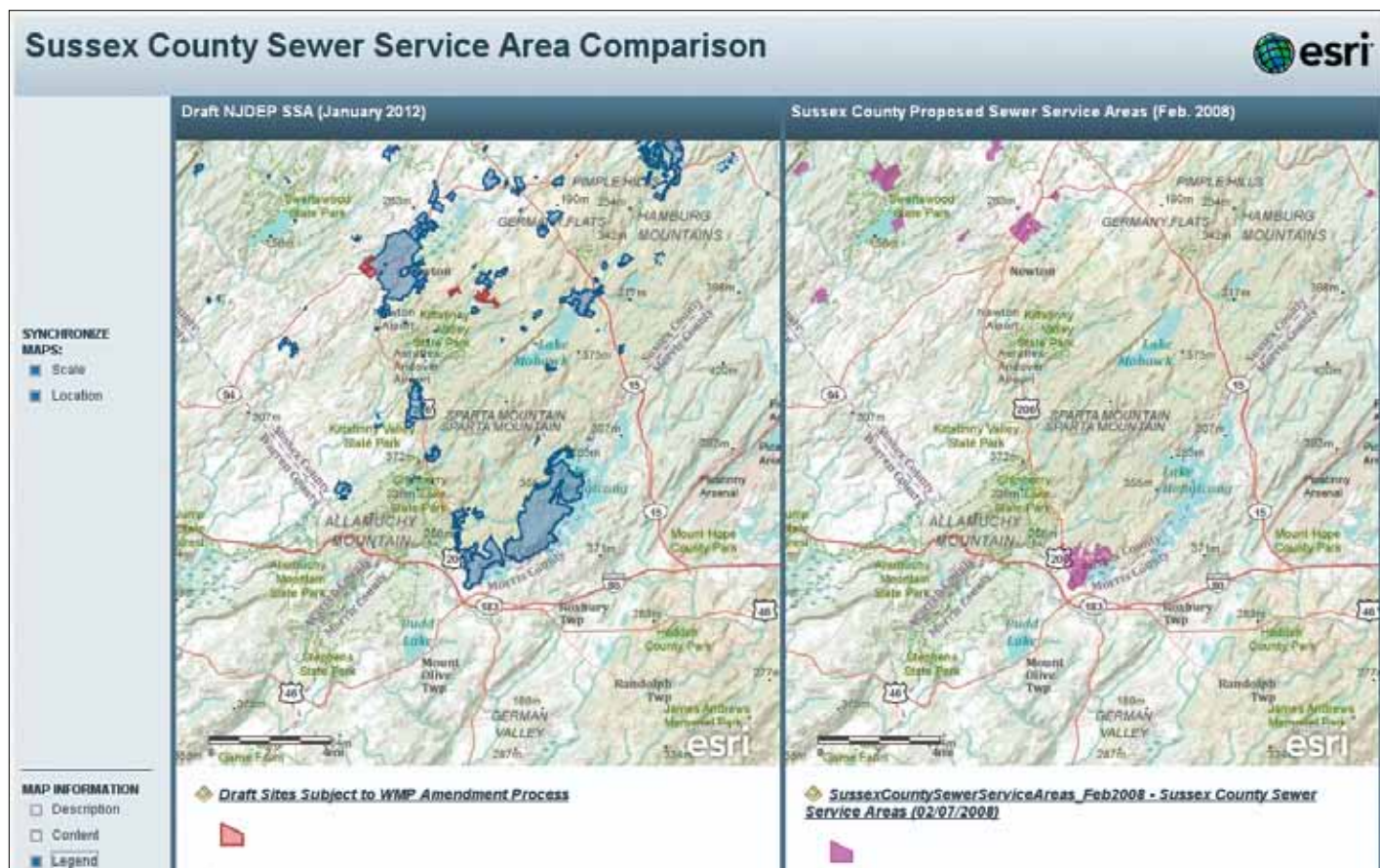
To create the bridge and road closure application, the GIS department provided a simple database where the engineering staff could input a bridge identifier and status (open or closed and reason for closure). As information changes, the map service that is published

in ArcGIS Online is automatically updated.

Adding this feature service to a basemap gives the Board of Elections an internally editable map it can share with the public.

"We wanted to develop tools that allow staff to work independently so they can manage their own GIS data," says Kunz. "Now they don't have to wait for the GIS department to create maps for them—it's automatic."

In addition to improving the speed with which they post geographic information online, departments throughout the county are using ArcGIS Online to communicate with each other. A private group gives them a place to collaborate. Instead of sending data and maps back and forth, group members can share real-time data and comment through the ArcGIS Online group.



↑ The Sewer Service Area (SSA) application shows proposed areas in 2008 (right) compared with proposed and existing SSAs in January 2012.





↑ The Sussex County Home Page Created with ArcGIS Online

"The use of the ArcGIS technology has afforded the county the opportunity to more quickly and effectively address both ongoing and emerging constituent issues," says John Eskilson, county administrator. "The emergency road and bridge closure mapping during Hurricane Irene is a perfect example of how the technology can be used to better communicate with the public. A second but no less important benefit has been to allow ease of access and sharing of data among the many county departments and divisions, saving time and ensuring that common data is used to address issues that cut across departmental boundaries."

## Creating Mapping Power

ArcGIS Online is a cloud-based, collaborative content management system for maps, applications, data, and other geographic information. Although Sussex County has GIS servers, Kunz notes that having Esri host maps and applications in the cloud benefits the county.

"We have hardware and our own private cloud," he says. "But with Esri's cloud, we now have the flexibility to choose where we want to host our content."

The county is choosing to host a map of its common places in Esri's cloud. The Sussex County 911 Common Places and Dispatch Zone map allows public safety staff to add location data, such as names of popular businesses and other well-known places with a valid address.

Members of the sheriff's office and police departments had been submitting this information in Excel spreadsheets and via e-mails requesting that the GIS department geocode them. That workflow created a lag in getting the places identified on a map. When a name changed, it wasn't quickly reflected on the map; public safety staff had to request deletions or changes. Now that public safety staff members have a map on ArcGIS Online, they can update names and post new ones immediately, which is proving to be a tremendous benefit to the municipalities.

"We created a small, easy-to-use editing application built on one of the editor templates in ArcGIS Online, and now they can create or edit existing records in the database," says Kunz. "They know the data better than I do, so they can post it and verify that it's correct."

The Common Places application, which uses Esri's ArcGIS for Local Government Information Model, is generating a single authoritative source for addresses in the county. This source will be used to improve the 9-1-1 dispatch system and support a new paperless inspection application in the health department.

"An advantage of using ArcGIS Online is that it's hands off. I don't have to send data updates; I don't have to be concerned about what the data structures are," says Kunz. "I can just have my service sitting on ArcGIS

Online for a department or a municipality to access when they want current data. It's not a copy; it's not a ZIP file; it's our live, current data that people can consume without having to wait for us to send it."

## Changing the Way Governments Operate

The Sussex County government has long supported the GIS needs of its municipal partners, since many of them don't have GIS resources. If they do, the resources are limited. Now the county is improving the way it extends its resources to the municipalities.

For Byram Township, the county created a mapping application to show information related to dog ownership, registration, and reported problems. The county health department and public safety staff will also be able to use the application to understand incidents such as dog bites.

As the Division of Planning updates sewer service areas, municipalities provide critical input. Effectively sharing information on where there is existing infrastructure and the potential for infrastructure in the future is core to the project.

"ArcGIS Online facilitates a good dialog between the county and municipalities in trying to finalize these boundaries," says Kunz. "In the past, we would have used hard-copy maps that would have been distributed to all the municipalities for review and comment. This year, we have one map in one place, and they can review it at their own pace. Unlike the hard-copy maps, they can zoom in to clearly identify where the boundaries should be."

When Kunz looks ahead, he sees the potential to improve data sharing up to the state level.

"A lot of the state's data comes from the counties, so the county GIS program sits in a very unique position to support the local governments, as well as provide the information we obtain from them to the state," says Kunz. "With ArcGIS Online, we are better able to serve the needs of governments at all levels."

For more information, contact David Kunz, GIS manager, County of Sussex: [dkunz@sussex.nj.us](mailto:dkunz@sussex.nj.us).



# Geospatial Technology Saves Commuters Time and Money on the Illinois Tollway

Tollway Customers Use Trip Calculator and Interactive Map to Figure Out Toll Costs

A new online mapping application created using geospatial technology from Esri helps drivers on the Illinois Tollway plan their routes and calculate what they will pay in tolls before they leave on their trips, saving them time and money. The Illinois Tollway's Trip Calculator at [www.illinoistollway.com](http://www.illinoistollway.com) has proved popular with tens of thousands of people who travel on the 286-mile tollway system in northern Illinois.

The application's interactive mapping component also helps drivers who accidentally missed paying a toll while on the road to view the route they traveled, calculate the toll, and connect to a section of the website where they can pay missed tolls online and avoid fines. More than 80,000 customers make online toll payments every month.

"The Trip Calculator is the easiest way for our customers to get clear, accurate information about the toll rates on our system," said Illinois Tollway executive director Kristi Lafleur. "It allows customers to customize their travels on the tollway and access the information they need with a few simple mouse clicks."

The GIS team at the Illinois Tollway, an administrative agency of the State of Illinois, developed the application using ArcGIS technology from Esri and the Microsoft

**Illinois Tollway**

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**Tollway Information**

**Trip Calculator**

**Entry Point**

Custom

**Exit Point**

Custom

**Vehicle Type**

Auto/Motorcycle (2 axles)

**Payment Type**

I-PASS

**Time**

All Times

Clear Get Route

**Total Toll Amount: \$5.65**

Plaza Name	Toll
<a href="#">DeKalb Toll Plaza (Plaza 66)</a>	\$1.80
<a href="#">Aurora Toll Plaza (Plaza 61)</a>	\$0.75
<a href="#">Meyers Road Toll Plaza (Plaza 52)</a>	\$0.75
<a href="#">Touhy Avenue Toll Plaza (Plaza 29)</a>	\$0.95
<a href="#">Waukegan Toll Plaza (Plaza 21)</a>	\$1.40
<b>Total</b>	<b>\$5.65</b>

PAY UNPAID TOLLS ONLINE

**Illinois Tollway**

Home | Access Data | XML Feeds | About | **HELP**

**Tollway Information**

**Trip Calculator**

**Entry Point**

SELECT ENTRY or RIGHT CLICK on THE MAP

**Exit Point**

SELECT EXIT or RIGHT CLICK on THE MAP

**Vehicle Type**

Auto/Motorcycle (2 axles)

**Payment Type**

Cash

**Time**

All Times

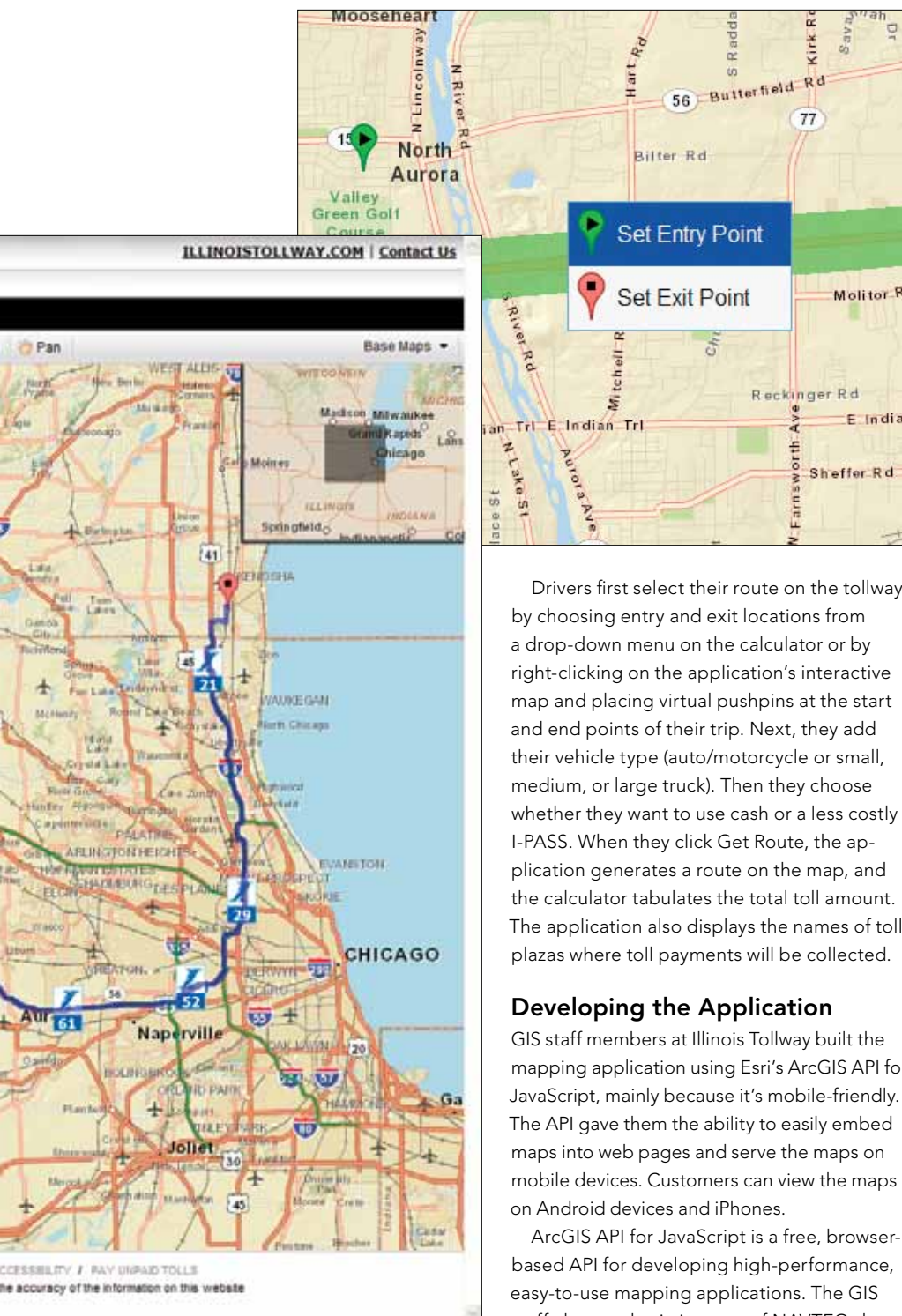
Clear Get Route

PAY UNPAID TOLLS ONLINE

↑ Trip Calculator users start on this page to plan their routes and determine toll charges.

↑ The route drivers will take on the tollway is displayed, along with the toll charges.

Corporation's .NET development platform. Work began on the Trip Calculator project in November 2011, and the tollway launched it in March 2012. Through May 2012, Trip Calculator averaged more than 1,700 unique page views each day.



← Users can select entry and exit points by right-clicking on the map.

Drivers first select their route on the tollway by choosing entry and exit locations from a drop-down menu on the calculator or by right-clicking on the application's interactive map and placing virtual pushpins at the start and end points of their trip. Next, they add their vehicle type (auto/motorcycle or small, medium, or large truck). Then they choose whether they want to use cash or a less costly I-PASS. When they click Get Route, the application generates a route on the map, and the calculator tabulates the total toll amount. The application also displays the names of toll plazas where toll payments will be collected.

### Developing the Application

GIS staff members at Illinois Tollway built the mapping application using Esri's ArcGIS API for JavaScript, mainly because it's mobile-friendly. The API gave them the ability to easily embed maps into web pages and serve the maps on mobile devices. Customers can view the maps on Android devices and iPhones.

ArcGIS API for JavaScript is a free, browser-based API for developing high-performance, easy-to-use mapping applications. The GIS staff also used existing sets of NAVTEQ data with Esri's ArcGIS Network Analyst software. Used in conjunction with the NAVTEQ street network map, Network Analyst calculates the most efficient routes of travel on the tollway system and performs a geospatial operation to determine the location of intersecting toll plazas after a customer selects the start and end points. Esri's ArcGIS for Server powers the mapping application.

### Mapping Additional Tollway Information

The application was added to Illinois Virtual Tollway, an online map launched in 2008 to provide information to travelers and serve as a single point of 24/7 access for infrastructure-related information for tollway staff, consultants, and partner agencies for Illinois Tollway construction projects.

Besides calculating toll charges via the route driven, Trip Calculator offers drivers the ability to view the rates by clicking individual toll plaza locations, which are highlighted on the map of the tollway system. (Tolls vary by road, toll plaza, and ramp.)

The Illinois Virtual Tollway map also contains a font of information for travelers, including the location and pop-up photographs of Tollway Oases, where drivers can stop to buy food, snacks, and fuel. People also can view milepost markers virtually and see where construction lane closures are in effect.

Through the use of Extensible Markup Language (XML) data feeds, public or partner agencies can seamlessly incorporate the tollway's daily lane closure report into their own websites, further expanding public access.

Trip Calculator is one of many enhancements the Illinois Tollway has made to help customers access the information they need, when they need it, on the tollway website.

For more information, visit [illinoisvirtualtollway.com](http://illinoisvirtualtollway.com).

### Mapping Out a Route

The easy-to-use Trip Calculator application provides a simple, visual way for customers to view a trip on the tollway and, based on the type of vehicle being driven, calculate the toll charges for that trip.



## King County Documents ROI of GIS continued from cover

the county distributes services equitably and that all citizens experience fairness and equal opportunity. For example, GIS services help county leaders determine whether communities have enough parks and if social services are distributed fairly to all neighborhoods. GIS is also used to site waste transfer stations to ensure equity for county areas by not overloading them with certain types of facilities.

"Waste transfer station siting and disaster debris planning are important," says Gary Hocking, King County Information Technology service delivery manager, who oversees GIS for the county.

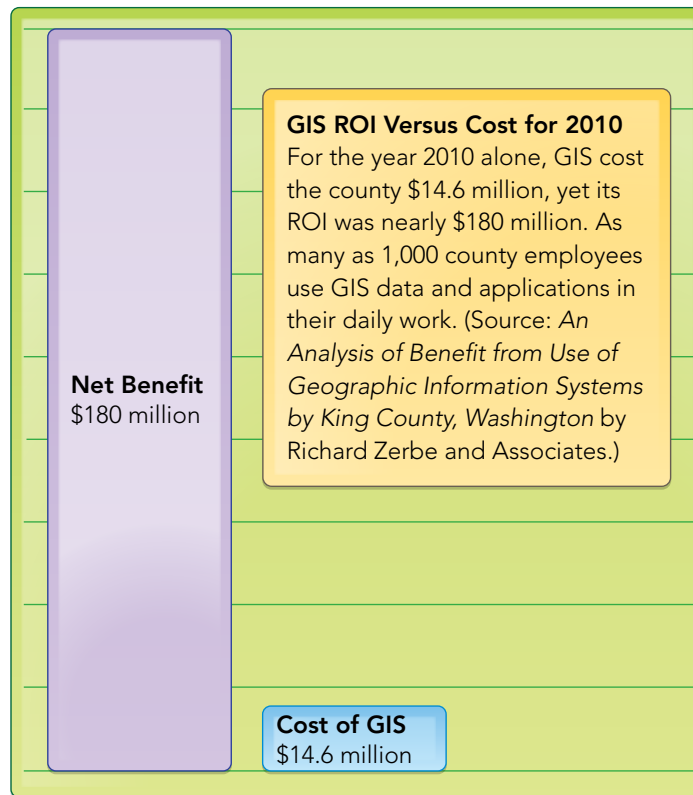
Like Hocking, Greg Babinski, King County GIS Center finance and marketing manager, knows the GIS program provides value to users, the county government, and citizens, but he wanted to see numbers.

### Determining Value

Babinski began talking with fellow URISA board member and Oregon geographic information officer Cy Smith in 2008 about doing a return on investment study with an independent economist to measure the ROI that has accrued as a result of the King County GIS program.

Those discussions led Babinski to the cost-benefit analysis work of Dr. Richard Zerbe, a renowned economist at the University of Washington and director of the UW Benefit-Cost Analysis Center at the Evans School of Public Affairs. Zerbe agreed to conduct an ROI study on the county's GIS program. He and his associates studied the 18-year period from the beginning of the GIS program in 1992 until 2010, with Babinski participating in the study as the project manager. King County and the State of Oregon cofunded the study. Smith explained that an extensive literature review conducted for the study indicated that no such study to measure the accrued ROI for an enterprise GIS program had been done before.

To begin their research, Zerbe's team met with county staff. They conducted face-to-face interviews with 30 county employees to gauge the role of GIS in various agencies and to better understand the kinds of work GIS facilitates. The team then sent a survey to employees to determine current production levels and the pre-GIS levels. One hundred seventy-five GIS professionals and users responded to the survey.



The savings in time and effort were monetized based on salary figures and full-time employee statistics to determine what it would cost agencies to replicate their pre-GIS level of output with GIS technology as well as the cost of replicating current GIS-aided production levels without GIS technology.

For 2010, for example, they determined that the cost of GIS was \$14.6 million and the net benefit was approximately \$180 million. The study by Richard Zerbe and Associates used a "with versus without" approach. While costs for all years were available, estimating benefits for the 18-year period was challenging. How opportunity cost was calculated had a substantial effect on the resultant ROI value. In addition, benefits are measured in outputs that are quantitatively and qualitatively better with GIS, leading to increased demand for these outputs. Assigning a dollar value to these more useful outputs is difficult. These factors were expressed in the three estimates in net benefits between 1992 and 2010: a conservative estimate of net benefit of approximately \$776 million, a less conservative benefit level of \$1.76 billion, and the least conservative estimate of almost \$5 billion. (See

the original report for a complete description of the methodology used: [esriurl.com/KCROI](http://esriurl.com/KCROI).)

"It's important in this day and age in government to be able to validate your benefits and provide cost-benefit analysis for investments," says Hocking. "We had our own anecdotal evidence of the value of GIS, but now we have solid evidence of that value."

King County chief information officer Bill Kehoe agrees and views the GIS service as a trailblazer for IT-based county services. "Our GIS service is an example of a high-performing IT service that is providing a large amount of customer efficiency for the investment," he says. "The GIS service is a model that we want all our services within King County IT to aspire to."

The ROI study doesn't just validate King County's investment in GIS; it also provides strong evidence other governments can use to show that GIS improves government operations and delivers significant value.

To view the full ROI study, visit [esriurl.com/KCROI](http://esriurl.com/KCROI). For more information about King County Information Technology, contact Gary Hocking, King County (e-mail: [gary.hocking@kingcounty.gov](mailto:gary.hocking@kingcounty.gov)); visit [www.kingcounty.gov/operations/it.aspx](http://www.kingcounty.gov/operations/it.aspx); or contact Chris Thomas, Esri (e-mail: [cthomas@esri.com](mailto:cthomas@esri.com)).





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