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Project Title: A Return on Investment Case Study of Iowa One Map: A Public-Private Partnership for the shared development of the Iowa Geospatial Infrastructure

Final report

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Iowa Department of Economic Development
Iowa Homeland Security and Emergency Management Division
Cities, Councils of Government, and Counties in the state of Iowa
Private Businesses and Utilities in the state of Iowa

Executive Summary

The Iowa Geographic Information Council (IGIC) led a multi-agency return on investment case study for the Iowa Geospatial Infrastructure (IGI), which is Iowa's contribution to the National Spatial Data Infrastructure (NSDI). The study addressed the needs and interests of several groups of stakeholders that produce and consume IGI framework data, especially data needed for economic development activities and related decision making. IGIC was assisted with their ROI project by the Geospatial Information Technology Association (GITA), who participated in two earlier ROI studies of the IGI.

The new ROI study combined financial metrics from the two previous Iowa ROI studies, recalculated previous flood benefits, removed federal funding for imagery, and added a new analysis of economic development activities to suite of benefits from the IGI. The study also included standalone financial analysis of GIS adoption by regional electrical cooperatives and smaller cities, and a business case for acquiring municipal utility work management software.

The 20-year financial analysis of the IGI indicates that development of the IGI (including creation, maintenance and sharing of framework data layers, and a GIS service bureau to lead framework coordination, train users and develop web services) will cost a total of \$88 million, while providing benefits back to the state on the order of \$694 million. The analysis shows a Net Present Value of \$605 million with an annualized Return on Investment of 34.21%, and a payback in the first year.

Project Narrative

Overview of project results:

This year's study was developed as a follow-on to two previous financial analysis projects: the original IGIC multi-agency analysis (http://www.iowagic.org/igi/documents/IGI_Final_Report.pdf), which focused on seamless statewide data sharing built up from county level data; and the analysis of the use of GIS, imagery and modeling in response to 2008 Iowa flooding (<http://www.iowagic.org/igi/documents/roi-2-gis-and-the-flood-of-2008>). The vision was to extend and update previous analyses to incorporate:

- benefits from economic development, which were identified in the original study as a potentially valuable area
- benefits related to utilities, particularly in the area of public/private partnerships focused on data acquisition and maintenance
- benefits for municipalities, particularly small municipalities that have not yet acquired GIS capabilities

Our research in the area of economic development was particularly successful. We were able to interview representatives of 16 of the 18 state regional development groups, as well as the Iowa Area Development Group, Iowa Department of Economic Development, Iowa Workforce Development, numerous municipal Chambers of Commerce and related ED groups, county level ED organizations, independent site selection professionals, and Iowa commercial real estate brokers. We collected a wide variety of benefits metrics from these organizations and ultimately developed a model of potential economic development activity based on Cedar Rapids Priority One annual metrics scaled to comparable US Census Bureau job metrics at the county level.

Our investigation of the potential for public/private partnerships related to data use in the utility sector was not as productive. Private utility companies consistently indicated an unwillingness to share data, even with password-protected access, due to corporate policies regarding liability issues. Although utilities would very much like to receive county and municipal data through the proposed service agency, their inability to participate in data sharing appears to limit any participation in partnerships for the time being.

Results of the final Iowa Geospatial Infrastructure combined study showed a 20 year Net Present Value of \$605 million. Of this, benefits to flood management are \$387 million, by far the largest of any application category that we studied (see figure 1). This flood management number is down from the \$550 million NPV in the 2nd Iowa ROI study due to removal of direct benefits attributed to the 2008 flood management effort and some better numbers used in calculations. From the original study, state, federal and county agencies had a total of \$152 million in benefits from improvements to effectiveness and efficiency of their business operations. The private sector also had substantial efficiency gains on the order of \$49 million. From the research carried out in the current study on economic development impacts of IGI, we show benefits on the order of \$37 million, using metrics based on the improved effectiveness of regional entities that assist in new business development activities (see discussion below). Also from the current study, benefits to smaller cities adopting GIS were included, adding \$40 million through educational programs run by the state GIS service bureau. Total 20 year cost of the IGI was calculated to be \$88 million, up from the first study which assumed a substantial amount of federal funding for ortho imagery, which may not materialize any time soon. The annualized Return on Investment for IGI is 34.21%, with payback the first year.

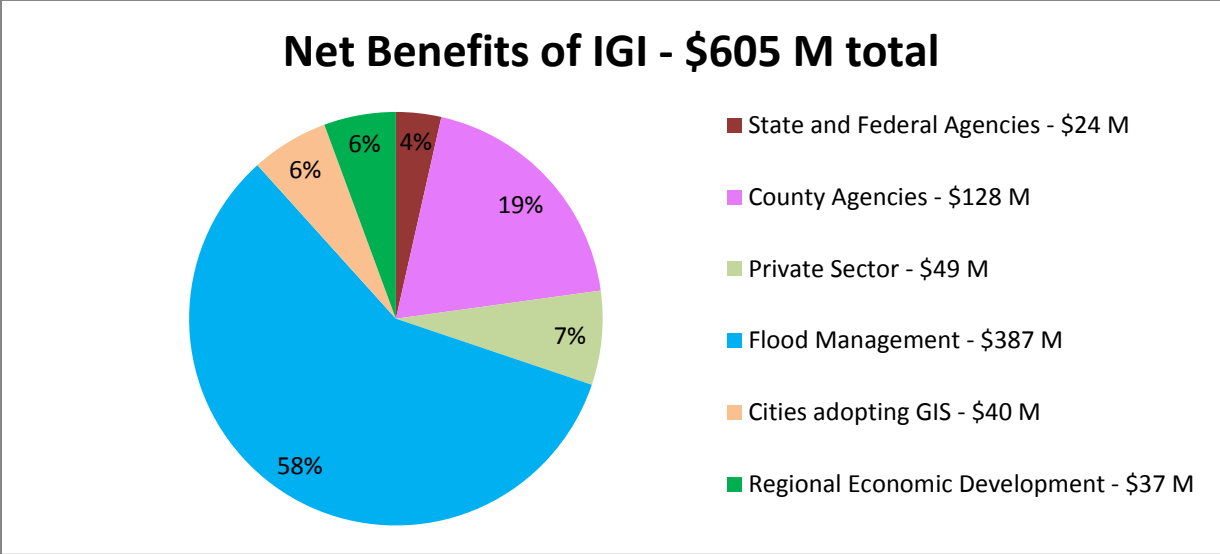


Figure 1: Chart showing relative benefits (Net Present Value) of IGI services to stakeholder groups, over the 20 year study period of the ROI financial analysis.

In addition to the main IGI financial analysis, we were also able to create a few standalone studies. We were quite successful in developing a business case for a utility work management system leveraged on a mature municipal GIS. The City of Ames Public Works Department plans to deploy a sophisticated work management/asset management project in 2012 and was able to provide extensive cost and benefits metrics to construct a financial analysis for their project. Results of the ten-year forward-looking analysis showed \$196,000 Net Present Value, 4.65% annualized Return on Investment, with a four-year payback period.

A municipal analysis was also done for Polk City, providing a detailed description of the adoption of GIS by a very small municipality. Results from Polk City were used to model costs and benefits for 100 small municipalities adopting GIS over the next 20 years.

We did a financial analysis for the full life cycle of developing GIS capabilities for Linn County REC. Linn County is the largest REC in Iowa and began its GIS project in 2004 as part of a three-utility consortium. Startup costs were quite high, as the utility invested heavily in field inventory of its facilities, development of land base data as well as in software and hardware for GIS, field design and inspection, field mobility, and outage management. Analysis of this project from 2004 through 2013 showed \$317,000 Net Present Value, 1.26% annualized ROI, and eight year payback period. We chose not to extend these metric to the potential for other RECs adopting GIS as the Linn County project appears somewhat atypical due to the size of this utility.

What didn't work:

At the start of the project, we were quite optimistic regarding the opportunity to perform an analysis of Dubuque Smart City efforts, particularly in the area of Smart Grid and GIS. The first utility rollout was for water meters and we worked with water department GIS staff to quantify benefits. However, we were not able to discover sufficient benefits to balance the large startup costs, nor were we able to access internal business cases developed by the city for this project. We also learned that this project has not yet addressed connections to the city's GIS which further hinders the development of realistic projected benefits related to GIS technology. Current rollouts of electric and gas smart meters as well as Smart City projects for transportation and health will no doubt also lead to significant realization of benefits through

GIS analysis of data collected. It remains uncertain at this time how long it will take until staff are able to quantify benefits they are receiving from this project.

We made a number of attempts to quantify benefits of using GIS to analyze potential for joint trenching projects, hoping to leverage previous GITA ROI research regarding this type of benefit. Municipalities showed enthusiasm for the concept but we were not able to collect sufficient metrics to complete a financial analysis addressing joint trenching.

Barriers:

- GIS literacy, particularly in ED organizations where staff are unfamiliar with the technology
- joint trenching and One Call issues (standards for data sharing, ability to enforce policies to minimize pavement breaks)
- full integration with GIS of innovative projects such as Dubuque's Smart City

Recommendations for future studies:

- public benefits from increased data availability
- benefits to educational organizations, including stimulation of workforce development through those organizations
- novel approaches to public/private partnerships, attempting to solve the utility liability dilemma
- joint trenching benefits, worth a revisit given large potential ROI (we note that Cleveland Water projected joint trenching benefits were in excess of costs for its entire multi-year paper maps to digital GIS conversion project).

Explanation of Economic Development GIS/ROI Methodology:

Interviews with local Iowa economic development agencies in the first FGDC CAP grant funded study (http://www.iowagic.org/igi/documents/IGI_Appendix_A.pdf) showed potentially large benefits to business development activities due to increased access to high-quality site information and other spatial data in GIS format, through data sharing and other IGI services. Anecdotal stories about GIS usage and benefits to making business sites attractive to prospective buyers ranged from 5 to 50% of the value of the new activity. While many subsequent interviews had a similar range of potential benefits, few persons could offer documented metrics that seemed reasonable.

After many of these qualitative interviews, we found that Priority One, the economic development division of the Cedar Rapids Chamber of Commerce, was able to provide metrics on new jobs and accompanying earnings for the past four years, 2006 through 2009. These metrics are presented in its annual economic impact analysis developed by the Economic Strategy Center of NCDS, Inc., and presented for each year for the time frame of September 1 through August 31. Metrics used for the IGI business case are New Jobs, Direct Impact (the impact generated directly from the jobs created with the assistance of Priority One initiatives of the year of the study) and a related metric Earnings, Direct Impact. We did not include metrics describing jobs and earnings from indirect impact and induced impact as this would not allow us to align Cedar Rapids Priority One metrics with comparable county metrics provided by the US Census Bureau.

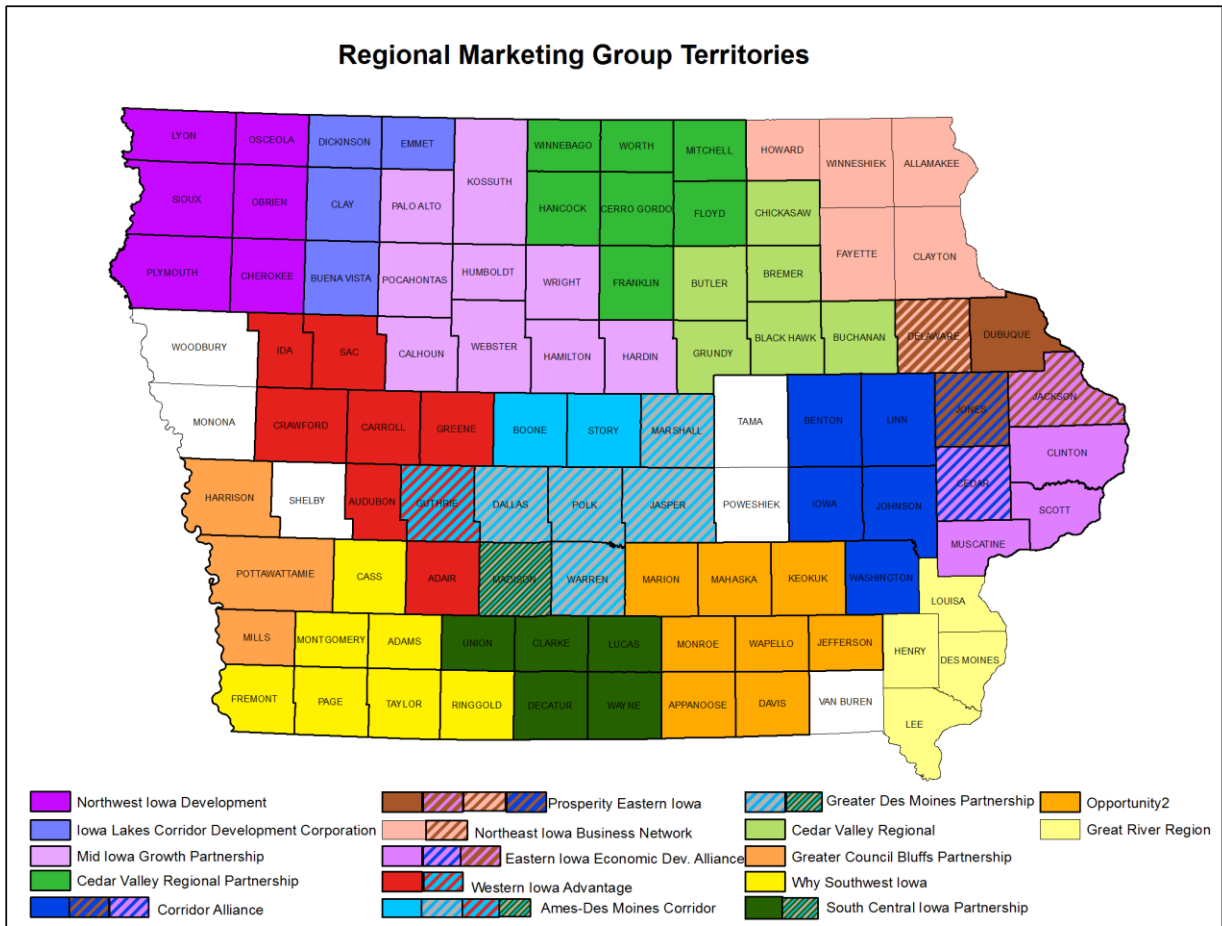


Figure 2: Map showing regional economic development marketing group territories, used in this ROI analysis.

To understand Census Bureau metrics we worked with James B. Morris, Labor Market Research Economist III, at Iowa Workforce Development, Employment Statistics. He led us to the Census Bureau's Quarterly Workforce Indicators (QWI), found at <http://lehd.did.census.gov/led/datatools/qwiapp.html>. This data is available for all counties and Metropolitan Statistical Areas (MSAs). The data is displayed adjacent to the statewide counterpart and listed with the previous three quarters averaged in. We used Job Creation and Average Monthly Earnings to compute total annual earnings from new jobs for each county in Iowa and average annual earnings over the four years of our study. Counties were grouped according to the state's 17 economic development regions.

We determined a scaling factor to provide a ratio of Priority One economic benefits to Census Bureau economic benefits. Using Census Bureau metrics for the Cedar Rapids MSA, we developed an annual scaling factor (Cedar Rapids annual Priority One direct job impact/Cedar Rapids annual Census Bureau job creation). This was averaged over the four years of available data, resulting in a scaling factor of 0.0369. This scaling factor indicates that a county in Iowa could expect to get 3.69% of its direct benefits from new job earnings due to economic development efforts comparable to those of Priority One. The scaling factor was applied to each economic development region's average annual Census earnings, to get potential earnings from economic development activity similar to Priority One efforts.

Finally, economic development regions (see figure 2) were ranked regarding their use of GIS for economic development successes. Regions were assigned values ranging from a 1% to 5% contribution of GIS. The resulting calculations provide an estimate of current contribution by GIS to economic development success by region, with a calculated annual statewide GIS contribution of \$2.46 million. Regions not operating at the full 5% GIS contribution were evaluated, resulting in a calculation of \$2.33million potential annual benefits from regions not using GIS at the level of Priority One and other major GIS users in the state. Over the 20 years of the ROI analysis, these benefits contributed a total of 37.4 million, or 6% of the overall \$606 million Net Present Value of IGI.

Feedback on Cooperative Agreements Program

What are the CAP Program strengths and weaknesses?

Strengths: The CAP program has made a significant difference for our state in developing plans that should eventually lead to sustainable funding for a statewide geospatial infrastructure. While Iowa probably spends \$8-10 million a year on maintaining state and county GIS programs, absolutely nothing is spent on coordinating between agencies. CAP funded ROI studies have shown that a modest \$3-4 million per year spatial infrastructure development program will benefit the state 8 times over. The issue now is timing with the economic recovery going slowly, and new programs are difficult to launch. Without CAP would not have had the resources to design and study a state spatial infrastructure. We are “shovel ready”, waiting for opportunities to put this to work.

Weaknesses: Not so much a weakness of CAP, but of federal support for GIS in general, there is a significant funding gap between what is needed and what is actually available. We have taken advantage of every federal funding opportunity that comes along, and through our state geospatial liaison, have benefited from that support. But there obviously remains a long way to go. As a state, we've realized that if we want all the high-quality GIS being produced by counties, then we will have to partner with them at a significant level – we can't just expect them to hand over their data. I think this applies to the federal level as well. Federal agencies will need to partner more with states than they have in the past, if they really want the NSDI to work.

Where does it make a difference?

We have applied ROI methodology to collecting benefits from our statewide lidar effort, which conservatively provides \$5 million a year in benefits. This will undoubtedly be useful the next time we decided to fund the lidar follow-on project.

Was the assistance you received sufficient or effective?

Yes as stated above, we made a lot of headway with our CAP awards and support from our state geospatial liaison office.

What would you recommend that the FGDC do differently?

Maybe one area where FGDC could move ahead is to develop contracting mechanisms that states could utilize. We used the USGS CR-2 contracting vehicle for our statewide lidar project. While not ideal, it did allow us to move ahead and get started sooner. I think a good state ortho program could be developed if there were options that facilitated coordinated acquisitions. I think many counties would welcome some contracting assistance if there were a limited number of good product options available. Even without a lot of federal money for direct support, this could move local and state governments to work together more, make more standardized data available, make more web services available.

Are there program management concerns that need to be addressed, such as the time frame?

We especially appreciate that FGDC is flexible when it comes to time frames, that sometimes things don't always go according to plan A. Even though some of our basic assumptions proved faulty, we were able to gather useful information and produce a good ROI analysis that will continue to underpin our planning, and should be applicable to others.

If you were to do this again, what would you do differently?

I doubt if we would have done anything differently, given the same initial conditions. There were good reasons to study public-private partnerships, and economic development uses of GIS in various forms. It took many interviews to find out useful directions for metrics (ED), and the partnership idea was a dead end at this time.