

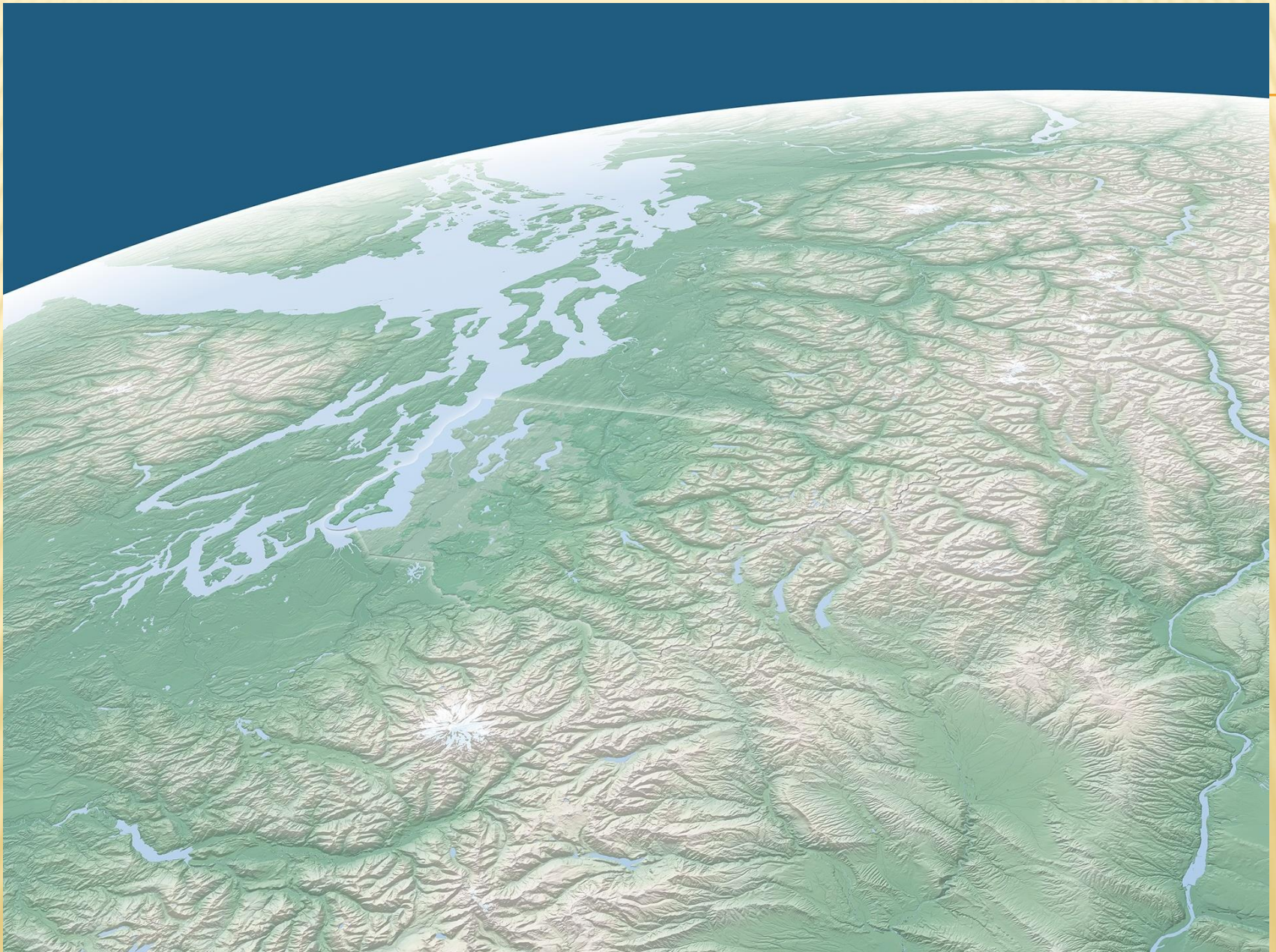
KING COUNTY GIS: REGIONAL COORDINATION AND RETURN ON INVESTMENT

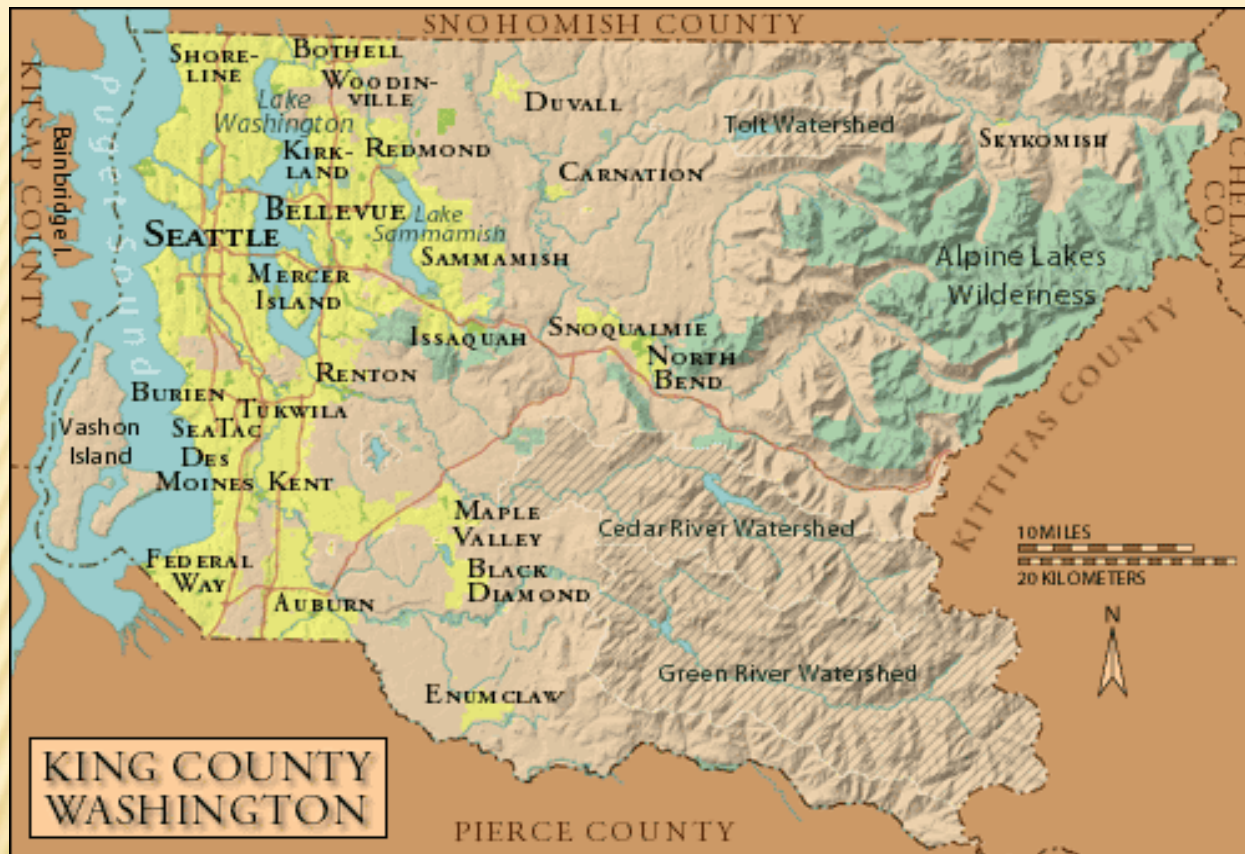
**Exploring GIS Potential for
Northwestern Ontario
May 13, 2015**



**King County
GIS CENTER**

**Dennis R. Higgins, Jr., GISP
Client Services Manager
King County GIS Center
Seattle, WA, USA**





KING COUNTY, WASHINGTON, USA

- ❑ **Microsoft**
- ❑ **Boeing**
- ❑ **Paccar**
- ❑ **Nordstrom's**
- ❑ **Amazon**
- ❑ **Starbucks**
- ❑ **Port of Seattle**
- ❑ **Weyerhaeuser**
- ❑ **Univ. of Washington**

Population: 2,044,000 (14th most populous US county)

Area: 5,520 sq. km. (the size of Delaware)

Topography: sea level to 2,400 m.

39 incorporated cities; many more muni. service districts

Economic engine of the NW US

Viable agricultural and private forestry areas

Remote wilderness & watershed lands

King County GIS - Development History:

- ❑ **Originated with 1992 PlanGraphics study**
- ❑ **1992 Benefit Cost Analysis**
- ❑ **PlanGraphics identified 126 business applications and a \$22 million capital cost estimate**
- ❑ **1992-1994 King County – Seattle Metro merger**
- ❑ **1993 joint King County – Metro GIS scoping plan – reduced \$6.8 million scope approved by King County Council**
- ❑ **1993-1997 GIS capital project executed**
- ❑ **1997 KCGIS O&M begins**
- ❑ **2002 KCGIS Consolidation implemented**

King County GIS – 1992 GIS ROI Estimate

PRESENT VALUE ANALYSIS

A present value analysis of the benefit/cost model was also performed for King County. Present value analysis compares equalized dollars by estimating the value of future dollars. In effect, present value devalues future dollars. For King County, this produces a more realistic projection of benefits and the year that benefits cumulatively exceed costs - 'system payback'. The 10-year present value analysis of the system benefits and costs is illustrated in Table 3-6 with the significant statistics presented below.

Present Value of Costs	=	\$22.5 million
Present Value of Benefits	=	\$33.6 million
Cumulative Present Value Benefit/Cost Ratio	=	1.49:1.0
GIS Payback	=	1999.

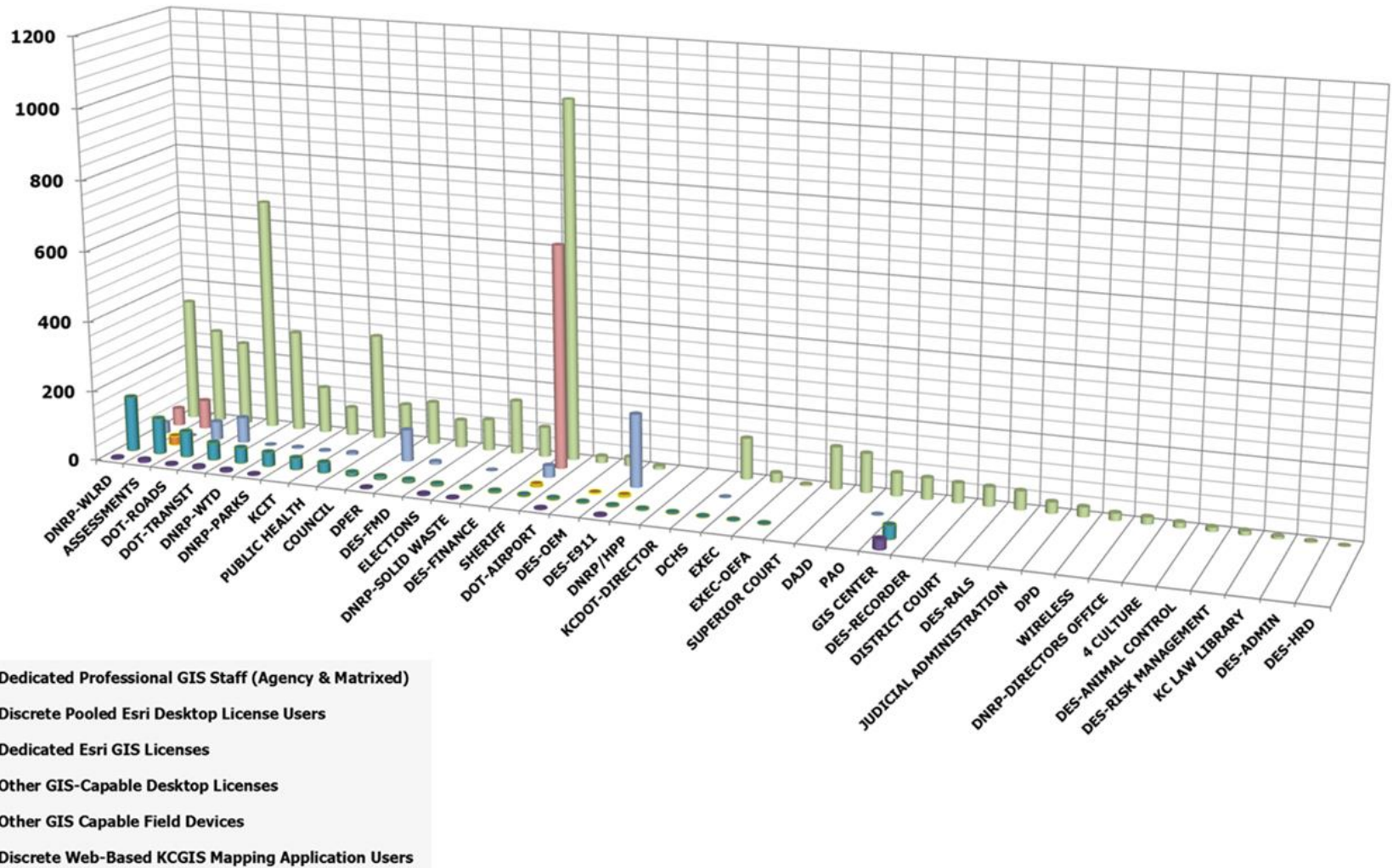
TABLE 3-6
PRESENT VALUE ANALYSIS

King County, WA	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
PRESENT VALUE ANALYSIS										
Present Value Factor	1.0000	0.9996	0.9991	0.9984	0.9979	0.9974	0.9968	0.9963	0.9958	0.9952
Short-term Interest Rate =	4.50%		Long-term Interest Rate =		5.30%					
Benefits										
Annual PV Benefits	\$112,000	\$1,081,000	\$1,218,000	\$2,072,000	\$3,164,000	\$4,149,000	\$5,018,000	\$5,293,000	\$5,581,000	\$5,880,000
Cumulative PV Benefits	\$112,000	\$1,193,000	\$2,411,000	\$4,483,000	\$7,647,000	\$11,796,000	\$16,814,000	\$22,107,000	\$27,688,000	\$33,568,000
Costs										
Annual PV Costs	\$483,000	\$5,425,000	\$5,780,000	\$2,919,000	\$1,736,000	\$1,374,000	\$1,130,000	\$1,170,000	\$1,210,000	\$1,253,000
Cumulative PV Costs	\$483,000	\$5,908,000	\$11,688,000	\$14,607,000	\$16,343,000	\$17,717,000	\$18,847,000	\$20,017,000	\$21,227,000	\$22,480,000
Benefit/Cost Ratios										
Annual B/C Ratio	0.23	0.20	0.21	0.71	1.82	3.02	4.44	4.53	4.61	4.69
Cumulative PV B/C Ratio	0.23	0.20	0.21	0.31	0.47	0.67	0.89	1.10	1.30	1.49

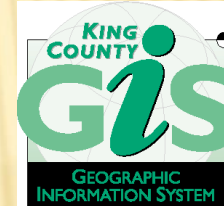
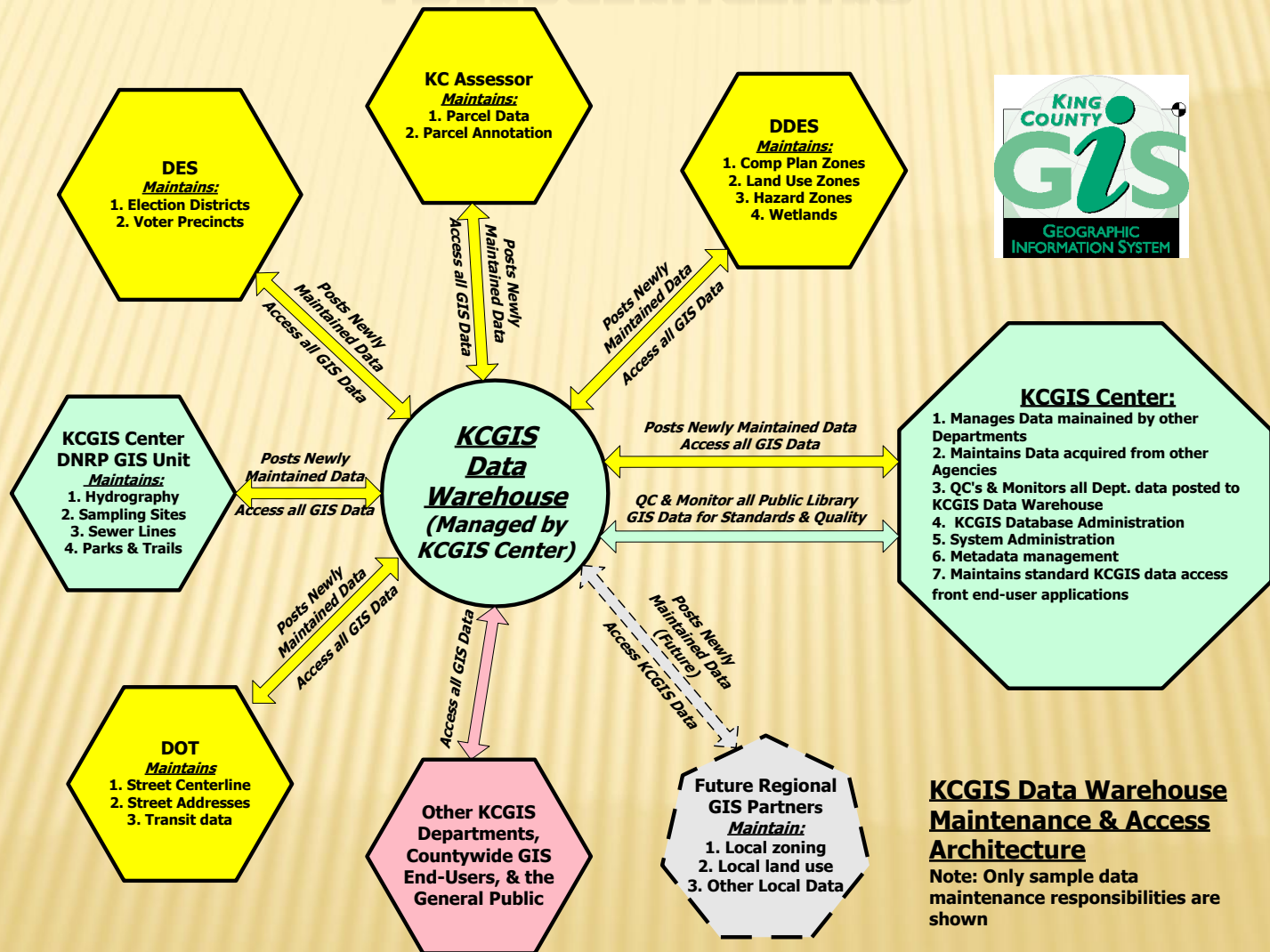
2015 KCGIS State of Development:

- ❑ **500+ /- desktop GIS users**
- ❑ **100,000 annual internal web based GIS user sessions**
- ❑ **2.2 million annual external web based GIS user sessions**
- ❑ **50 GIS professionals**
- ❑ **Supporting 35 county departments and offices**
- ❑ **Contracted GIS support for four cities, two sewer/water districts**
- ❑ **Data sharing agreements with 29 of 39 cities**
- ❑ **Client Services provides ad-hoc support**

KCGIS Center & Agency GIS End-Users



KCGIS Center Achievements: Infrastructure



Infrastructure

- ❑ **5 'Data Steward' departments maintain core KCGIS data**
- ❑ **KCGIS Center manages data integration routines**
- ❑ **KCGIS Center manages Data Warehouse and Portal to ensure accessibility for 500+ internal users and thousands of external users**

KCGIS Center Achievements: Governance

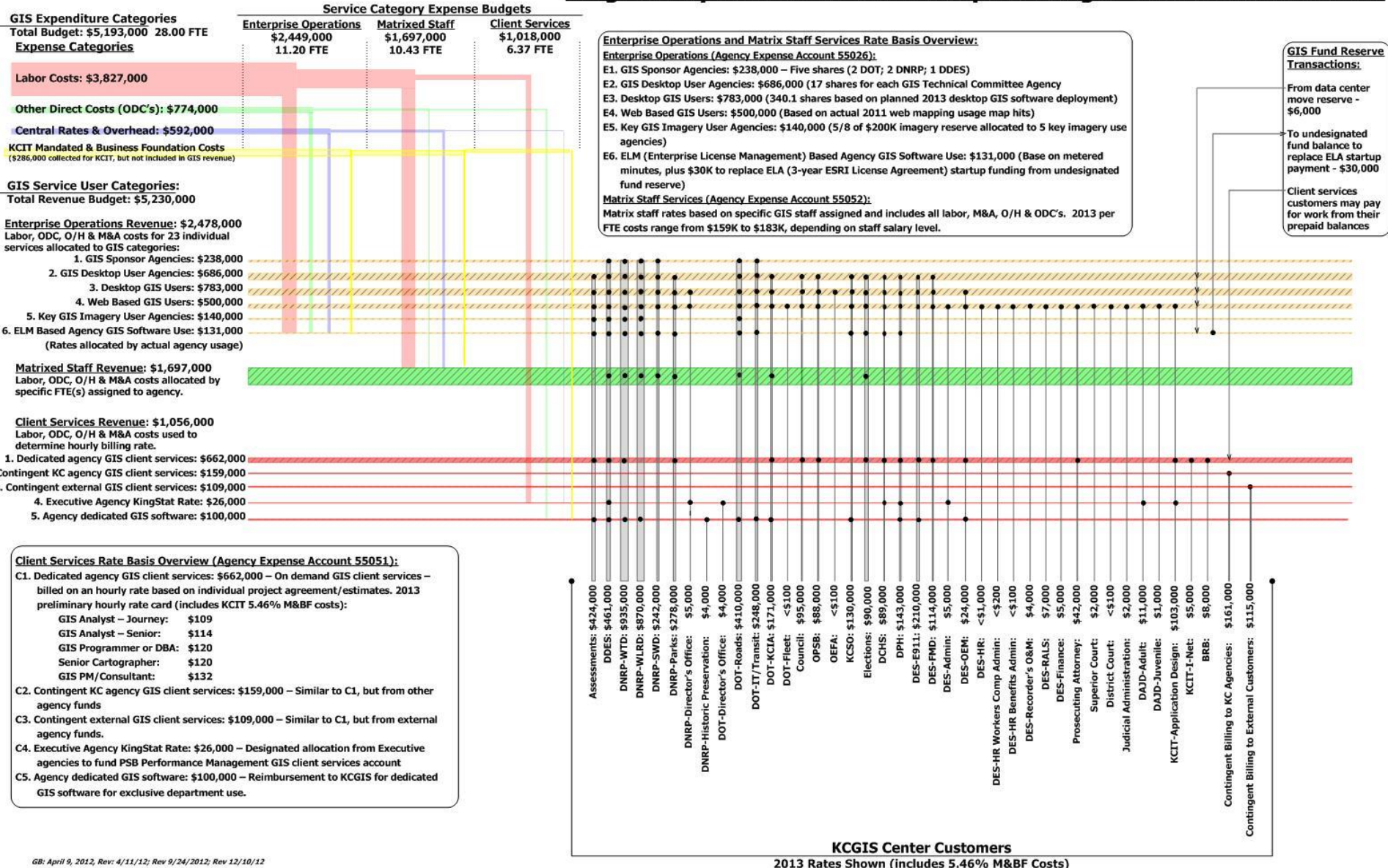
The King County Geographic Information System (KCGIS) is a coordinated regional geographic information resource, organized to meet the business needs of King County, local agencies, and the general public.

KCGIS is comprised of both the King County GIS Center (responsible for core GIS resources and enterprise services for the entire County) and business specific activity in various GIS units distributed across other County departments.

The King County GIS Center annual work plan and budget is approved by the KCGIS Technical Committee, comprised of 35 voting members, one from each contributing agency.

KCGIS Center Governance: 35 Agencies

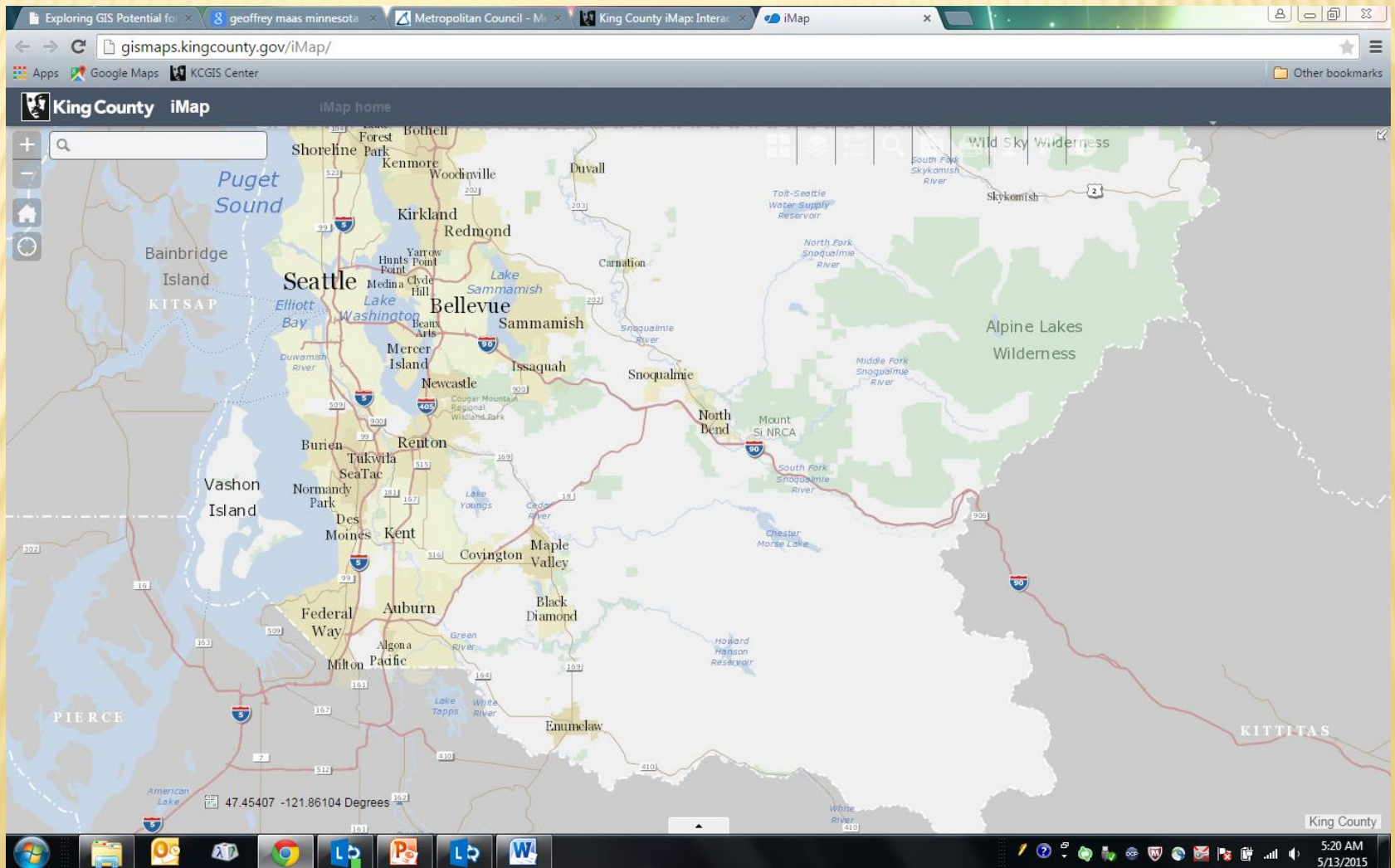
King County GIS Center 2013 Adopted Budget Rates Basis Overview



KCGIS Center Achievements: Regional Data Coordination

- 5 'Data Steward' departments maintain core KCGIS data**
- KCGIS Center manages data integration routines, metadata, integrity and completeness checks**
- KCGIS Center manages Data Warehouse and Portal to ensure accessibility for 500+ users**
- Hundreds of thousands of external users**
- 2015 Imagery Acquisition Program: \$1.2 M cost; 95 partner agencies including neighboring counties Kitsap, Snohomish and Pierce; High resolution natural color orthoimagery, infrared orthoimagery, and supplemental vector products (such as impervious mapping)**

KCGIS Center Achievements: Regional Data Coordination



Bad Historic Survey Data

KCGIS Center Achievements: Training Program

- ❑ To ensure a viable and cost-effective GIS training program for King County
- ❑ To support GIS development within the region....and beyond
- ❑ Opening these classes to non-county employees enables us to hold them more frequently
- ❑ New relationship with TeachMeGIS, Inc.
- ❑ Have laptop, will travel



**GIS TRAINING
EXPRESS™**

*Professional GIS training in our
Seattle facility or at your site.*

- ✓ Expert ArcGIS® Training
- ✓ Custom Classes and Workshops
- ✓ GIS Academy™ "Beyond the Basics"
- ✓ GIS Certification Institute Qualified
- ✓ URISA's Pacific NW Education Center
- ✓ Veterans' GI Bill Benefits *Selected programs of study at the King County GIS Center are approved for those eligible to receive benefits under Title 38 and Title 10, USC.*



 **King County
GIS CENTER**

*We help you put
GIS to work!*

www.kingcounty.gov/gis/training
gistraining@kingcounty.gov

KCGIS Center Achievements: Client Services

- ❑ **Fee-based ad-hoc on-call GIS service**
- ❑ **Special support for King Co. agencies**
- ❑ **Local cities & counties**
- ❑ **Utilities, school districts, special districts, tribes**
- ❑ **Federal & state agencies**
- ❑ **Private business**
- ❑ **Private individuals, students**

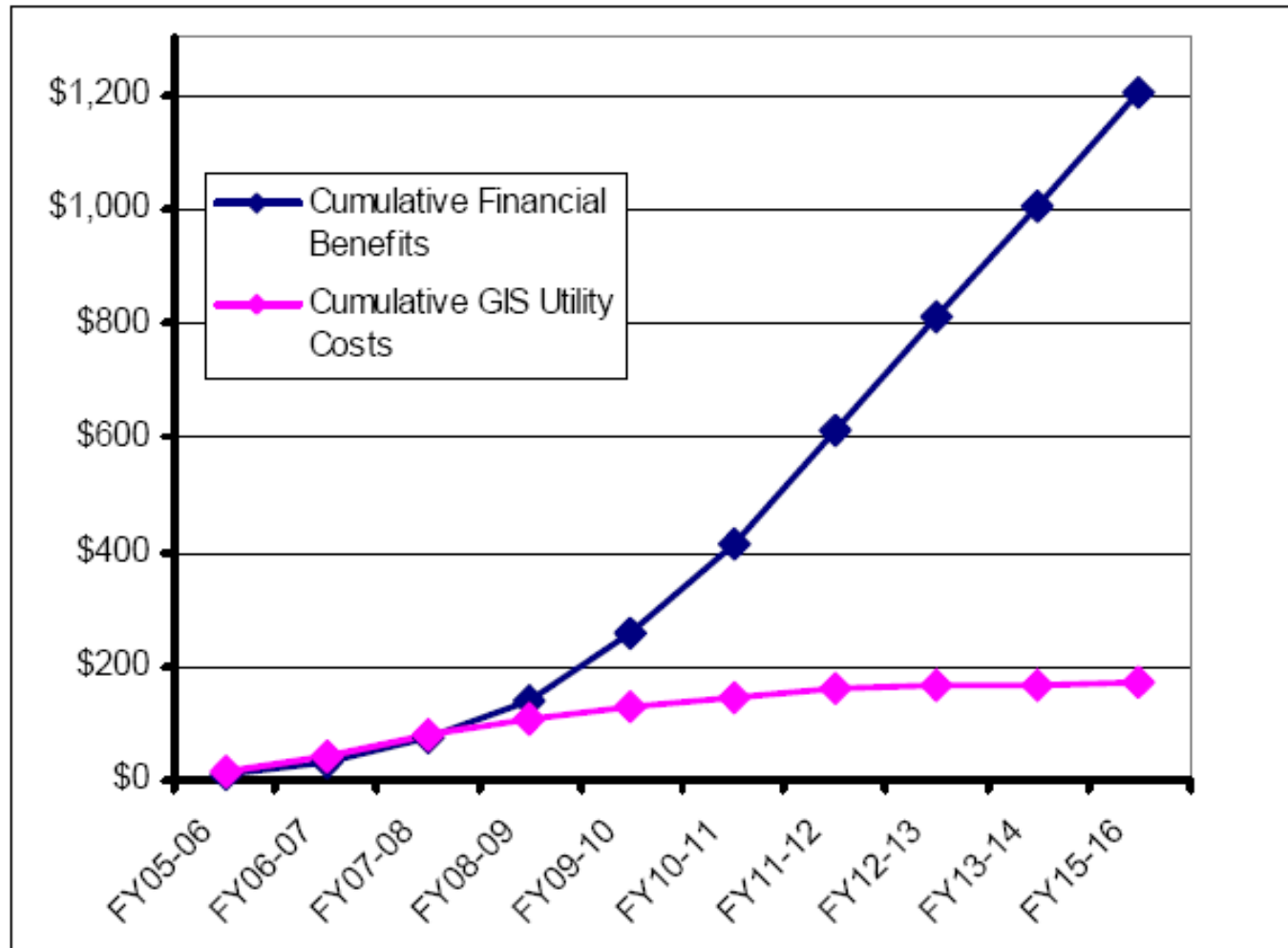
**But where are we *really* on
the optimal development of
GIS in King County?**

What was (is) our ROI?

Why GIS ROI Documentation Studies?

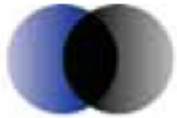
State of Oregon

Figure 5-5: Comparison of Cumulative GIS Utility Costs and Benefits (millions of \$)



GIS ROI Documentation Study Breakthrough

New Zealand



ACIL Tasman
Economics Policy Strategy

Spatial information in the New Zealand economy

Executive summary

In 2008, the use and re-use of spatial information is estimated to have added \$1.2 billion in productivity-related benefits to the New Zealand economy. This value is the result of increasing adoption of modern spatial information technologies over the period 1995-2008, and is equivalent to slightly more than 0.6 per cent of GDP or GNP in 2008.

Other (non-productivity) benefits linked to the increasing use of spatial information are probably worth a multiple of this. Uncertainties around the likelihoods of future events and valuation methodologies limit the ability to express such benefits in dollar terms; however, non-productivity benefits are nevertheless important to policy and decision making.

KCGIS GIS ROI Study Project

- ❑ **Conceived during 2009 URISA AC in Anaheim**
- ❑ **Approach finalized during 2009 ULA in Seattle**
- ❑ **State of Oregon & King County joint funding**
- ❑ **KCGIS 2010 Priority Initiative**
- ❑ **Managed by KCGIS Center**

KCGIS GIS ROI Study

- ❑ **May 2010 RFP sent to targeted consultants**
- ❑ **June 2010 consultant selection**
- ❑ **August 2010 contract signed**
- ❑ **July 2010 work began**
- ❑ **September & October 2011 Preliminary Results Released**
- ❑ **March 2012 Final Report Published**

KCGIS GIS ROI Study

Consultant Team from UW Evans School of Public Affairs:

- ❑ **Benefit-Cost Analysis Center**
- ❑ **Dr. Richard W. Zerbe, Professor of Public Affairs**



The screenshot displays the website of the Evans School of Public Affairs at the University of Washington. The header features the school's logo and a tagline: "BREAKTHROUGH RESEARCH IN THE PUBLIC INTEREST" with the subtitle "Driving change and shaping policy in communities worldwide". A navigation bar includes links for Search, Prospective Students, Courses & Degrees, Research & Centers, Faculty & Staff, Current Students, Alumni, and Executive Education. The main content area is titled "BENEFIT-COST ANALYSIS CENTER" and describes the center's mission to improve the understanding and use of benefit-cost analysis (BCA) as a decision-making tool. It lists four key goals: improving and standardizing BCA methodology, strengthening relationships between institutions, disseminating information about its use and misuse, and expanding its use when appropriate. A sidebar on the left lists various resources, including "Benefit-Cost Analysis Center", "What is Benefit-Cost Analysis?", "Benefit-Cost Analysis Papers", "Principles & Standards Papers", and "Society for Benefit-Cost Analysis". A right sidebar titled "Benefit-Cost Analysis Papers" encourages users to download and discuss papers, with a link to "Read more".

W
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BENEFIT-COST ANALYSIS CENTER

The core aim of the Benefit-Cost Analysis Center is to improve the understanding and use of benefit-cost analysis (BCA) as a decision-making tool. Our research and outreach is geared toward:

- Improving and standardizing benefit-cost analysis methodology
- Strengthening relationships between institutions that use it
- Disseminating information about its use and misuse
- Expanding its use when appropriate

Benefit-Cost Analysis Papers

Download and discuss papers on benefit-cost analysis. [Read more](#)

KCGIS GIS ROI Study

Methodology:

- ❑ **'With versus without' research design.**
- ❑ **Qualitative interviews: 20; Quantitative surveys: 200**
- ❑ **What would have happened if KCGIS applications had not been implemented and how is King County better off having them?**
- ❑ **Literature review and qualitative interviews will identify key benefits associated with GIS applications (e.g., increased productivity).**
- ❑ **Questionnaire will allow assessment of the extent to which these benefits have been realized across different groups of users of GIS applications, as opposed to what these users would have done in the absence of GIS applications.**
- ❑ **By comparing the "with and without" scenarios, we can assess and monetize the added value of the GIS applications to compare to the costs of implementation, maintenance, and/or additional training.**

KCGIS GIS ROI Study: Methodology

With or without survey methodology:

- ❑ **How has GIS altered agency output levels?**
 - ❑ **Benefits associated with FTE reductions to produce the same (pre-GIS) level of output**
 - ❑ **Benefits associated with enhanced production with the same FTE levels**
- ❑ **Three stage analysis:**
 - ❑ **Interview agency heads and key employees to assess the types of applications and business uses. Interviews were used to build an employee survey.**
 - ❑ **Employees and managers across King County responded to the survey to record their pre and current (or with vs. without) GIS productivity by output types.**
 - ❑ **Interview and survey results were compiled by output type, agency, and productivity levels. Results were then monetized.**
- ❑ **Monetized benefits compared to detailed GIS capital O&M, and end-user costs**

KCGIS GIS ROI Study: Methodology

PERTINENT SURVEY QUESTIONS

Please estimate the number of each output you currently produce (in 2010), being clear about the time frame (per day, per year, etc.). Also state the total number of outputs from your agency (if known), and the number of employees and full-time employees (FTEs) currently working on producing this output.

If you answered that you did not produce a given output in the previous section, you may skip the personal production questions.

- ✖ How many units of this output do you personally produce? Choose # of units:**
- ✖ How many units of this output do you personally produce Per Unit of Time:**
- ✖ What percent of your time do you spend producing each output now? (%)**
- ✖ What percent of your time do you spend producing each output now: Per Unit of Time:**
- ✖ Number of Employees in your workgroup (including you) currently producing this output:**
- ✖ Total FTEs in your workgroup (including you) currently producing this output:**

KCGIS GIS ROI Study: Methodology

PERTINENT SURVEY QUESTIONS

Again, the outputs commonly produced by your agency are listed below in the first column. If you were not present when the output was produced without GIS, please answer No to the first question but provide your best estimate for the remaining questions.

For each output, please indicate how having GIS has impacted labor productivity for you personally and for your agency overall.

- ✗ Did you personally produce this output without GIS?**
- ✗ How many units of this output did you personally produce prior to GIS? Choose # of units:**
- ✗ How many units of this output did you personally produce Per Unit of Time prior to GIS:?What percent of your time did you spend producing each output prior to GIS?**
- ✗ What percent of your time did you spend producing each output Prior to GIS: Per Unit of Time:**
- ✗ Number of Employees in your workgroup (including you) producing this output prior to GIS?**
- ✗ Total FTEs in your workgroup (including you) producing this output prior to GIS?**

KCGIS GIS ROI Study Results

Results: We find that GIS technology appears to be an efficient, highly beneficial investment for King County. The full report presents various figures, but the most conservative estimate presented finds that the use of GIS has produced approximately \$775 million in net benefits over the eighteen year period from 1992 to 2010.

It is clear that the use of GIS by the County has been hugely beneficial. An analysis of the survey responses indicate that overall the use of GIS – compared to not having the GIS technology -- had a net benefit of approximately \$180 million for the year 2010 alone. This estimate assumes that the quality and usefulness of GIS reports remains at the same level as pre-GIS. In reality, we expect that the value of GIS-produced outputs is almost certainly higher than comparable outputs the County produced in years prior to the implementation of GIS technology. Nevertheless, on the assumption that the marginal value of output has decreased (a linear, downward sloping demand curve) we find a lower bound estimate of net benefits of \$87 million per year in 2010.² The benefits were broken down into benefits received from: (1) cost-savings due to more efficient production of original output; and (2) benefits generated from increased productivity beyond the original production level.

KCGIS GIS ROI Study Results

"The most conservative estimate presented finds that the use of GIS has produced approximately \$775 million in net benefits over the eighteen year period from 1992 to 2010...."

"Thus a reasonable estimate of total gains is between \$180 million and \$87 million in 2010."

"The most conservative benefit-cost ratio is 6.98:1.0; assuming outputs have equal value returns a benefit-cost ratio of 13.36:1.0 ."

KCGIS GIS ROI Study Results

Conclusion

Using any of our estimation methods, our survey and resultant analysis indicates that King County's GIS program is an excellent policy investment. Even by our most conservative estimate (in which we discount past cash flows at 3%, assume a diminished value for outputs in excess of 1992 levels, and interpolate past benefits using a B/C ratio that decreases by 10% per year), King County's GIS program is estimated to have earned \$776,361,408 in net benefits from 1992 to 2010. It is important to note, however, that this figure is estimated in comparison to the output of county agencies without GIS technology. For any future policy decision-making, an analysis would need to consider not only the null comparison of not funding any GIS technology, but also various levels of GIS funding and different types of GIS technology, since this is the true rubric against which any future GIS policy should be compared.

KCGIS GIS ROI Study

Questions & Answers:

- ❑ **At what stage is KCGIS in the total potential business use of GIS?**
- ❑ **Are the KCGIS results 'good'?**
- ❑ **How do we know?**
- ❑ **Do we need similar studies of other large counties?**
- ❑ **What about a single 'latitudinal' study of 12-15 mid-sized cities in Washington & Oregon?**
- ❑ ***Are government agency officials not now compelled to pursue full GIS development?***

URISA's GIS Management Institute

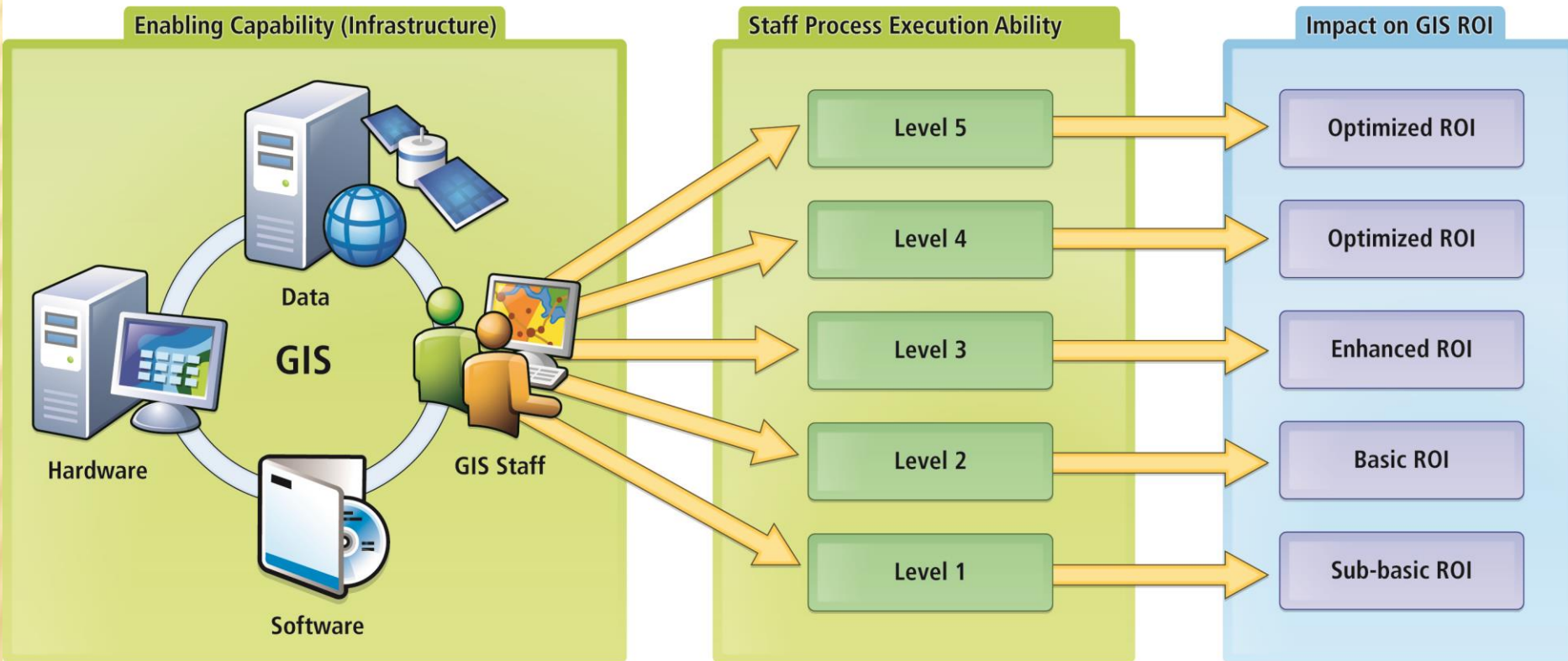
How will the GMI Operate?



URISA's GIS Management Institute

Who will use the GMI, and why?

Local Government GIS Capability Maturity Model



Babinski's Theory of GIS Management: As GIS Operational Maturity Improves, ROI Increases

ROI Study Acknowledgement:

- ☐ **State of Oregon GIS and Cy Smith, Oregon GIO**
- ☐ **KCGIS Technical Committee**
- ☐ **Richard O. Zerbe & UW GIS ROI Study Team**
- ☐ **KCGIS Center Interview team:**
 - ☐ **George Horning, Manager**
 - ☐ **Greg Stought, Enterprise Services Manager**
 - ☐ **Dennis Higgins, GISP, Client Services Manager**
 - ☐ **Debbie Bull, GIS DBA**
 - ☐ **Greg Babinski, GISP, Finance & Marketing Manager**

Questions, Comments & Discussion

Learn More:

- **ArcNews: Summer 2012:**
<http://www.esri.com/news/arcnews/summer12articles/king-county-documents-roi-of-gis.html>
- **Access full report on King County web site:** www.kingcounty.gov/gis

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