



Return on Investment Study for the Creation and Maintenance of Statewide Digital Parcels

Summary of Findings & Parcel Lifecycle Recommendations

May 26, 2015
Applied Geographics, Inc.



Today's Presentation

- Key Observations
 - Parcels as a public good
 - The “free ridership” issue
- Summary of Outreach Completed
- Benefits
 - Matrix
 - Use Case Results – Qualitative & Quantitative
- Costs
- Net Present Value and Projected ROI
- Parcel Lifecycle Recommendations

ROI Project Purpose

To **assess and document the value** of Statewide Parcel Data in GIS format in **quantifiable** terms and use the results to **provide business value and cost justification** to decision-makers.



<http://www.adweek.com/socialtimes>

Study Observations

- Parcel data as a “Public Good”
 - Utilization characteristics are non-excluding (i.e. publicly available) and non-rivaling (i.e. can be used simultaneously by many entities)
 - No market mechanism for valuing a public good
 - Without state support, inadequate production/maintenance is likely
 - Without state support, the potential net benefits will not be realized

Study Observations

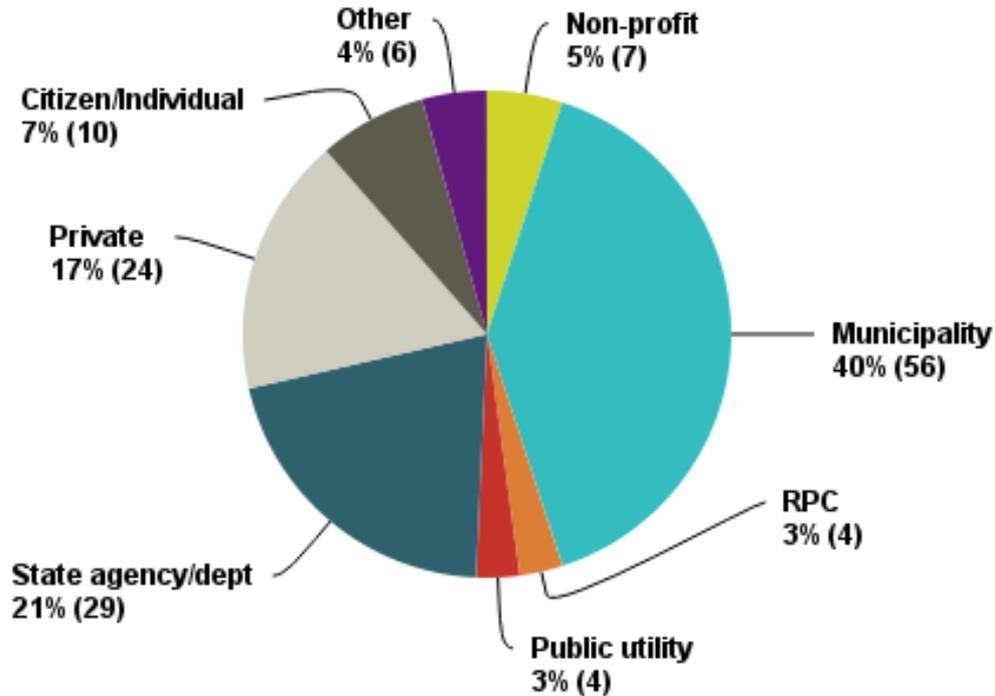
- Valuing Parcel Data and the Free Rider Problem
 - No market mechanism for people to indicate “willingness to pay”
 - People/organizations have no incentive to reveal true perception of value for a public good (makes estimating benefits challenging!)
 - Hard to compel organizations to pay for use, unless required via policy or negotiation
 - Need to negotiate fair contributions that are commensurate with expected utilization and ability to pay

Summary of Outreach

Online Survey

Q2 What type of organization do you represent?

Answered: 140 Skipped: 0



Summary of Outreach

Workshops

3 Locations:

- Rutland – 14 attendees
- Lake Morey – 19 attendees
- Winooski – 24 attendees

Attendees Included:

- Cities/Towns (Listers, Assessors, Public Works, GIS Techs, Planners)
- Regional Planning Commissions,
- State Agencies (VTrans, ACCD, ANR, Taxes),
- Non-profits and educational institutions,
- Private Sector (GIS services, consulting foresters, land surveyors, real estate)

Summary of Outreach

Interviews

1. Agency of Administration (Taxes, Current Use, Property Value & Review)
2. Agency of Commerce & Community Development (Economic Development, New Business Recruitment, GIS)
3. Agency of Natural Resources (Forests Parks and Recreation, Environmental Conservation)
4. Agency of Transportation (Stormwater Management, GIS)
5. City of South Burlington
6. Town of Reading
7. Town of Essex
8. Rutland Regional Planning Commission
9. South Windsor Regional Planning Commission
10. Vermont Assessors and Listers Association (VALA)
11. Vermont Society of Land Surveyors
12. Vermont Center for Geographic Information (VCGI)
13. Private - Dubois & King Surveying
14. Private - Russell Reay, Consulting Forester
15. Private - Meadowsend Timberlands, Consulting Forester

Economic Development

Qualitative Benefits

Category	Use Case
<i>Vermont Business Recruitment/Development</i>	Accurate and Complete Site Selection Tools; Reduced time hunting for information
	Streamlined permitting process
	Better able to compete with neighboring states
	Frees resources to focus on incentivizing new business
<i>Managing Forest Fragmentation</i>	Support forest products economy
	Tourism and Recreation
<i>Current Use Program Management</i>	Improved verification process; potential for enforcement
	Ability to analyze ratios and see trends statewide
	Fair and equitable taxation

Economic Development

Use Case: Improved Site Selection & Job Growth

Vermont 2020: Comprehensive Economic Development Strategy

- “Creating a Competitive Business Environment” is key to economic strategy
- VT faces “aggressive and well-funded business recruiting from neighboring states”
- The supply of available sites for larger companies is small
- Site locator tool is incomplete and inaccurate – info “in people’s heads”



Economic Development

Quantitative Benefits: Improved Site Selection & Job Growth

2013-2023 Projected Growth - Economic Clusters	Potential New Jobs by 2023	Value of New Jobs
Computer Systems Design & Related Services	39	\$ 1,197,575
Community Care Facilities for the Elderly	22	\$677,953
Coffee and Tea Manufacturing	14	\$433,731
Supermarkets and Other Grocery	81	\$2,486,849
Navigational, Measuring, Electromedical and Control Instrument Manufacturing	18	\$551,104
General Warehousing and Storage	10	\$317,275
Total Value in 2023	185	\$5,664,491
Total Annual Value		\$809,213

Average Per Capita Income (Projected)	\$30,566
Potential impact of parcels on growth (conservatively)	1%

Economic Development

Use Case: Current Use Program

- 18,000 properties and 2.4M acres of land (1/3 of state!) managed on paper maps
- “We owe it to the property tax payers to base taxes on current and accurate data”
- No resources for verification or investigating claims of current use or parcel location
- Would like to analyze ratios statewide and see use change
- Consulting foresters must spend tremendous amount of time researching and submitting maps

Economic Development

Quantitative Benefits: Current Use Program

Cost of Current Program	Potential Reduction of Costs through Better Verification, Time Savings	Expected Annual Savings (1%)
\$6,000,000	1%-2%	\$600,000



Economic Development

Use Case: Forest Fragmentation

- **2015 Vermont Forest Fragmentation Report:** *“Subdividing forests into lots for house sites or other types of construction fragments Vermont’s forests and reduces their value as wildlife habitat and a forest industry resource, as well as diminishes Vermont’s tourist economy.”*
- 80% of forested land in VT is privately owned – difficult to track fragmentation
- Statewide parcels would allow holistic view and new insights to ways to better manage the issue of forest fragmentation
- *“You can't manage what you can't measure”*

Economic Development

Quantitative Benefits: Forest Fragmentation

Avoided Loss of Revenue	Current Annual Revenue	Annual Growth of New Households	Revenue at Risk	Mitigating Impact of Parcels (1%)
Harvest and manufacturing of forest products	\$1.4B	.6%	\$8.4M	\$84,000

Avoided Loss of Revenue	Tourist Revenue + Associated Jobs	Annual Growth of New Households	Revenue at Risk	Mitigating Impact of Parcels (1%)
Fall Foliage Tourism and Recreation	\$618M	.6%	\$3.708M	\$37,080

Stormwater Management

Qualitative Benefits

Category	Use Case
<i>Asset Management and Project Planning</i>	Avoid extensive research to identify ownership and abutters
	Assign maintenance responsibilities
	Find willing sellers
	Vegetation management
<i>Site Selection</i>	Assess Interest and Value to Stormwater Management
	Identify sites for milkweed, butterflies
<i>Encroachment Detection</i>	Avoid loss of compensation for encroachment
	Preventative education

Stormwater Management

Quantitative Benefits

Time Savings	Annual Time Savings - Low	Annual Time Savings - High	Value - Low	Value - High
Researching property owners and abutters	416	1,248	\$20,800	\$62,400
Preventing Property Damage from Encroachment (labor)	416	1,248	\$20,800	\$62,400
Managing permit delays	1,872	2,808	\$93,600	\$140,400

Cost Savings	Value - Low	Value - High
Preventing Property Damage from Encroachment (cost)	\$100,000	\$200,000

Total	Annual Value - Low	Annual Value - High
	\$235,200	\$465,200

Public Safety

Qualitative Benefits

Category	Use Case
<i>Emergency Management</i>	Situational Awareness and Needs Assessment
	Damage Assessment
	Site Selection
	Grant Applications
<i>Fire Safety</i>	Retrieval of Land Ownership Information
	Access Planning
	Forest Fire Response
<i>Law Enforcement</i>	Policing
	E911

Public Safety

Use Case: Flood Risk Assessment

Damage from Irene over \$850M:

- Federal: \$602.72 million
- State: \$144.81 million
- Local: \$8.70 million
- Private: \$31.31 million



Consistent, complete statewide parcel data would...

- Help to assess damages and the property owners who are impacted
- Inform decisions on floodplain management by...
 - Making sure people who need the assistance get it
 - Eliminating errors and even fraud in applications for assistance, or reimbursement
 - Proactively reducing the risk of future damages to property with better data to inform floodplain management

Public Safety

Quantitative Benefits: Damage Assessment & Flood Risk

FEMA Assistance After Hurricane Irene	Mathematically Annualized Amount*	Expected Annual Benefits (1%)**
\$166,000,000	\$16,600,000	\$166,000

*Based on economic plausibility, not meteorology -- there have been 12 storm events since 2010 that qualified for FEMA financial assistance, including Irene

**Potentially, from either reduced assistance needed, or greater success in getting needed assistance

Public Safety

Use Case: Access Planning for Fire Safety

- In 2012 fire departments in Vermont responded to 47,653 emergency incidents (almost 4,000 per month)
- 2008-2012, there were 30 deaths from fires in Vermont
- 2008-11, there were over \$242M in reported losses by insurance companies related to fires (avg. \$60 M/year)
- Assume that statewide parcel data will improve access planning for fire safety, resulting in 1 less fatality over a 5-year period: \$5.2 M
 - Based on economic notion of “value of a statistical life” (VSL)
 - For analyses in 2014, USDOT used a VSL of \$9.2 M (based on a range of alternative values from \$5.2 M to \$13.0 M)

Public Safety

Quantitative Benefits: Access Planning for Fire Safety

5-Year VSL Resulting from 1 Less Fatality per Year	Annual VSL Resulting from 1 Less Fatality per Year	Annual VSL Divided by 2 to be Extra Conservative
\$5,200,000	\$1,040,000	\$520,000

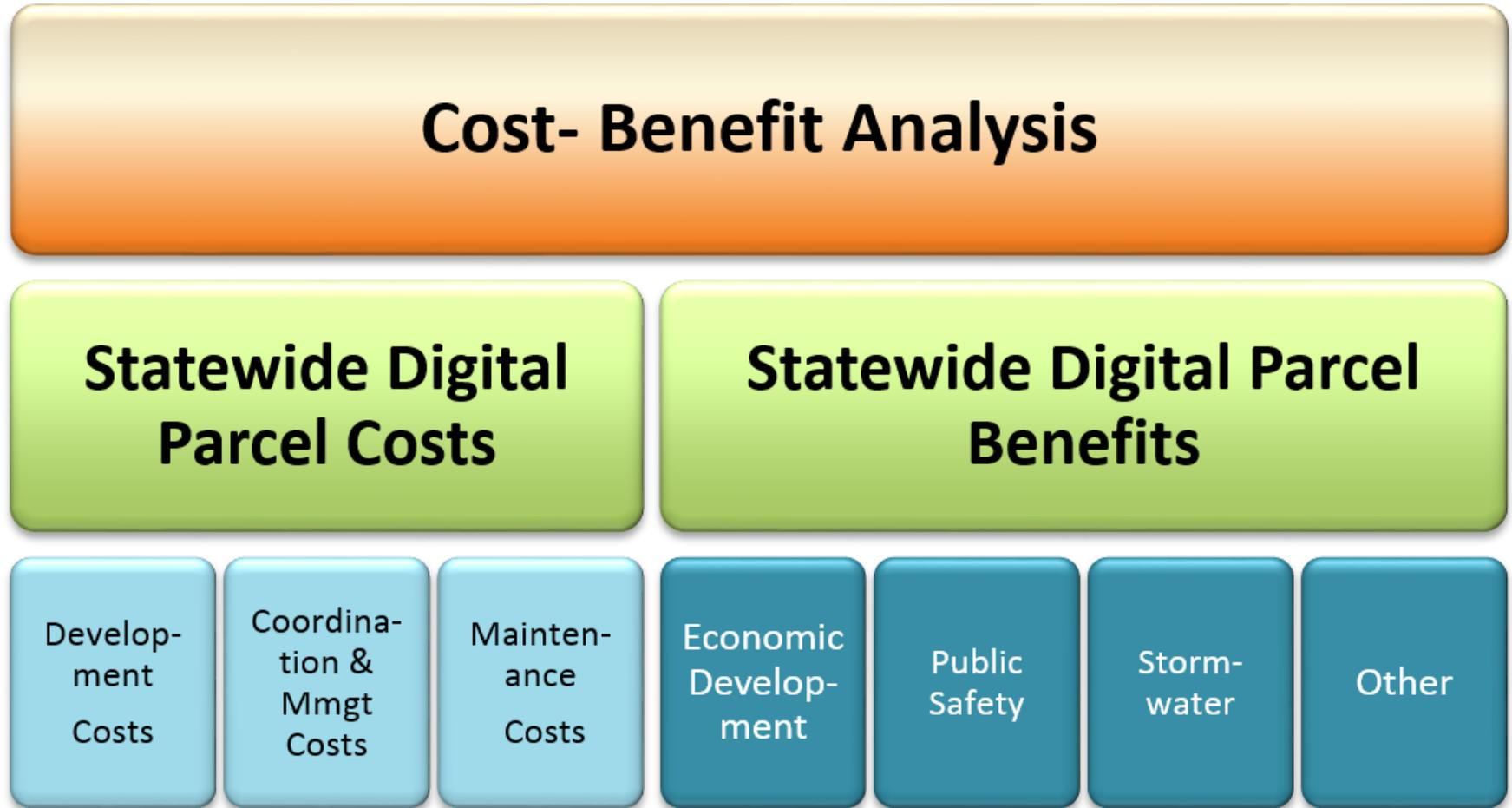


<http://archive.burlingtonfreepress.com/>



<http://www.wptz.com/news>

Conceptual Diagram of Cost-Benefit Analysis



Estimated Development, Maintenance, Operational Costs

COST ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	TOTALS
Data Development Costs						
Initial Development	\$445,378	\$445,378	\$445,378			\$1,336,134
Data Development Subtotals	\$445,378	\$445,378	\$445,378			\$1,336,134
Data Maintenance Costs						
Data Maintenance Costs		\$128,344	\$254,122	\$385,033	\$385,033	\$1,152,532
Data Maintenance Subtotals	\$0	\$128,344	\$254,122	\$385,033	\$385,033	\$1,152,532
State Operating Costs						
Data collection	\$10,000	\$9,000	\$9,000	\$7,000	\$7,000	\$42,000
Data extract, transform, load	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
Quality assurance	\$25,000	\$15,000	\$12,000	\$10,000	\$8,000	\$70,000
Ongoing outreach, education, coordination	\$20,000	\$15,000	\$12,000	\$10,000	\$8,000	\$65,000
Operating Subtotals	\$60,000	\$45,000	\$39,000	\$35,000	\$31,000	\$210,000
TOTALS:	\$505,378	\$618,722	\$738,500	\$420,033	\$416,033	\$2,698,666
NPV:	\$505,378	\$616,257	\$732,627	\$415,033	\$409,443	\$2,678,737

Calculating Net Present Value and ROI

Combine the benefits and costs into the **Net Present Value (NPV)** and **Return on Investment (ROI)** calculations

NPV Calculation

The Net Present Value (NPV) is the difference between the present value of benefits and the present value of costs.

$$NPV = \sum [(B_t - C_t) / (1 + r)^t]$$

ROI Calculation

Using the results of the NPV calculations as inputs, the ROI formula is:

$$\frac{\text{Discounted Benefits} - \text{Discounted Costs}}{\text{Discounted Costs}}$$

Cost Benefit Analysis

Benefits Summary

	<i>Discount Rate = r =</i>		0.4%		NPV=	Benefit_t/(1+r)^t
	(1+r)=		1.0040		t=	{0,1,2,3,4}
t=	0	1	2	3	4	
USE CASES "LOW" BENEFIT VALUES	Year 1	Year 2	Year 3	Year 4	Year 5	TOTALS
<i>Stormwater</i>	\$ 235,200	\$ 235,200	\$ 235,200	\$ 235,200	\$ 235,200	\$1,176,000
<i>Economic Develoment</i>	\$ 809,213	\$ 809,213	\$ 809,213	\$ 809,213	\$ 809,213	\$4,046,065
<i>Public Safety</i>	\$ 166,000	\$ 166,000	\$ 166,000	\$ 166,000	\$ 166,000	\$830,000
TOTALS:	\$1,210,413	\$1,210,413	\$1,210,413	\$1,210,413	\$1,210,413	\$6,052,065
NPV:	\$1,210,413	\$1,205,591	\$1,200,787	\$1,196,003	\$1,191,239	\$6,004,033
USES CASES "HIGH" BENEFIT VALUES						
<i>Stormwater</i>	\$ 465,200	\$ 465,200	\$ 465,200	\$ 465,200	\$ 465,200	\$2,326,000
<i>Economic Develoment</i>	\$ 1,618,426	\$ 1,618,426	\$ 1,618,426	\$ 1,618,426	\$ 1,618,426	\$8,092,130
<i>Public Safety</i>	\$ 520,000	\$ 520,000	\$ 520,000	\$ 520,000	\$ 520,000	\$2,600,000
TOTALS:	\$2,603,626	\$2,603,626	\$2,603,626	\$2,603,626	\$2,603,626	\$13,018,130
NPV:	\$2,603,626	\$2,593,253	\$2,582,921	\$2,572,631	\$2,562,381	\$12,914,812

Cost Benefit Analysis

ROI Results

Vermont ROI for Statewide Parcels

Cost-Benefit Analysis

Discount Rate = $r =$ 0.4%

Cost-Benefit Analysis - "Low"

	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Benefits Summary - "Low"	\$1,210,413	\$1,210,413	\$1,210,413	\$1,210,413	\$1,210,413	\$6,052,065
Cost Summary	\$505,378	\$618,722	\$738,500	\$420,033	\$416,033	\$2,698,666
Discounted Benefits - "Low"	\$1,210,413	\$1,205,591	\$1,200,787	\$1,196,003	\$1,191,239	\$6,004,033
Discounted Costs	\$505,378	\$616,257	\$732,627	\$415,033	\$409,443	\$2,678,737
Net Present Value	\$705,035	\$589,334	\$468,160	\$780,971	\$781,796	\$3,325,296

Return on Investment (ROI) "Low"

1.24

Cost-Benefit Analysis - "High"

	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Benefits Summary - "High"	\$2,603,626	\$2,603,626	\$2,603,626	\$2,603,626	\$2,603,626	\$13,018,130
Cost Summary	\$505,378	\$618,722	\$738,500	\$420,033	\$416,033	\$2,698,666
Discounted Benefits - "High"	\$2,603,626	\$2,593,253	\$2,582,921	\$2,572,631	\$2,562,381	\$12,914,812
Discounted Costs	\$505,378	\$616,257	\$732,627	\$415,033	\$409,443	\$2,678,737
Net Present Value	\$2,098,248	\$1,976,996	\$1,850,294	\$2,157,598	\$2,152,939	\$10,236,075

Return on Investment (ROI) "High"

3.82

Parcel Lifecycle Project Purpose

Develop a **programmatic approach and implementation plan** for the ongoing development, integration and maintenance of Statewide Parcel Data.

Parcel Lifecycle Recommendations

1. Secure Funding
 - a. Address “free ridership” issue
 - b. Request agency contributions commensurate with usage/ability to pay
2. Establish VCGI as Coordinator/Lead
 - a. Promote “shared responsibility” with locals, RPCs, state agencies
3. Strengthen/Promote Parcel Standard & Mapping Guidelines
 - a. Strengthen pairing of the two documents – should reinforce each other
 - b. Promote benefits to all levels of government and private sector
4. Leverage Private Sector and RPC’s to Develop/Maintain Data
 - a. Collaborators that can help promote standard with local towns
 - b. Contract directly
 - c. “a logistical necessity” in Massachusetts program

Parcel Lifecycle Recommendations

4. Facilitate Link to Grand List Attributes
 - a. Technical guidance/support for inclusion of SPAN in parcels
 - b. Collaboration with NEMRC to facilitate linking (e.g. repeatable extracts, tools)
5. Establish Quality Control Processes and Tools
 - a. Require submission to VCGI as part of maintenance specification
 - b. Develop automated tools to check minimum requirements
 - c. Promote as benefit to towns; assurance of quality data
6. Support Ongoing Maintenance and PR
 - a. Continued outreach to locals, state agencies, vendors to understand barriers, collect feedback/ideas
 - b. Technical, and perhaps financial, resources to “have nots”
 - c. Promote availability of data as resource and benefit to everyone

The Wisdom of Many: *“Parcel Proverbs”*

- **Establish and promote a consistent Vision.**
- **Get to know the ecosystem in which you are working.**
- **Build relationships with stakeholders and get them involved.** They need to understand what you are doing and why.
- **Expand your team.** Recruit stakeholders that can proselytize on your behalf. Get their buy-in and create “sales people” out of them.
- **Be sure your QC is thorough** otherwise you are wasting your money.
- **Automate as much QC as possible** and make tools available to vendors.
- **PR, PR, and more PR.** Talk about your project to anyone who will listen and develop promotional materials.



Thank you!

Completed draft report will be
ready by end of May.



<http://www.uvm.edu>