Audit Methodology – Take-Home Vehicles

PNIAF

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Background of Take-Home Vehicles in KC

- Detectives and command staff historically had take-home vehicles
- King County expanded to all patrol officers in the early 1990's
  - Now, all 650 officers are eligible to commute to work in county-owned vehicles from a location within fifteen miles of the King County border

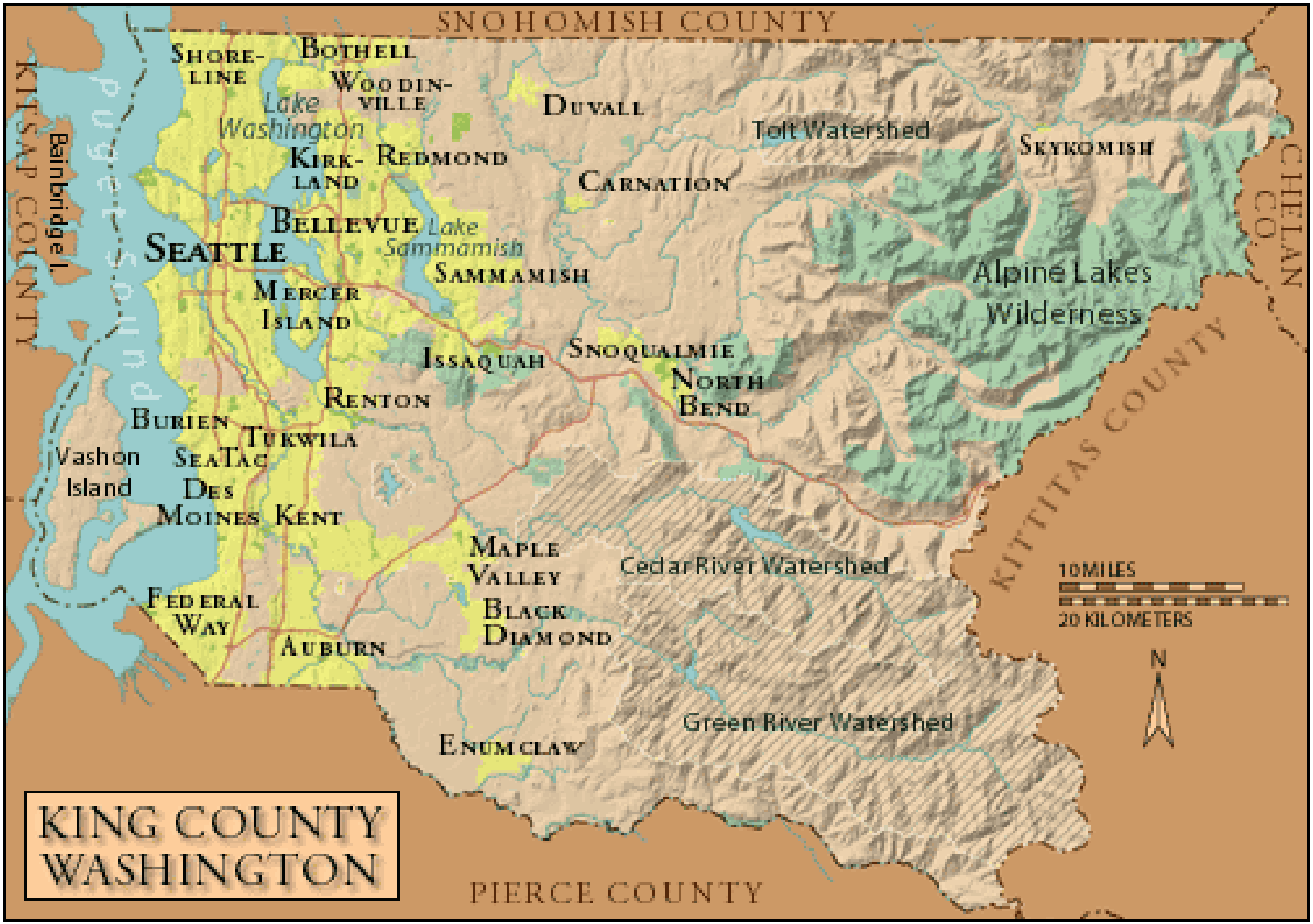
Audit Background

- Impetus for Audit
  - Suspicion that take-home vehicles were expensive
  - Sheriff requested we do an audit comparing current program to alternative and potentially identify efficiencies

Features of Take-Home Program

- Significant expense, more than $7 million annually to operate more than 650 take-home vehicles
- Take-home vehicles provide a number of benefits:
  - operational flexibility,
  - emergency response,
  - increased patrol time, and
  - visibility of police services.

About King County



Why This Audit is Relevant

- Most analyses involve going to a take-home program, not the reverse
- Calculating commute miles is complex
- Estimating costs of alternatives is challenging
- Importance of Sensitivity Analysis in Auditing
  - A methodological necessity
  - Lends credibility and acceptance of work

Audit Steps

- Determine costs of current take-home vehicles program
- Identify and model the costs of a potential alternative programs
- Identify operational or other impacts of change
- Determine improvements to current program

What are the Alternatives?

- Pooled vehicle program for patrol
  - Officers drive personal vehicles to a station
  - Don their uniforms
  - Pick up a pooled police vehicle
  - Transfer equipment
  - Report for duty
- End commute privilege for non-patrol
  - Officers drive personal vehicles to station
  - Report for duty
  - Pick up assigned or pool car as needed

Comparison of Alternatives

Patrol

Costs of Shared Pool
Facilities
Parking
Time

Costs of Take-Home
Larger Fleet
More Mileage

Comparison of Alternatives

Non-Patrol

Ending Take-Home

~~Facilities~~

Parking

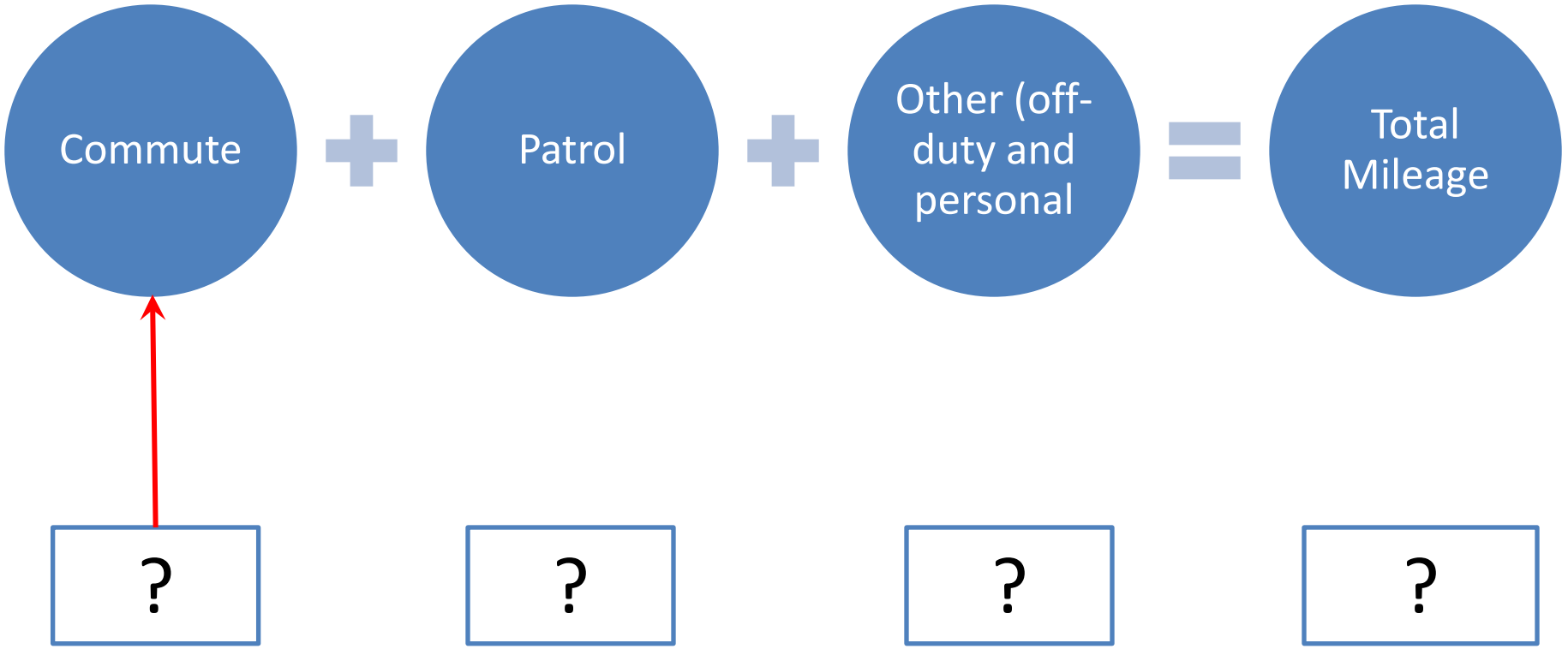
~~Time~~

Costs of Take-Home

~~Larger Fleet~~

More Mileage

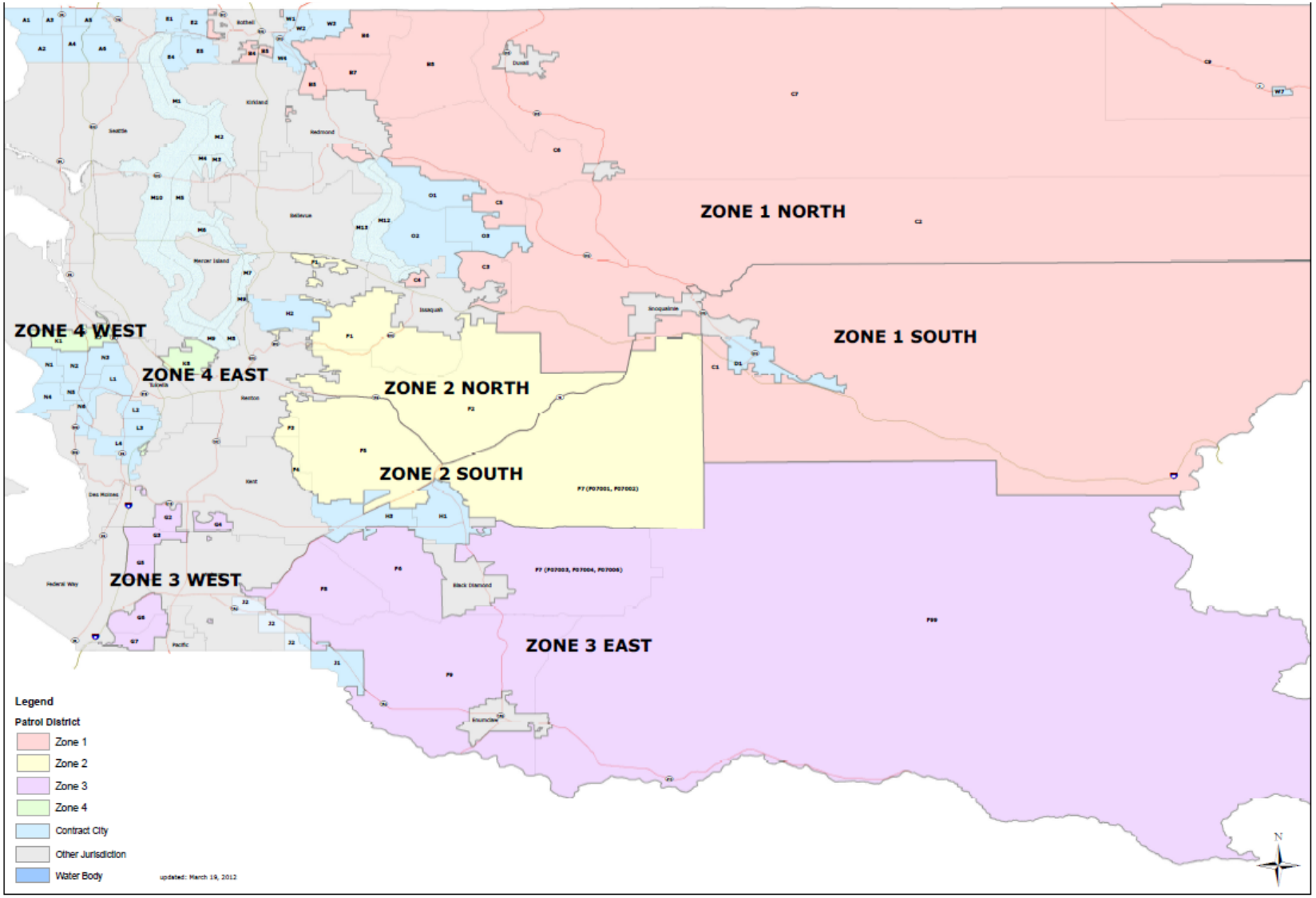
Components of Mileage



Commute Analysis

- Each officer annually fills out a form noting where they are commuting from with an estimated distance (however distance estimate unreliable)
- We calculated an estimated commute distance for each officer
- Complicated by zone system

Zone Map


ZONE 1 NORTH
ZONE 1 SOUTH
ZONE 2 NORTH
ZONE 2 SOUTH
ZONE 3 WEST
ZONE 3 EAST
ZONE 4 WEST
ZONE 4 EAST
Legend
Patrol District
Zone 1
Zone 2
Zone 3
Zone 4
Contract City
Other Jurisdiction
Water Body
updated: March 19, 2012
N

Calculating Commute Distance

- Used center of each zone or other mutually agreed upon location
- Established a work location for each officer
- Used CDX ZipStream to import from Excel to MapPoint and back with distance calculation

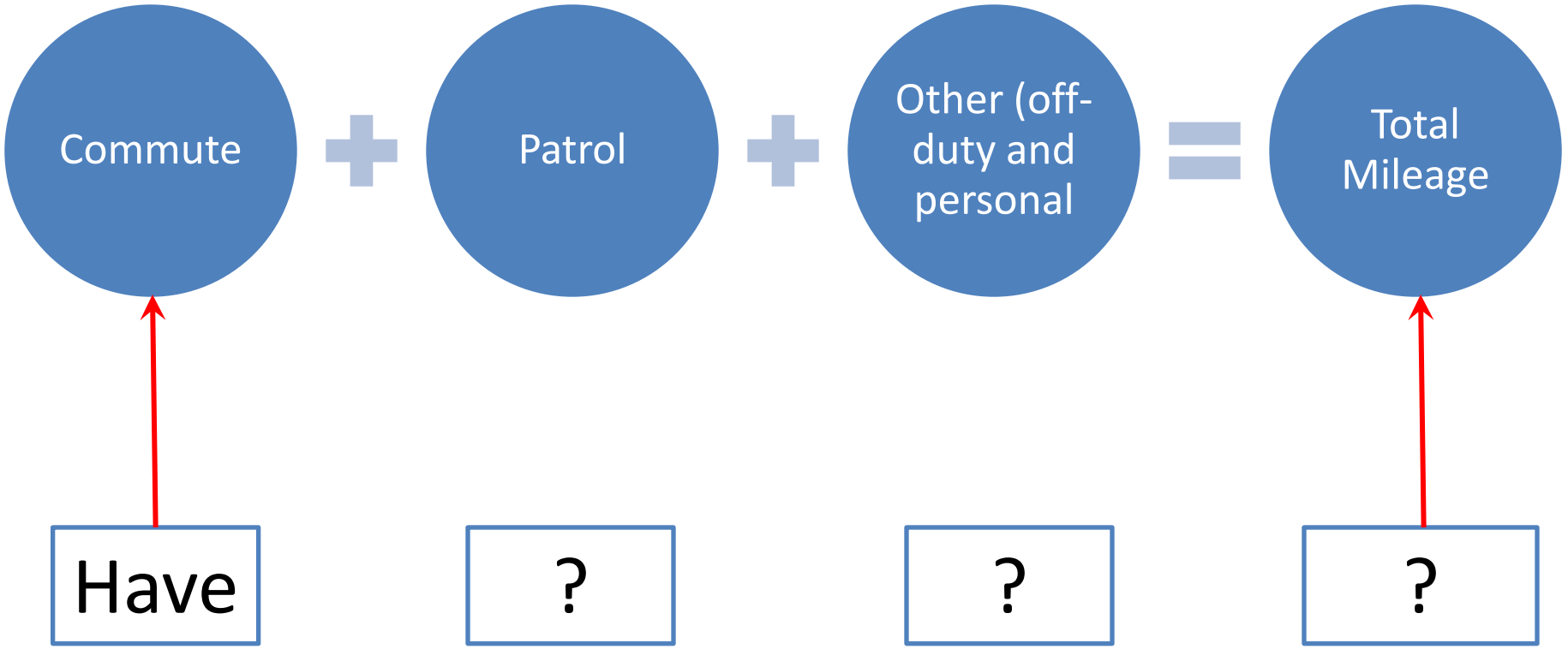
Pros and Cons of MapPoint

- Seemed like the best choice given cost ($170 for license)
- Not very powerful
- Thought would work with other Microsoft programs (Excel) however it did not
- Forced to work around with trial program

Calculating Commute Distance II

- Took commute distance estimate for each officer and multiplied times estimated work incidence
- Work incidence determined by average leave and schedule:
  - 4/10s 163 days annually
  - 5/2 5/3 198 days annually
  - 5/2 215 days annually
- Annual commute mileage estimate by officer

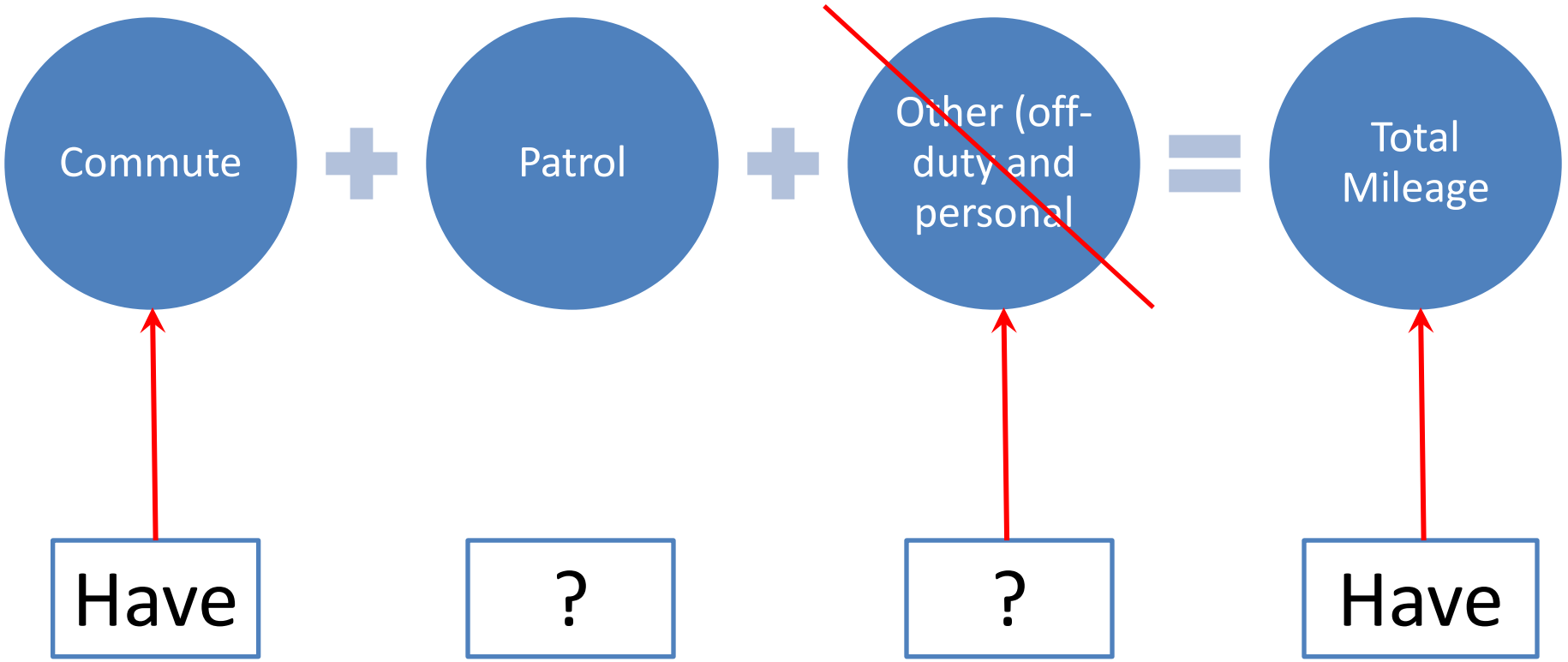
Components of Mileage



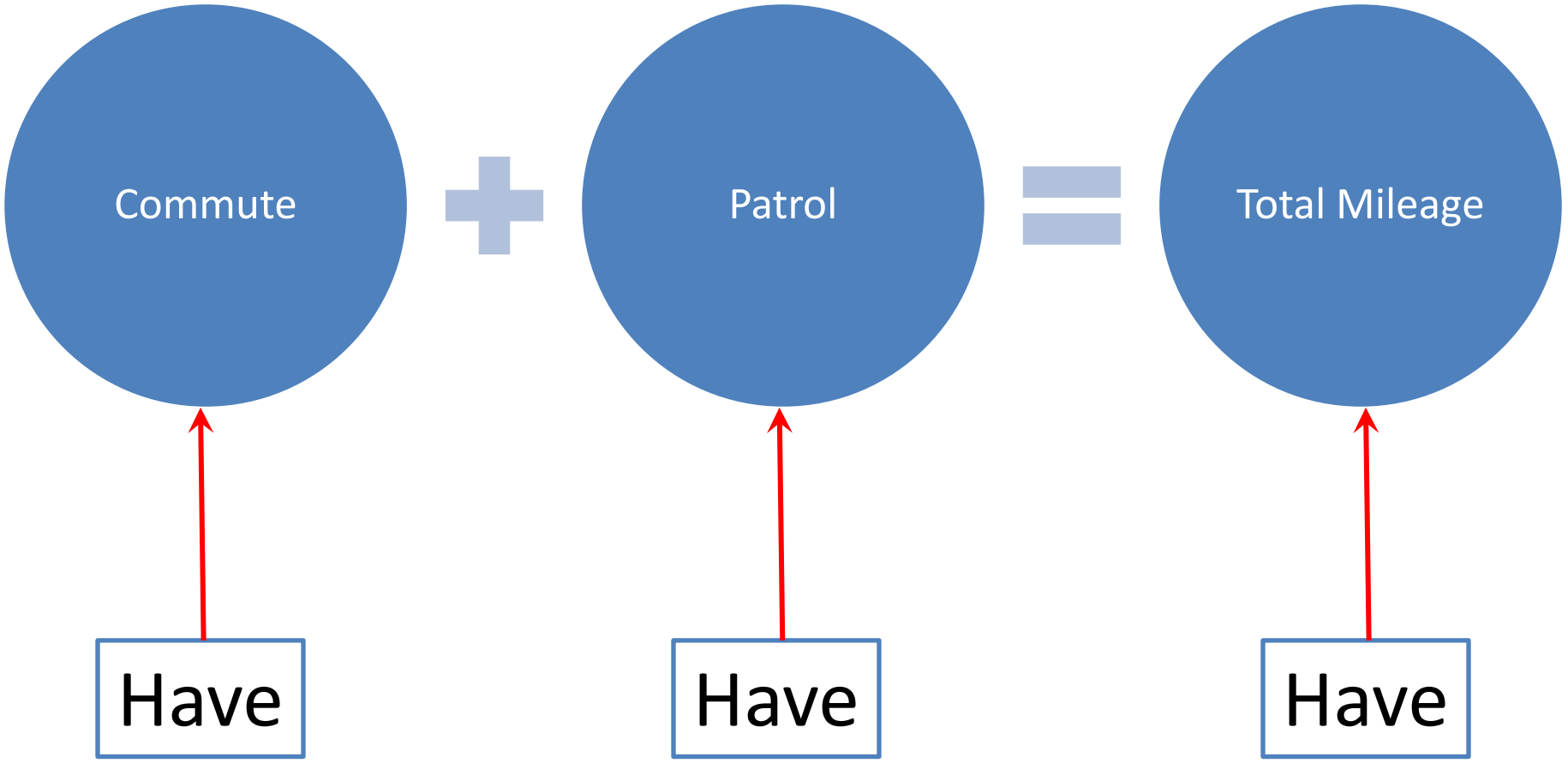
Total Mileage

- Harder than we thought
- Turn-over between officers and vehicles
- Many specialty vehicles
- Used vehicle fueling database
- Matched 65,000 fueling transactions to vehicles and drivers
- Provided estimated annual mileage for 550 out of 650 officers (85%)

Components of Mileage



Components of Mileage

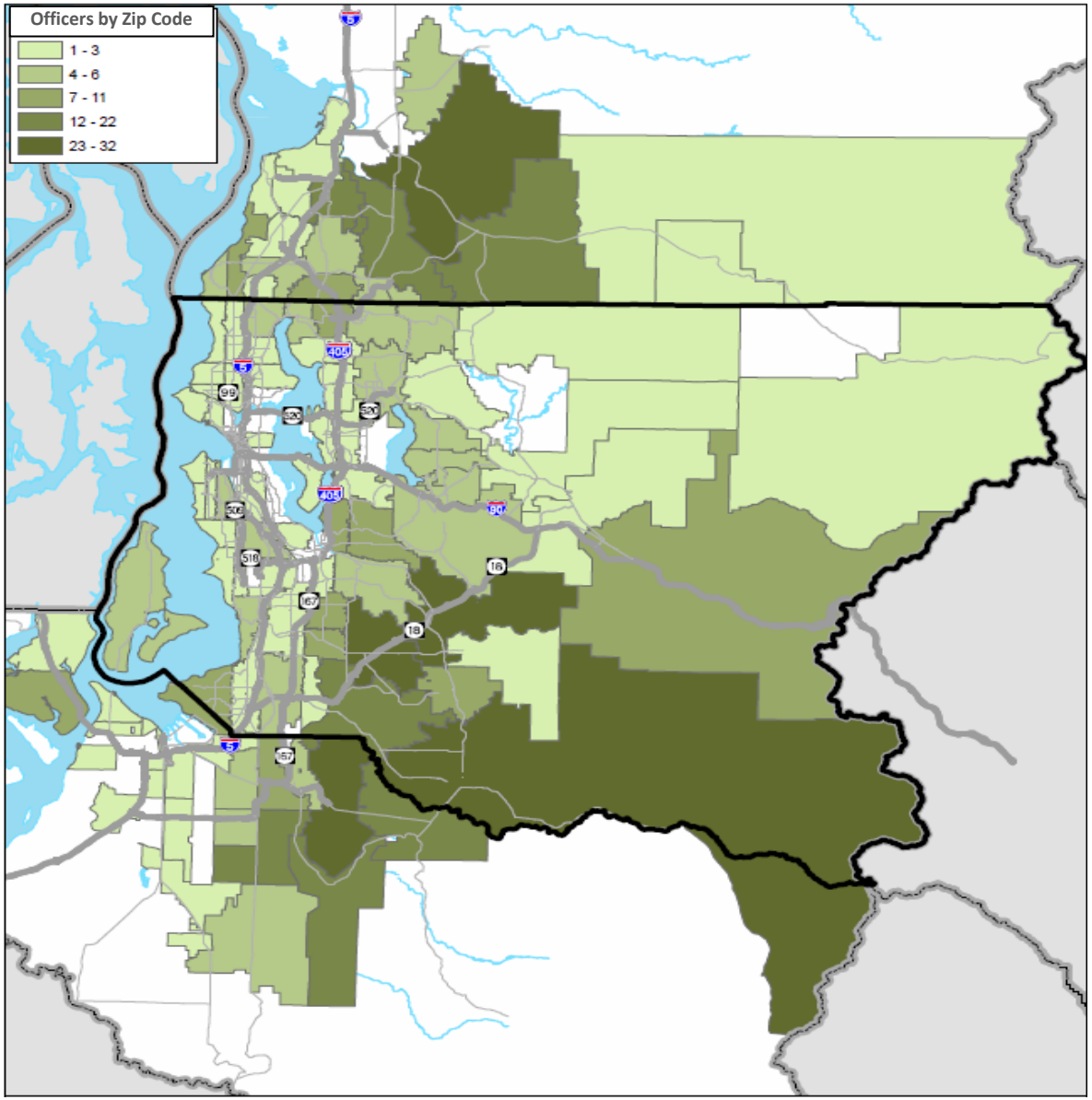


Commute Analysis

56% of total vehicle mileage is commute

Officer's Vehicle Garage Location	Number of Officers	% of Total
Inside King County	309	49%
Outside King County	325	51%
Pierce County	182	29%
Snohomish County	135	21%
Other Counties	8	1%

Garage Locations by Zip Code



Commute mileage costs the County about $4 million per year

Even officers living within King County can have long commutes

Take-home vehicles diminish the incentive to live close to work

Cost Sharing

	Commute Charge (per mile)			
Examples	Within King County	Outside of King County	Estimated Total Revenue	Average Annual Charge per Officer
A	$ -	$0.20	$95,241	$150
B	$0.10	$0.40	$699,222	$1,103
C	$0.20	$0.60	$1,303,203	$2,056

The County Executive, in consultation with the King County Sheriff's Office, should assess options to more equitably share the costs of commuting with King County Sheriff's Office employees with assigned vehicles.

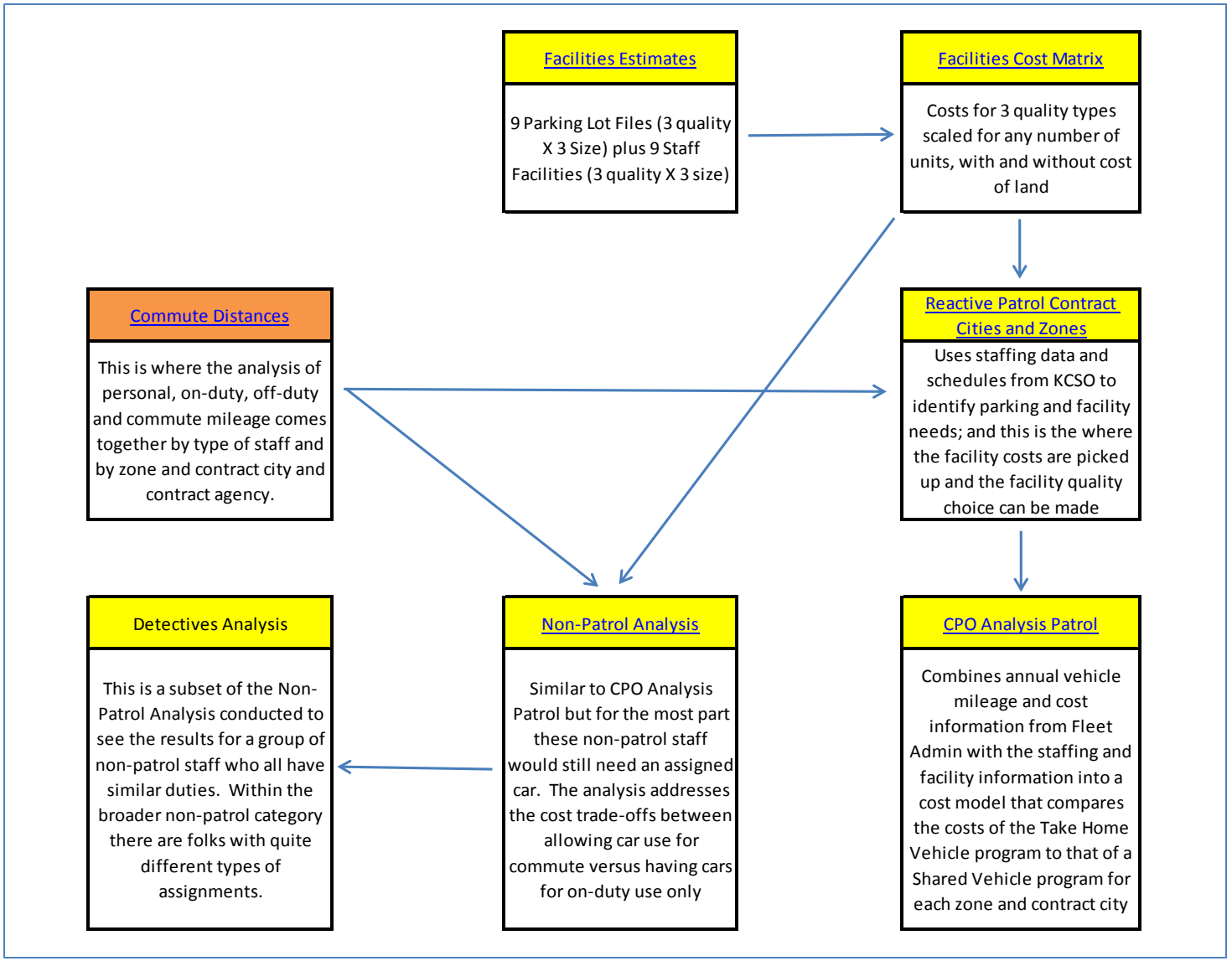
Cost Comparison Difficulties

- Cost of take home program?
  - Based on commute analysis and current charges
- Cost of alternatives?
  - Pre-Post analysis not possible
  - Other studies of limited value (except for identifying variables)
  - Many different police operations
  - Multiple cost and benefit variables

Key Cost Elements of Alternatives

Information We Had	Information We Could Estimate or Calculate	Initial Ranges for Other Variables
Vehicle Users	Parking Lot Costs	Discount Rate
O&M Costs by Vehicle Type	Facilities Costs	Useful Live of Lots and Facilities
Replacement Costs	Debt Service	Size of Reserve Fleet
Outfitting Costs	Commute Mileage	Time Loss Savings
Salvage Values	# Vehicles Needed for Pool	Vehicle O&M Savings
Financing Costs		
Vehicle turnover miles		
Shift and Work Week data		

Key Cost Elements of Alternatives



Outcome of Cost Comparisons

For Patrol

"When looking at fleet costs alone, shifting to a shared pool program for patrol appears to save an estimated $2.7 million annually. However, when facility costs and the value of lost duty time are included, going to a shared pool program would cost about $3.6 million annually."

For Non-Patrol

"The overall added cost of commuting is about $1 million per year greater than the alternative."

Sensitivity Analysis and Results

- In order to understand the impact of the key assumptions on the results of the analysis, we conducted a sensitivity test on each assumption.

- The purpose of this type of analysis is to determine the extent to which changing the value of an assumption impacts the results of the analysis.

Overall, we found that while varying our assumptions magnified or shrank the result (e.g., increased costs or decreased savings), it did not reverse the results such that a cost became a savings or savings a cost.

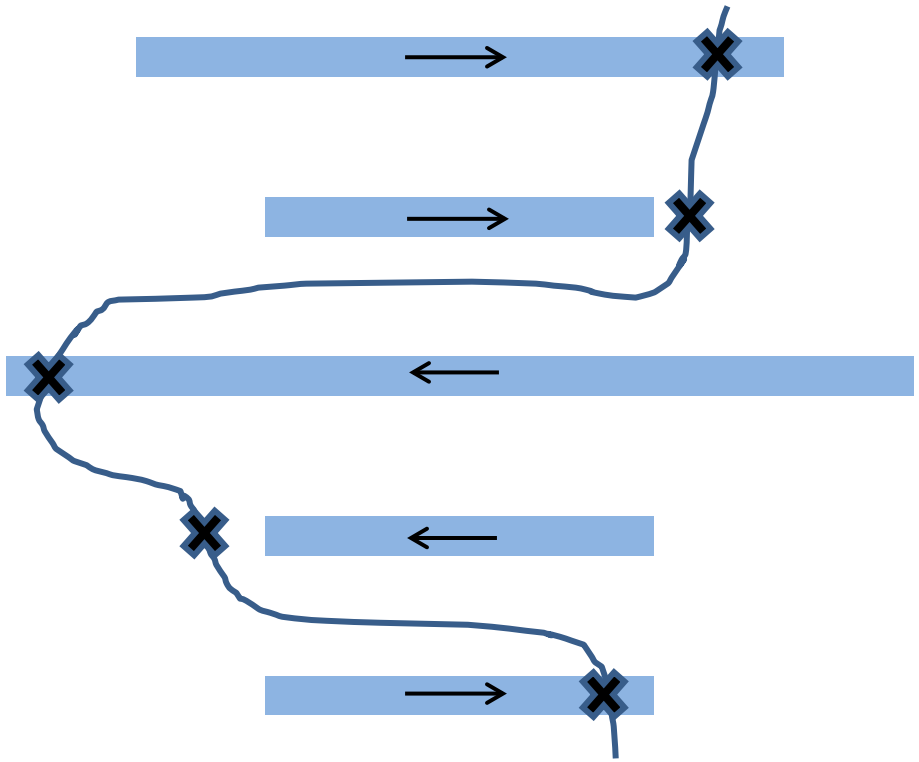
Sensitivity Analysis is Essential

- Chosen Value is usually a point in a range
- Economic assumptions are based on history, judgment and opinion
- Overall cost estimate can change
- Relative rank of alternatives can change
- Decision from analysis can change
- Assumption choice shopping can become obvious

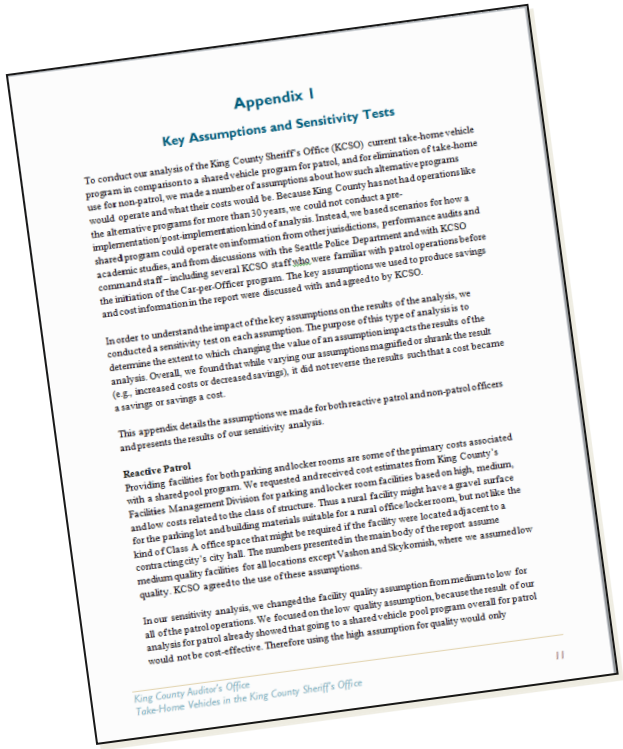
Shopping for Favorable Assumptions

Ranges for Reasonable Assumptions

Arrows points in favorable direction



Sensivity Analysis Now Standard at KCAO



Appendix I

Key Assumptions and Sensitivity Tests

To conduct our analysis of the King County Sheriff's Office (KCSO) current take-home vehicle program in comparison to a shared vehicle program for patrol, and for elimination of take-home use for non-patrol, we made a number of assumptions about how such alternative programs would operate and what their costs would be. Because King County has not had operations like the alternative programs for more than 30 years, we could not conduct a pre-implementation/post-implementation kind of analysis. Instead, we based scenarios for how a shared program could operate on information from other jurisdictions, performance audits and academic studies, and from discussions with the Seattle Police Department and with KCSO command staff – including several KCSO staff who were familiar with patrol operations before the initiation of the Car-per-Officer program. The key assumptions we used to produce savings and cost information in the report were discussed with and agreed to by KCSO.

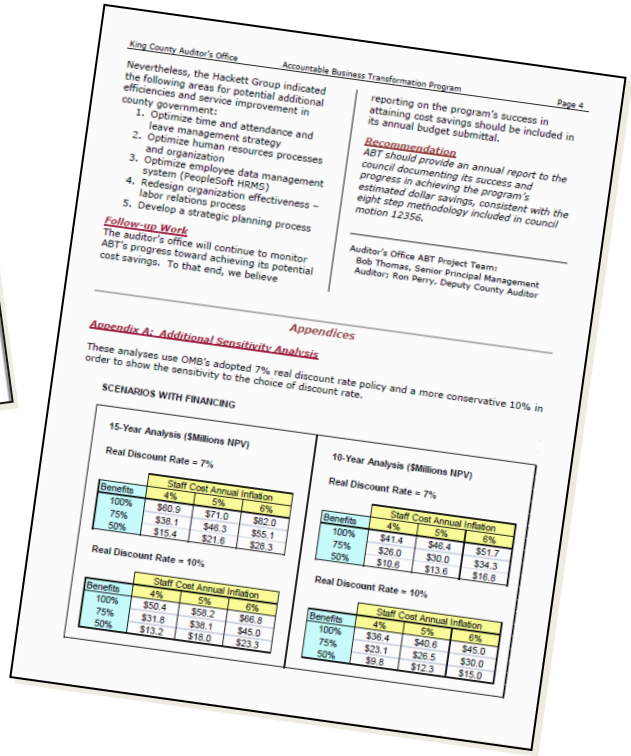
In order to understand the impact of the key assumptions on the results of the analysis, we conducted a sensitivity test on each assumption. The purpose of this type of analysis is to determine the extent to which changing the value of an assumption impacts the results of the analysis. Overall, we found that while varying our assumptions magnified or shrank the result (e.g., increased costs or decreased savings), it did not reverse the results such that a cost became a savings or savings a cost.

This appendix details the assumptions we made for both reactive patrol and non-patrol officers and presents the results of our sensitivity analysis.

Reactive Patrol

Providing facilities for both parking and locker rooms are some of the primary costs associated with a shared pool program. We requested and received cost estimates from King County's Facilities Management Division for parking and locker room facilities based on high, medium, and low costs related to the class of structure. Thus a rural facility might have a gravel surface for the parking lot and building materials suitable for a rural office/locker room, but not like the kind of Class A office space that might be required if the facility were located adjacent to a contracting city's city hall. The numbers presented in the main body of the report assume medium quality facilities for all locations except Vashon and Skykomish, where we assumed low quality. KCSO agreed to the use of these assumptions.

In our sensitivity analysis, we changed the facility quality assumption from medium to low for all of the patrol operations. We focused on the low quality assumption, because the result of our analysis for patrol already showed that going to a shared vehicle pool program overall for patrol would not be cost-effective. Therefore using the high assumption for quality would only



Nevertheless, the Hackett Group indicated the following areas for potential additional efficiencies and service improvement in county government:

1. Optimize time and attendance and leave management strategy
2. Optimize human resources processes and organization
3. Optimize employee data management system (PeopleSoft HRMS)
4. Redesign organization effectiveness – labor relations process
5. Develop a strategic planning process

Follow-up Work

The auditor's office will continue to monitor ABT's progress toward achieving its potential cost savings. To that end, we believe reporting on the program's success in attaining cost savings should be included in its annual budget submittal.

Recommendation

ABT should provide an annual report to the council documenting its success and progress in achieving the program's estimated dollar savings, consistent with the eight step methodology included in council motion 12356.

Auditor's Office ABT Project Team:
Bob Thomas, Senior Principal Management Auditor; Ron Perry, Deputy County Auditor

Appendices

Appendix A: Additional Sensitivity Analysis

These analyses use OMB's adopted 7% real discount rate policy and a more conservative 10% in order to show the sensitivity to the choice of discount rate.

SCENARIOS WITH FINANCING

15-Year Analysis ($Millions NPV)

Real Discount Rate = 7%

Benefits	Staff Cost Annual Inflation 4%	5%	6%
100%	$60.9	$71.0	$82.0
75%	$38.1	$46.3	$55.1
50%	$15.4	$21.6	$28.3

Real Discount Rate = 10%

Benefits	Staff Cost Annual Inflation 4%	5%	6%
100%	$50.4	$58.2	$66.8
75%	$31.8	$38.1	$45.0
50%	$13.2	$18.0	$23.3

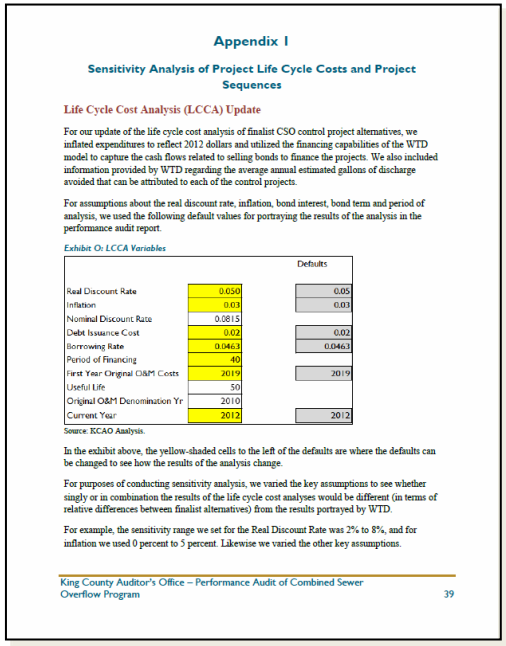
10-Year Analysis ($Millions NPV)

Real Discount Rate = 7%

Benefits	Staff Cost Annual Inflation 4%	5%	6%
100%	$41.4	$46.4	$51.7
75%	$26.0	$30.0	$34.3
50%	$10.6	$13.6	$16.8

Real Discount Rate = 10%

Benefits	Staff Cost Annual Inflation 4%	5%	6%
100%	$36.4	$40.6	$45.0
75%	$23.1	$26.5	$30.0
50%	$9.8	$12.3	$15.0



Appendix I

Sensitivity Analysis of Project Life Cycle Costs and Project Sequences

Life Cycle Cost Analysis (LCCA) Update

For our update of the life cycle cost analysis of finalist CSO control project alternatives, we inflated expenditures to reflect 2012 dollars and utilized the financing capabilities of the WTD model to capture the cash flows related to selling bonds to finance the projects. We also included information provided by WTD regarding the average annual estimated gallons of discharge avoided that can be attributed to each of the control projects.

For assumptions about the real discount rate, inflation, bond interest, bond term and period of analysis, we used the following default values for portraying the results of the analysis in the performance audit report.

Exhibit O: LCCA Variables

		Defaults
Real Discount Rate	0.050	0.05
Inflation	0.03	0.03
Nominal Discount Rate	0.0815	
Debt Issuance Cost	0.02	0.02
Borrowing Rate	0.0463	0.0463
Period of Financing	40	
First Year Original O&M Costs	2019	2019
Useful Life	50	
Original O&M Denomination Yr	2010	
Current Year	2012	2012

Source: KCAO Analysis.

In the exhibit above, the yellow-shaded cells to the left of the defaults are where the defaults can be changed to see how the results of the analysis change.

For purposes of conducting sensitivity analysis, we varied the key assumptions to see whether singly or in combination the results of the life cycle cost analyses would be different (in terms of relative differences between finalist alternatives) from the results portrayed by WTD.

For example, the sensitivity range we set for the Real Discount Rate was 2% to 8%, and for inflation we used 0 percent to 5 percent. Likewise we varied the other key assumptions.

No Good Reason Not To

It is not too hard to do.

- Sensitivity analysis is limited by poor modeling practices, including typing numbers that should be variables – easy to change this!

Constructing analysis to be able to do sensitivity analysis leads to better modeling

Managing multiple variables and scenarios can be made easy (relatively speaking) with Excel's Scenario Manager and/or use of Data Tables.

✓ Most important: Improves quality and credibility

Excel Model Demo

LIFE CYCLE COST ANALYSIS CALCULATOR

Measure Description	First Cost of System	Type of Measure	Cash Flow	Useful Life/Replace Cycle	Net Present Value	Sum of Gains	Sum of Costs
Heating System A	$ (75,000)	One Time	$ -	25	$ (84,421)	$ (84,421)	$ -
Major Maintenance Equipment	$ -	One Time	$ (5,000)	10	$ (6,489)	$ (6,489)	$ -
Energy Savings	$ -	Annual	$ 12,000		$ 235,205	$ -	$ 235,205
Total Net Present Value					**$ 144,296**	**$ (90,910)**	**$ 235,205**

3.0%	Assumed discount rate (Range 3% to 7%)
30	Useful Life of Building (Range 30 to 50 years)

Select System

		First Cost	FC Cycle	Major Maint	MM Cycle	Ann Savings	Discount	Useful Life
A1	Heating System A	$ (75,000)	25	$ (5,000)	10	$ 12,000	3%	30

		First Cost	FC Cycle	Major Maint	MM Cycle	Ann Savings	Discount	Useful Life	NPV Data Table	
										$ 144,296
A1	Heating System A	$ (75,000)	25	$ (5,000)	10	$ 12,000	3%	30	**A1**	**$ 144,295.6**
A2	Heating System A	$ (75,000)	25	$ (5,000)	10	$ 12,000	3%	50	**A2**	**$ 187,855.2**
A3	Heating System A	$ (75,000)	25	$ (5,000)	10	$ 12,000	7%	30	**A3**	**$ 65,212.7**
A4	Heating System A	$ (75,000)	25	$ (5,000)	10	$ 12,000	7%	50	**A4**	**$ 71,965.7**
B1	Heating System B	$ (66,000)	20	$ (4,000)	20	$ 12,000	3%	30	**B1**	**$ 146,983.3**
B2	Heating System B	$ (66,000)	20	$ (4,000)	20	$ 12,000	3%	50	**B2**	**$ 191,696.1**
B3	Heating System B	$ (66,000)	20	$ (4,000)	20	$ 12,000	7%	30	**B3**	**$ 70,915.7**
B4	Heating System B	$ (66,000)	20	$ (4,000)	20	$ 12,000	7%	50	**B4**	**$ 78,420.5**
C1	Heating System C	$ (85,000)	25	$ (7,000)	15	$ 12,500	3%	30	**C1**	**$ 144,835.5**
C2	Heating System C	$ (85,000)	25	$ (7,000)	15	$ 12,500	3%	50	**C2**	**$ 187,938.5**
C3	Heating System C	$ (85,000)	25	$ (7,000)	15	$ 12,500	7%	30	**C3**	**$ 62,065.7**
C4	Heating System C	$ (85,000)	25	$ (7,000)	15	$ 12,500	7%	50	**C4**	**$ 68,241.4**