Costing Transit Services Workshop

presented by

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Why This Course Now?

*Understanding the **cost to provide services** can help transit staff to make better decisions when balancing finite resources with the best service to consumers.*

Transit staff must balance decisions of:

How to deliver services **Cost of delivering**

What We Hope You Get Out of It

When asked cost questions, you'll be able to answer

- What is the cost by route and by program?
- How do I price the cost of service reasonably?
- Why did our administration cost go up?
- I am being asked to extend a route, how much will that cost?
- What is the cost of urban vs. rural service, fixed-route vs. demand response?
- How do my costs look as compared to my peers?

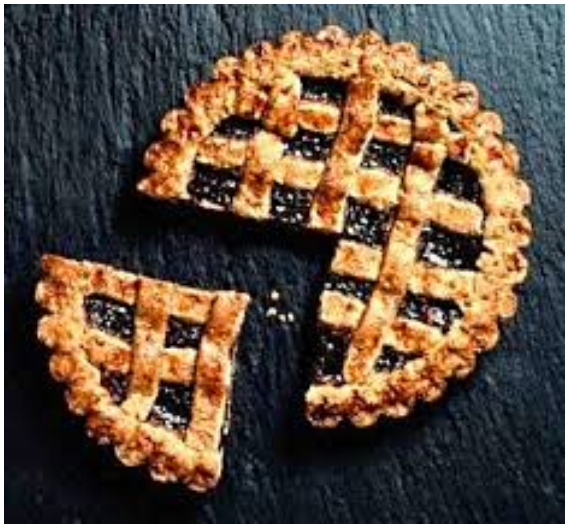
What We Hope You Take Away

- Identify the elements of an effective cost-reporting framework
- Determine cost by function (what does that mean?)
- Determine fixed and variable cost (creating a cost formula)
- Apply the cost formula to price services
- Apply cost formula to answer management questions
- Elements to consider when analyzing costs and comparing costs to peers

We Are Talking Cost Accounting

"**Cost accounting** is a process of collecting, analyzing, summarizing and evaluating various alternative courses of action. Its goal is to **advise the management** on the most appropriate course of action based on the cost efficiency and capability. Cost accounting provides the **detailed cost information that management needs to control current operations and plan for the future**."

Start with the Whole Cost



Total Cost?

	Total	5311	5307	JARC	Mobility Management	Section 5310
Total Operating Costs	**$1,876,339**	$355,736	$133,296	$169,691	$150,458	$106,253
Salaries	$529,694	$123,984	$16,379	$70,069	$8,720	
Fringe	$262,006	$61,085	$8,158	$34,594	$4,229	
Indirect	$256,799	$59,932	$8,053	$33,972	$4,064	
Temporary Services	$368,019	$51,174	$62,964	$7,529	$124,749	
Travel	$12,086	$1,964	$739	$500	$2,617	
Supplies	$4,822	$478	$86	$193	$466	
Printing	$630	$44	$2			
Marketing	$3,325	$493	$214	$254		
Uniforms	$4,885	$945		$932		
Communications	$7,811	$1,610	$862	$883		
Classified Ads	$2,962	$146			$1,845	
Drug & Alcohol	$965	$195	$100	$50		
Radio Fees	$5,346	$918	$492	$537		
Repairs/ Maintenance	$53,178	$3,229	$546	$1,018	$113	$39,402
Insurance	$28,191	$6,741	$2,136	$3,310		
Small Tools	$4,474	$291	$184	$155		$2,588
Assets under $5000	$21,135	$21		$11	$2,514	$18,175
Other Expenditures	$483	$77		$49	$147	
Utilities	$0					
Computer Supplies	$4,470	$488		$227	$994	$1,106
Program Costs	$1,039	$18	$267	$4		
Fuel/ Oil	$259,037	$41,903	$32,114	$15,404		
Tires	$44,982					$44,982

Participant Introductions & Round Table Discussion

- What types of services do you have?
- What kinds of questions do you get about your costs?
- What does your chart of accounts look like? Do you maintain by grant or as a whole?
- What types of questions about costs are difficult for you to answer?

Workshop Materials

- Guidebook: Managing Operating Costs for Rural and Small Urban Public Transit Systems
- Workbook of reference materials and worksheets
- Excel spreadsheet

(send to participants)

Agenda

Part 1: Cost Framework

- Elements of effective cost-reporting framework

Part 2: Assigning Costs

- Assigning costs to functions
- Assigning costs to fixed and variable costs (creating formula)

Part 3: Service Cost Allocation & Costing Service Changes

- Using the formula to allocate and cost service
- Applying formula to answer management questions

Part 4: Analyzing and Managing Costs

Introduce You To
Anywhere Transit Agency (ATA)

PART 1. COST FRAMEWORK

Key Elements of an Effective Cost-Reporting Framework

- Agreed upon **chart of accounts**
- Track/report ***ALL* expenses** (total-cost) and all operating data (passengers, miles, hours)
- Separate **capital costs** from **operating costs**

CHART-OF-ACCOUNTS

Chart of Accounts

- The agency's chart of accounts is the basic tool used to ensure that all transportation costs are reflected in the agency's accounting system
- Chart of accounts reflected on the general ledger for accounting

Transit Industry Standard Chart-of-Accounts

- Uniform System of Accounting (USOA)—the public transit industry standard for the Federal Transit Administration
- Major class categories
  - Each expense class may contain detailed subcategories.
  - Ex. “Labor” separate entries for drivers, administrators, dispatcher, mechanics

Chart of Accounts – Expense Classes

Typical Expense Classes According to USOA:

- Labor
- Fringe benefits
- Services
- Materials and supplies (includes fuel/lubricants)
- General administrative expenses (allocated central services, if applicable)
- Utilities
- Casualty and liability insurance costs
- Taxes
- Purchased transportation
- Miscellaneous expenses
- Interest expense
- Leases and rentals
- Depreciation and amortization
- Capital expenses

Example Chart of Accounts – Major Classes

See Full USOA Chart of Accounts in Workbook
& "Anytown Transit Agency (ATA)"

USOA Object Class Expenses	Total
Total Operating Costs	**$1,474,500**
501. LABOR	$635,000
502. FRINGE BENEFITS	$226,750
503. SERVICES	$172,250
504. MATERIALS AND SUPPLIES CONSUMED	$291,000
505. UTILITIES	$45,000
506. CASUALTY AND LIABILITY COSTS	$41,000
507. TAXES	$37,500
508. PURCHASED TRANSPORTATION SERVICE	$0
509. MISCELLANEOUS EXPENSES	$14,000
512. LEASES AND RENTALS	$12,000

Expense Classes

Each expense class may have detailed subcategories:

- Category "labor" could have separate entries for drivers, administrators, dispatchers, and mechanics and may separate salaries paid for training or overtime
- Other expense categories that may be useful in certain conditions include indirect expenses (for multi-service agencies providing transportation and other services), expense transfers, and interest expenses

TCRP Report 144, 2011

"Sharing the Costs of. Human Services Transportation"

onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_144v2.pdf

CONCEPT OF REPORTING "TOTAL COST"

REPORT ALL EXPENSES

Full Cost Accounting

- Reporting the total cost of providing service means:
  - **All functions:** Operating, maintenance, administration, planning, purchased transportation
  - **Both direct and indirect costs**
  - **Includes non-cash contributed services** (including in-kind services)

Direct and Indirect Costs

The transit provider should include both direct and indirect cost in reporting expenses

Direct Costs

- Expenses that can be associated directly to transit service
- Examples:
  - Driver wages
  - Fuel
  - Vehicle maintenance

Indirect Costs

- Transit is part of a larger organization (municipal or county government, or a multi-purpose agency)
- The larger organization incurs costs that support several functions, only one of which is public transportation
- Costs cannot be associated with a specific program or function - such as facility rent and administrative salaries

Indirect rate may be used to allocate expenses to transit

Non-Cash ("Contributed")

- Report *non-cash* assets or services from another entity that benefits the transit provider

Report the cost of non-cash "contributions" of:

- Physical assets
- Services if the service meets the following test:
  - The service is significant and essential.
  - The transit provider has reasonably good control over the services.
  - There is an objective basis to value services.
  - The service benefits people outside the contributor's organization.

Contributed Services

Examples of contributed services may include:

- Utility services provided without-charge
- Marketing provided without-charge
- Maintenance services provided without-charge
- Office space provided without-charge

Impact of Not Including All Costs

	Total Cost	Partial Cost
Operating Cost	$100,000	$80,000
Miles	40,000	40,000
Cost per Mile	$2.50	$2.00

Cost measures are not accurately reflected

OPERATING & CAPITAL COSTS

Operating and Capital Costs

- **Operating costs -** typically expenses consumed in a one-year include labor, fringe benefits, materials and supplies (e.g. fuel), maintenance, office space, equipment and administrative costs
- **Capital costs** - expenses associated with long-term acquisitions and leases of physical assets, such as buses, garages, and maintenance facilities
  - FTA: capital expenses are the costs incurred that exceed $5,000 or the capitalization value established by the local government unit *if lower*

PART 2. ASSIGNING COSTS

Assigning Costs to Functions

Operating Expenses by Function

- Functional areas represent a set of line item expenses
  - Operating
  - Maintenance
  - Administration
  - Planning
  - Purchased transportation (or purchase of service POS)

Operating Expense Reference by Function

Operating
- Transportation Administration & Support
  - Garage & Station Supervision
  - Safety & Training
  - Field Supervision
  - Accident Investigation
- Revenue Vehicle Movement Control
  - Starters
  - Dispatching
  - Technology Support (AVL, Signal Priority)
- Scheduling of Transportation Operations
  - Data Collection Activities (Ride/Time Checks)
  - Scheduling & Runcutting
  - Development of Schedule Summaries
- Revenue Vehicle Operation
  - Operators
  - Fuels & Lubricants (& related taxes)
  - Tires
  - Vehicle Licensing & Registration
  - Lease & Rental Costs (Facilities, Vehicles)
- Ticketing & Fare Collection
  - Producing Fare Media
  - Distributing Fare Media
  - Pulling Vaults
  - Counting Cash
  - Processing Debit/Credit Card Transactions
- System Security
  - Patrolling Buses & Stations
  - Securing Operating Facilities
  - Monitoring Closed Circuit TV
  - Court Appearances

Financial Reporting Expenses

Maintenance
- Vehicle Maintenance (including Service Vehicles)
  - Maintenance Administration
    - Maintaining Vehicle Databases
    - Accumulating Performance Data
    - Providing Technical Training
    - Scheduling & Recording Maintenance Activities
    - Engineering Maintenance Activities
  - Vehicle Servicing
    - Interior & Exterior Washing/Cleaning
    - Refueling
    - Adding Engine Oil or Water
    - Movement of Vehicles for Servicing
  - Vehicle Inspection & Maintenance
    - Schedule preventive maintenance
    - Minor Repairs & Fluid Changes
    - Road Calls/Towing
    - Component Rebuild/Overhaul
    - Major Repairs
    - Major Unit Replacement
    - Accident Repair
    - Vandalism Repair
- Non-Vehicle Maintenance
  - Vehicle Movement Control Systems
  - Fare Collection & Counting Systems
  - Structures, Tunnels, Subway; Roadway & Track
  - Passenger Stations
  - Operating Stations (Garages), Grounds & Equipment
  - Vandalsim & Accident Repair of Buildings, Grounds & Equip.
  - Operations & Maintenance of Electrical Power Towers
  - Administrative Supervision & Clerical Support

Purchased Transportation
- Expenses that are billed by the seller of service (invoiced)
- Does not include:
  - Seller's expenses that are not billed
  - Expenses in support of purchased transportation

Administrative
- Finance & Procurement
  - Accounting
  - Payroll
  - Budgeting & Financial Reporting
  - Purchasing
  - Storing & Issuing Materials
  - Inventory Management
  - Real Estate Management
- Marketing & Customer Service
  - Telephone Information
  - Complaint Lines
  - Distributing Information to Facilities
  - Promotions
  - Media Relations
  - Market Research
- Risk Management
  - Claims Management
  - Payments for Injuries & Damages
  - Defending Liability Cases
  - System Safety Planning
- General Activities
  - Personnel
  - Legal Services
  - Insurance
  - Information Technology
  - Office Management
  - General Management

Planning
- Service Development
  - Researching Demographics & Techn
  - Identifying Route Configurations
  - Identifying Service Levels
  - Regional Planning
  - Long-Range Planning
  - Coordination Planning

FUNCTION REFERENCE SHEET

SEE WORKBOOK

“Operating” Function

- **Operating function** includes all expenditures associated with activities to dispatch and operate vehicles in revenue service to carry passengers, including fuel, tires, security. Operations expenses are the typically the largest expense function.

“Maintenance” Function

- **Maintenance function** includes all expenditures associated with *vehicle* maintenance and *non-vehicle* maintenance
- FTA identifies certain *operating expenses* that are eligible for reimbursement from capital funds. A transit agency receiving Section 5307 or Section 5311 funds may elect to file for reimbursement of preventive maintenance operating expenses from capital funds, at the rate of 80% Federal participation.

Maintenance Eligible Expenses

Basically ALL maintenance expenses (vehicle maintenance and non-vehicle maintenance) are eligible for federal reimbursement at the rate 80% from capital funds

- NTD provides a list of maintenance categories: //www.ntdprogram.gov/ntdprogram/Glossary.htm#M):
- Additional clarity on the definition of "maintenance" can be found in the USOA established by FTA.

  //www.ntdprogram.gov/ntdprogram/pubs/reference/USOA.pdf

“Administration” Function

- **Administration function** are expenditures associated with activities (other than operating, maintenance, planning and purchased transportation expenses) supporting the provision of transit service
- If a transit provider is part of a larger organization, many of these supporting services may provided by the larger organization.

See discussion of expenses for central services on previous slides

“Planning” Function

Planning function include costs associated with preparing long-range, regional and coordinated transportation plans and financially feasible transit improvement projects. Activities include:

- Planning
- Service development
- Market research

“Purchased Transportation” Function

- Purchased transportation function include expenses billed by purchased transportation provider (seller) in the operation of the contracted transit service
- A buyer may incur costs to oversee a purchased transportation service. These costs are not a part of the purchased transportation agreement and are not recorded as a purchased transportation expense. May be reported as an Operations expenditures

Assign General Ledger to Functions

Ledger	Operating	Maintenance	Administration
Driver Salaries	X		
Mechanic Salaries		X	
Admin Salaries			X
Driver Benefits	X		
Mechanic Benefits		X	
Admin Benefits			X
Building Rental			X
Parts and Supplies		X	

Exercise 1. Assign Costs to Functions

Object Class Expenses	Total	Operating	Maint.	Admin.	Purch. Transp.	Planning
Driver Labor	$100,000					
Fuel	$50,000					
Tires	$5,000					
Security for Buses	$30,000					
Bus Washing	$5,000					
Major Repairs	$25,000					
Accounting	$35,000					
Marketing	$2,000					
Purchased Transp.	$50,000					
Route Design	$5,000					

Exercise 1 Answer.
Assign Costs to Functions

Object Class Expenses	Total	Operating	Maint.	Admin.	Purch. Transp.	Planning
Driver Labor	**$100,000**	$100,000				
Fuel	**$50,000**	$50,000				
Tires	**$5,000**	$5,000				
Security for Buses	**$30,000**	$30,000				
Bus Washing	**$5,000**		$5,000			
Major Repairs	**$25,000**		$25,000			
Accounting	**$35,000**			$35,000		
Marketing	**$2,000**			$2,000		
Purchased Transp.	**$50,000**				$50,000	
Route Design	**$5,000**					$5,000

ATA Assignment of Costs to Functions

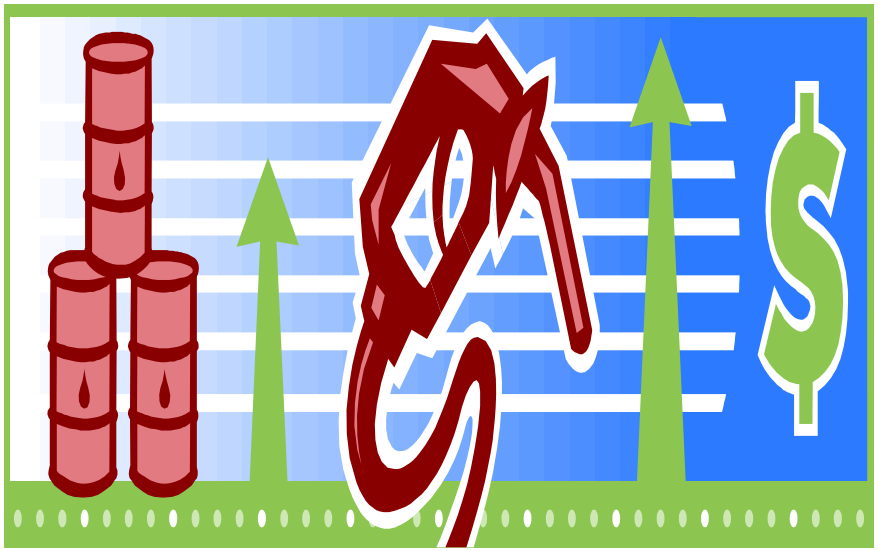
USOA Object Class Expenses	Total	Operating	Maint.	Admin.	Purch. Transp.	Planning
Total Operating Costs	**$1,474,500**	**$1,037,000**	**$179,500**	**$244,500**	**$0**	**$13,500**
501. LABOR	**$635,000**	$490,000	$35,000	$100,000		$10,000
502. FRINGE	**$226,750**	$172,500	$12,250	$38,500		$3,500
503. SERVICES	**$172,250**	$9,000	$122,250	$41,000		
504. MATERIALS/SUPP.	**$291,000**	$268,000	$10,000	$13,000		
505. UTILITIES	**$45,000**	$15,000		$30,000		
506. CASUALTY/ LIAB.	**$41,000**	$39,000		$2,000		
507. TAXES	**$37,500**	$37,500				
508. PURCH. TRANSP.	**$0**					
509. MISCELLANEOUS	**$14,000**			$14,000		
512. LEASES/RENTALS	**$12,000**	$6,000		$6,000		

Assigning Costs to Fixed and Variable Costs

"Creating a Cost Formula"

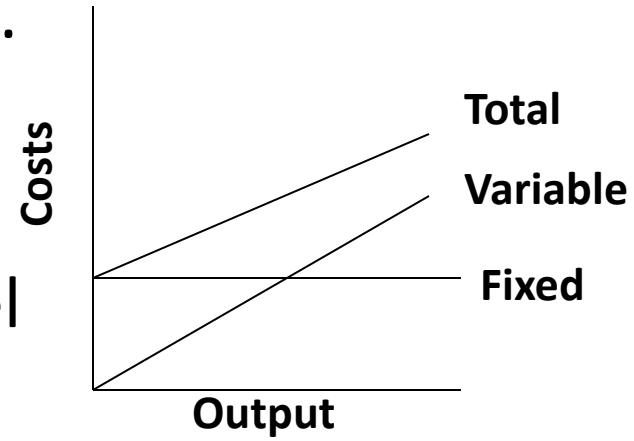
How to Determine Variable/Fixed Costs?

- Determine which costs will change with service changes (variable costs)
- Determine which costs will not vary (fixed costs)



Fixed and Variable Costs Defined

- **Fixed costs**
  - Costs that do not vary with the amount of service provided (i.e. administrative salaries)
- **Variable costs**
  - Costs that change with the level of service provided (i.e. driver wages and fuel)



Total Costs = Fixed + Variable

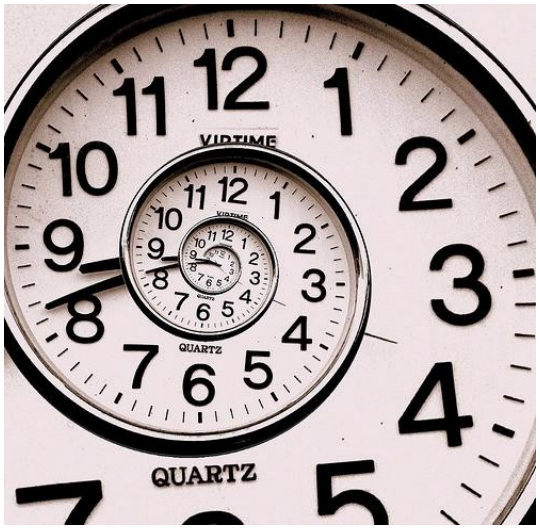
Guidelines

No Mandatory Rules but…

- Administration costs are almost always fixed
- Understand the basis of each cost item and assign accordingly
- Be logical
- BE CONSISTENT

Assign Fixed and Variable Cost

- Assign fixed costs
- Assume remaining costs are variable
- Determine the driver of variable costs
  - Hours driven
  - Miles driven



Exercise 2.
Assign Costs to Fixed and Variable Cost

Object Class Expenses	Total	Fixed	Miles-Driven Variable	Hours-Driven Variable
Driver Labor	$100,000			
Driver Fringe	$30,000			
Fuel	$50,000			
Tires	$5,000			
Security for Buses	$30,000			
Bus Washing	$5,000			
Preventive Maintenance	$25,000			
Accounting	$35,000			
Marketing	$2,000			
Route Design	$5,000			

Exercise 2 Answer.
Assign Costs to Fixed and Variable Cost

Object Class Expenses	Total	Fixed	Miles-Driven Variable	Hours-Driven Variable
Driver Labor	**$100,000**			$100,000
Driver Fringe	**$30,000**			$30,000
Fuel	**$50,000**		$50,000	
Tires	**$5,000**		$5,000	
Security for Buses	**$30,000**	$30,000		
Bus Washing	**$5,000**		$5,000	
Preventive Maintenance	**$25,000**		$25,000	
Accounting	**$35,000**	$35,000		
Marketing	**$2,000**	$2,000		
Route Design	**$5,000**	$5,000		

ATA Assignment of Costs to Fixed/Variable

			Variable Costs	
USOA Object Class Expenses	Total	Fixed Costs	Miles-Driven	Hours-Driven
Total Operating Costs	**$1,474,500**	**$285,000**	**$500,000**	**$689,500**
501. LABOR	**$635,000**	$110,000	$35,000	$490,000
502. FRINGE	**$226,750**	$42,000	$12,250	$172,500
503. SERVICES	**$172,250**	$62,000	$100,000	$9,000
504. MATERIALS/SUPP.	**$291,000**	$13,000	$278,000	
505. UTILITIES	**$45,000**	$30,000		$15,000
506. CASUALTY/ LIAB.	**$41,000**	$2,000	$39,000	
507. TAXES	**$37,500**		$37,500	
508. PURCH. TRANSP.	**$0**			
509. MISCELLANEOUS	**$14,000**	$14,000		
512. LEASES/RENTALS	**$12,000**	$12,000		

Part 3. Cost Allocation to Service
&
Costing Service Change

What is Cost Allocation?

- *Cost allocation* is the process of assigning costs to any activity or item for which you want to separately measure costs.
- Tool to distribute costs fairly and equitably
- Method to disaggregate costs across services, programs or other areas

Why Cost Allocation?

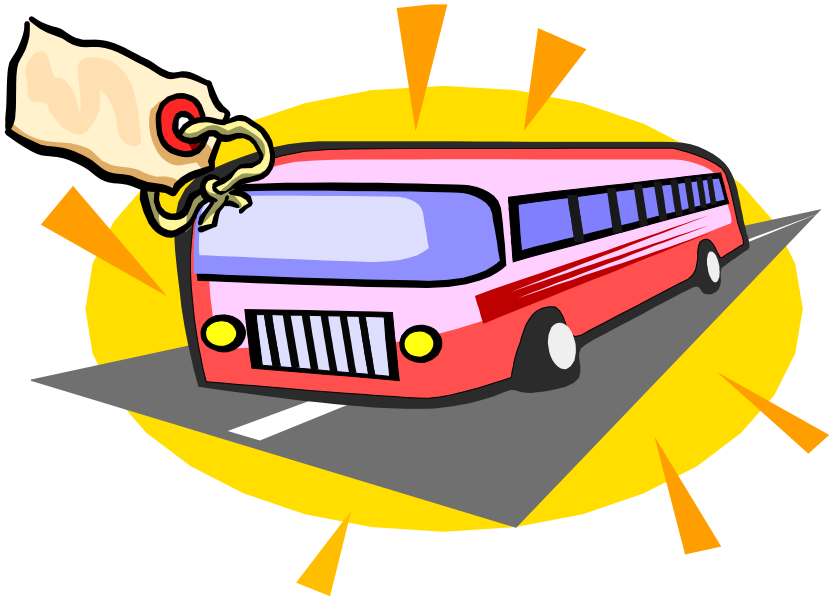
- Consider the following:

Restaurant Bill	
Salad	$ 5.00
Entrée #1	$10.00
Entrée #2	$10.00
1 Dessert	$ 5.00
2 Drinks	$10.00
Total	$40.00

Dinner #1	
Salad	$ 5.00
Entree	$10.00
1 Dessert	$ 5.00
2 Drinks	$10.00
Total	$30.00
Dinner #2	
Entree	$10.00
Total	$10.00

Why Do Cost Allocation?

- Required by funding agency
- Determine the cost of an activity, service, program
- Account for or justify costs
- Determine cost drivers
- Price services
- Spread costs equitably



Service Cost Allocation Advantages

- Provides an organization the **ability to understand on a per trip or per person basis** what it costs to provide that transportation as a direct service.

- Provides **a benchmark** to **compare the unit costs** of other service delivery alternatives (e.g., **different modes, different providers, different models of service delivery**)

- Make **informed management decisions** concerning the most cost-effective strategies for service delivery.

(TCRP 144, Burkhardt, et al., 2011)"

Cost Formula!

- Cost formula uses the total variable and fixed cost totals that you determined when you assigned costs.
- Cost formula can be used to allocate costs across service types, modes, programs, conduct ‘what-if’ scenarios …

ATA Assignment of Costs to Fixed/Variable

			Variable Costs	
USOA Object Class Expenses	Total	Fixed Costs	Miles-Driven	Hours-Driven
Total Operating Costs	**$1,474,500**	**$285,000**	**$500,000**	**$689,500**
501. LABOR	**$635,000**	$110,000	$35,000	$490,000
502. FRINGE	**$226,750**	$42,000	$12,250	$172,500
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509. MISCELLANEOUS	**$14,000**	$14,000		
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ATA Assignment of Costs to Fixed/Variable

			Variable Costs	
USOA Object Class Expenses	Total	Fixed Costs	Miles-Driven	Hours-Driven
Total Operating Costs	**$1,474,500**	**$285,000**	**$500,000**	**$689,500**
Miles			500,000	
Hours				33,000

Calculate the *Variable* Cost Factors

- **Variable unit cost per mile =**

  Total miles-driven cost ÷ total miles

- **Variable unit cost per hour =**

  Total hours-driven cost ÷ total hours

Exercise 3.
Calculate ATA's Variable Cost Factors

- We know from assigning costs that ATA has a total $500,000 in miles-driven cost and $689,500 in hours driven cost. ATA operates a total of 500,000 miles and 33,000 hours, calculate the variable cost factors.

Variable unit cost per mile = miles-driven cost ÷ miles

Variable unit cost per hour = hours-driven cost ÷ hours

Exercise 3 Answer. Calculate ATA's Unit Costs

Variable unit cost per mile =

$500,000 ÷ 500,000 = **$1.00**

Variable unit cost per hour =

$689,500 ÷ 33,000 = **$20.89**

Calculate the Fixed-Cost Rate

The fixed-cost rate is the % of fixed cost to variable cost

Fixed-Cost Rate =

Total fixed-cost ÷ total variable cost

Exercise 4.
Calculate ATA's Fixed-Cost Overhead Rate

We know from assigning costs that ATA has a total variable cost of $1,189,500 and a total fixed cost of $285,000 for a total operating cost of $1,474,500.

Fixed-Cost Rate =

Total fixed-cost ÷ total variable cost

Exercise 4 Answers.
Calculate ATA's Fixed-Cost Overhead Rate

We know from assigning costs that ATA has a total variable cost of $1,189,500 and a total fixed cost of $285,000 for a total operating cost of $1,474,500.

Fixed-Cost Rate =

Total fixed-cost ÷ variable cost

$285,000 ÷ $1,189,500 = **23.96%**

That's All You Need For Your Cost Formula

Hours		Miles		Total
Hours		Miles		
x Unit cost per hour		**x Unit cost per mile**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**Fixed Cost Rate**		Total Fixed Cost
			=	Total Cost

Exercise 5.
Determine the Cost Formula for ATA

Hours		Miles		Total
Hours		Miles		
x **Unit cost per hour**		**x** **Unit cost per mile**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**Fixed Cost Rate**		Total Fixed Cost
			=	Total Cost

Exercise 5 Answer.
Determine the Cost Formula for ATA

Hours		Miles		Total
Hours		Miles		
X $20.89		**x $1.00**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**23.96%**	=	Total Fixed Cost
			=	Total Cost

Total Service Cost

Hours		Miles		Total
33,000 Hours		500,000 Miles		
X $20.89		**x $1.00**		
$689,500 Total Hours-Based Cost	+	$500,000 Total Miles-Based Cost	=	$1,189,500 Total Variable Cost
	+	**23.96%**	=	$ 285,000 Total Fixed Cost
			=	**$1,474,500** **Total Cost**

Using the Cost Formula to Allocate and Cost service

What Do You Want to Do?

- Determine your cost for different types of service?
- Price a service to sell? Negotiate competitive rates?
- Determine if funding source is fully paying for service?
- Determine budget impact?
- Add cost of vehicle into price of service?

Cost Allocation by Service

Possible Service Allocation Categories

Allocation by:

- **Mode**
  - Example: Fixed route vs. demand response
- **Service area**
  - Example: Urban/rural, county/city
- **Program**
  - Example: Medicaid, Workforce Solutions, Head Start

Allocate Fixed Route and Demand Response Using Formula

ATA Service Hours and Miles

	Total	Fixed Route	Demand Response
Vehicle Hours	33,000	15,300	17,700
Vehicle Miles	500,000	153,000	347,000
Passenger Trips	185,000	150,000	35,000

Insert Hours and Miles to Allocate Costs

Hours		Miles		Total
Hours		Miles		
X $20.89		**x $1.00**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**23.96%**		Total Fixed Cost
			=	Total Cost

Exercise 6. Determine Fixed-Route and Demand Response Service Cost

Hours		Miles		Total
Hours		Miles		
X $20.89		**x** $1.00		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	23.96%		Total Fixed Cost
			=	Total Cost

Exercise 6 Answer.

Fixed-Route Cost

Hours		Miles		Total	
15,300		153,000			
X $20.89		x $1.00			
$319,677	+	$153,000	=	$472,677	Variable
	+	23.96%		$113,252	Fixed
			=	$585,929	Total

Demand-Response Cost

Hours		Miles		Total	
17,700		347,000			
X $20.89		x $1.00			
$369,823	+	$347,000	=	$716,823	Variable
	+	23.96%		$171,748	Fixed
			=	$888,571	Total

What Does The Allocation Tell Us?

	Total	Fixed Route	Demand Response
Vehicle Hours	33,000	15,300	17,700
Vehicle Miles	500,000	153,000	347,000
Passenger Trips	185,000	150,000	35,000
Total Cost	**$1,474,500**	**$585,929**	**$888,571**
Total Cost per Hour	$44.68	$38.30	$50.20
Total Cost per Mile	$2.95	$3.83	$2.56
Total Cost per Passenger	$7.97	$3.91	$25.39
Passengers per Hour	5.61	9.80	1.98
Miles per Hour	15	10	20

Excel Workbook

	Total	Fixed Route	Demand Response
Vehicle Hours	33,000	15,300	17,700
Vehicle Miles	500,000	153,000	347,000
Passenger Trips	185,000	150,000	35,000
Variable Unit Cost per Hour	$20.89	$20.89	$20.89
Variable Unit Cost per Mile	$1.00	$1.00	$1.00
Fixed-Cost Rate	23.96%	23.96%	23.96%
Hours-Driven Cost	$689,500	$319,677	$369,823
Miles-Driven Cost	$500,000	$153,000	$347,000
Total Variable	$1,189,500	$472,677	$716,823
Fixed-Cost	$285,000	$113,252	$171,748
Total Cost	$1,474,500	$585,929	$888,571

Costing a Service Expansion

Costing Service Expansion

	Hours	Miles	Total
Current Year Service	33,000	500,000	
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs	$689,370	$500,000	$1,189,370
Expanded Service			
(10 hrs/day X 250 Days & 20 MPH)	2,500	50,000	
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs	$52,225	$50,000	$102,225
Total Variable Costs with Expanded Service			$1,291,595

What about fixed costs? Add or not?

Exercise #7 Service Expansion

ATA is considering expanding service by 5,000 hours a year and 100,000 miles (adding two routes for 10 hours a day on weekdays). What is the estimated cost of the service expansion?

	Hours	Miles	Total
Current Year Service	33,000	500,000	
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs	$689,370	$500,000	$1,189,370
Expanded Service			
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs			
Total Variable Costs with Expanded Service			

Answer #7 Service Expansion

ATA is considering expanding service by 5,000 hours a year and 100,000 miles (adding two routes for 10 hours a day on weekdays). What is the estimated cost of the service expansion?

	Hours	Miles	Total
Current Year Service	33,000	500,000	
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs	$689,370	$500,000	$1,189,370
Expanded Service	5,000	100,000	
X Variable Unit Costs	$20.89	$1.00	
= Total Variable Costs	$104,450	$100,000	$204,450
Total Variable Costs with Expanded Service			$1,393,820

Costing a Service Change

Estimate Savings Change in Service

Savings per Vehicle Trip for Transfers to METRO in Houston

	Hours	Miles	Total
Average Trip Length to Houston	1	20	
Variable Unit Costs	$20.89	$1.00	
Variable Costs	$20.89	$20.00	$40.89
Reduced Miles to Transfer Center	-0.5	-10	
Variable Unit Costs	$20.89	$1.00	
Savings Variable Costs	-$10.45	-$10.00	-$20.45
Trips per Day			10
Savings per Day			-$205
Savings per Year (250 Days)			**-$51,250**

Exercise #8 Service Reduction

ATA is considering shortening a route by 1 hour and 20 miles a day during weekdays. What is the estimated cost savings of the service reduction?

	Hours	Miles	Total
Reduced Daily Service			
Variable Unit Costs	$20.89	$1.00	
Daily Savings Variable Costs			
Savings per Year (250 Days)			

Answer #8 Service Reduction

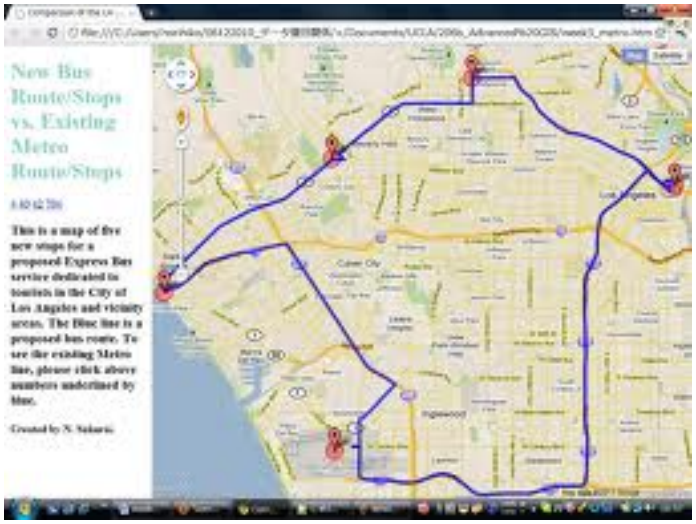
ATA is considering shortening a route by 1 hour and 20 miles a day during weekdays. What is the estimated cost savings of the service reduction?

	Hours	Miles	Total
Reduced Daily Service	-1	-20	
Variable Unit Costs	$20.89	$1.00	
Daily Savings Variable Costs	-$20.89	-$20.00	-$40.89
Savings per Year (250 Days)			**-$10,222**

Costing a Service Extension

Cost of Service Extension

- Extend hours on a route during summer months for 2 hours and 24 miles each weekday
- Should you include fixed costs?



Estimate Cost of Service Extension

	Hours	Miles	Total
Additional Service Each Weekday	2	24	
Variable Unit Costs	$20.89	$1.00	
Variable Costs	$41.78	$24.00	$65.78
Weekdays June-August			60
Cost to Extend Hours for the Summer			**$3,947**

Exercise #9 Service Extension

ATA is considering extending the service span of a route for 2 more hours and 24 miles each weekday. What is the estimated additional cost of the service extension?

	Hours	Miles	Total
Additional Service Each Weekday			
Variable Unit Costs	$20.89	$1.00	
Variable Costs			
Weekdays (250)			250
Cost to Extend Service			

Answer #9 Service Extension

ATA is considering extending the service span of a route for 2 more hours and 24 miles each weekday. What is the estimated additional cost of the service extension?

	Hours	Miles	Total
Additional Service Each Weekday	2	24	
Variable Unit Costs	$20.89	$1.00	
Variable Costs	$41.78	$24.00	$65.78
Weekdays (250)			250
Cost to Extend Service			**$16,445**

Allocate by Each Fixed-Route

Same Process
Insert Hours and Miles for Each Route

Hours		Miles		Total
Hours		Miles		
X $20.89		**x $1.00**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**23.96%**		Total Fixed Cost
			=	Total Cost

Set-up a Spreadsheet to Automate

Unit Cost	$20.89	$1.00		23.96%	
Route	Hours	Miles	Total Variable Cost	Fixed Cost	Total Cost
Total	15,300	153,000	$472,677	$113,252	$585,929
1	5,100	52,000	$158,559	$37,990	$196,549
2	3,100	43,000	$107,771	$25,822	$133,593
3	7,100	58,000	$206,347	$49,440	$255,787

What Does The Allocation Tell Us?

Route	Hours	Miles	Total Cost	Passengers	**Cost per Passenger**	Passengers per Hour
Total	15,300	153,000	$585,929	150,000	**$3.91**	9.8
1	5,100	52,000	$196,549	30,000	**$6.55**	5.9
2	3,100	43,000	$133,593	50,000	**$2.67**	16.1
3	7,100	58,000	$255,787	70,000	**$3.65**	9.9

Allocate by Demand Response Program

Same Process
Insert Hours and Miles by Program

Hours		Miles		Total
Hours		Miles		
X $20.89		**x $1.00**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**23.96%**		Total Fixed Cost
			=	Total Cost

Exercise #10: Cost of Demand Response Program

Medicaid hours operated are 7,000 and miles are 200,000. What is the cost of operating Medicaid?

Hours		Miles		Total
Hours		Miles		
X $20.89		**x $1.00**		
Total Hours-Based Cost	+	Total Miles-Based Cost	=	Total Variable Cost
	+	**23.96%**		Total Fixed Cost
			=	Total Cost

Answer #10: Cost of Demand Response Program

Medicaid Transportation Program hours operated are 7,000 and miles are 200,000. What is the cost of operating MTP?

Hours		Miles		Total
7,000		200,000		
X $20.89		**x $1.00**		
$146,230	+	$200,000	=	$346,230
	+	**23.96%**		$82,955
			=	$429,185

Use Excel Workbook to Automate

Unit Cost	$20.89	$1.00		23.96%	
Route	Hours	Miles	Total Variable Cost	Fixed Cost	Total Cost
Total	17,700	347,000	$716,823	$171,748	$888,571
General Public	9,533	136,590	$335,734	$ 80,441	$416,175
Medicaid	7,000	200,000	$346,230	$ 82,955	$429,185
Head Start	1,167	10,410	$34,789	$ 8,335	$43,124

What Does The Allocation Tell Us?

Route	Hours	Miles	Total Cost	Passengers	**Cost per Passenger**	Passengers per Hour
Total	17,700	347,000	$888,571	35,000	**$25.39**	1.98
General Public	9,533	136,590	$416,175	17,500	**$23.78**	1.84
Medicaid	7,000	200,000	$429,185	8,750	**$49.05**	1.25
Head Start	1,167	10,410	$43,124	8,750	**$4.93**	7.50

Example Report by Route & Program

Routes	Passenger Boardings	Total Operating Costs	Cost per Passenger Boarding	Passengers per Vehicle Hour
Fixed-Route	229,810	$2,761,364	$12.02	4.12
Route 1	29,454	$209,969	$7.13	6.78
Route 2	3,482	$170,610	$49.00	0.91
Route 3	26,077	$191,296	$7.34	6.23
Route 4	3,237	$49,731	$15.36	3.36
Route 5	5,563	$136,484	$24.53	1.93
Demand Response:	4,945	$121,716	$24.61	2.13
General Public	272	$4,207	$15.47	3.20
MTP	204	$15,419	$75.58	0.66
Head Start	4,469	$102,090	$22.84	2.32

Including Vehicle Costs in Pricing

Cost Allocation for Transit Vehicles

Vehicle Type	Cost	Expected Service Life		Allocated Cost	
		Years	Miles	Per Year	Per Mile
Cutaway Van	$80,000	5	150,000	$16,000	$0.53
Small Bus	$150,000	7	200,000	$21,400	$0.75
Mid-Size Bus	$300,000	10	350,000	$30,000	$0.86
				Fixed Cost	Variable Cost

Include Vehicle Cost in Pricing Service

	Hours	Miles	Total
Current Year Service	7,000	200,000	
Variable Unit Costs	$20.89	$1.00	
Variable Costs (rounded)	$146,000	$200,000	$346,000
Fixed Costs (rounded)	+	23.96%	$83,000
Projected Budget for Next Year			$429,000
Variable Cost for Capital Investment in Vehicle	**$0.53**	**200,000**	**$106,000**
			$535,000

Exercise #11: Adding Vehicle Cost in Pricing of a Service

Add the cost of using a "small bus" in service

	Hours	Miles	Total
Current Year Service	7,000	200,000	
Variable Unit Costs	$20.89	$1.00	
Variable Costs (rounded)	$146,000	$200,000	$346,000
Fixed Costs (rounded)	+	23.96%	$83,000
Projected Budget for Next Year			$429,000
Variable Cost for Capital Investment in Vehicle (Small Bus)		**200,000**	
Total			

Answer #11: Adding Vehicle Cost in Pricing of a Service

Add the cost of using a "small bus" in service

	Hours	Miles	Total
Current Year Service	7,000	200,000	
Variable Unit Costs	$20.89	$1.00	
Variable Costs (rounded)	$146,000	$200,000	$346,000
Fixed Costs (rounded)	+	23.96%	$83,000
Projected Budget for Next Year			$429,000
Variable Cost for Capital Investment in Vehicle (Small Bus)	**$0.75**	**200,000**	**$150,000**
Total			**$579,000**

Subsidy by Route/ Program

Use the Spreadsheet to Determine Subsidy by Program

Routes	Passenger Boardings	Total Operating Costs	Total Fares Collected	Subsidy per Passenger Boarding
Fixed-Route	**150,000**	**$585,929**	**$141,900**	**$2.96**
Route 1	30,000	$196,549	$29,400	$5.57
Route 2	50,000	$133,593	$42,500	$1.82
Route 3	70,000	$255,787	$70,000	$2.65

What About Shared-Ride Demand Response Service

Shared-Ride Demand Response Considerations

- Co-mingling of variety of passenger trip programs complicates allocating costs by program
- Your demand response system may provide shared ride service to the general public, to Medicaid recipients, to Headstart, etc. – how do you cost by program when the rides are all on the same vehicle at the same time?

Ask First, Are Average Trip Lengths Different by Program?

General Public Passenger

Average 10 miles

Medicaid Passenger Average 24 miles

JARC Passengers–

Average 5 miles

Are Average Trip Lengths Different by Program?

- **If No**, then

  Allocate Demand Response Vehicle Hours and Vehicle Miles by Simply the % of Passenger Boardings

- **If Yes**, then

  Allocate Demand Response Total Vehicle Hours and Total Vehicle Miles by the % of Passenger Miles and Passenger Hours

Shared Ride Demand Response Service

AVERAGE TRIP LENGTHS SAME

If Demand Response Trip Lengths are the Same, Allocate by % Passenger Boardings

Demand Response		**Boardings**	
Total		35,000	100%
General Public		17,500	50%
Medicaid		8,750	25%
Head Start		8,750	25%
		Hours	**Miles**
Total		17,700	347,000
General Public	**50%**	**8,850**	**173,500**
Medicaid	**25%**	**4,425**	**86,750**
Head Start	**25%**	**4,425**	**86,750**

Drop Into Formula

	$20.89	$1.00		23.96%	
	Hours	**Miles**	**Total Variable Cost**	**Total Fixed-Cost**	**Total Cost**
Total DR	17,700	347,000	$716,823	$171,748	$888,571
General Public	8,850	173,500	$358,411	$85,874	$444,285
Medicaid	4,425	86,750	$179,206	$42,937	$222,143
Head Start	4,425	86,750	$179,206	$42,937	$222,143

Costs per Unit are the Same

	Total Cost	Boardings	Cost per Boarding	Cost per Hour	Cost per Mile
Total	$888,571	35,000	$25.39	$50.20	$2.56
General Public	$444,285	17,500	$25.39	$50.20	$2.56
Medicaid	$222,143	8,750	$25.39	$50.20	$2.56
Head Start	$222,143	8,750	$25.39	$50.20	$2.56

Shared Ride Demand Response Service

AVERAGE TRIP LENGTHS DIFFER

If Demand Response Trip Lengths Differ, Allocate by % Passenger Miles/Hours

- What is the definition of passenger miles and passenger hours?

What is the Definition of Passenger Miles and Passenger Hours?

- Passenger miles are the sum total of miles that each passenger traveled.
- Passenger hours are sum total of hours that each passenger traveled.

For example: If two passengers traveled together 10 miles, then total passenger miles would equal 20 miles.

How to Determine Average Trip Lengths

Steps:

1. Sample of Manifest Data (download or data entry)
2. Calculate Passenger Miles and Passenger Miles by Trip
3. Sum Passenger Miles and Passenger Hours by Program
4. Calculate Average Trip Lengths

Step 1: Driver Manifest Sample

Demand Response Scheduling System					
Trip Type	Pssgr	Pickup		Dropoff	
		Odometer	Time	Odometer	Time
Medicaid	1	120,760.40	12:20	120,781.10	13:30
GP	2	121,762.50	12:30	121,773.90	13:36
Head Start	1	120,764.70	12:40	120,767.80	12:46
Head Start	1	120,765.60	12:44	120,768.40	12:59

Step 2: Calculate Passenger Miles/Hours

(For Each Trip Multiply the Trip Hours/Miles * Passenger Count)

Trip Type	Pssgr	Pickup		Drop-off		Trip		Passenger	
		Odometer	Time	Odometer	Time	Miles	Hours	Miles	Hours
Medicaid	1	120,760.40	12:20	120,781.10	13:30	20.70	1:10	20.70	1.17
GP	2	121,762.50	12:30	121,773.90	13:36	11.40	1:06	22.80	2.20
JARC	1	120,764.70	12:40	120,767.80	12:46	3.10	0:06	3.10	0.10
JARC	1	120,765.60	12:44	120,768.40	12:59	2.80	0:15	2.80	0.25

Step 3: Sum Totals by Program

Program	Passenger Boardings	Passenger Miles	Passenger Hours
Total from Sample	2,089	32,070	1,099
General Public	826	8,501	365
Medicaid	921	21,752	634
Head Start	342	1,817	100

Step 4: Calculate Average Trip Lengths

Are Trip Lengths Different?

Sample Manifests	Passenger Boardings	Passenger Miles	Passenger Hours	Avg. Passenger Miles per Boarding	Average Passenger Hours per Boarding
Total	**2,089**	**32,100**	**1,099**	**15**	**0.53 (32 min.)**
General Public	826	8,501	365	**10**	**0.44 (27 min)**
Medicaid	921	21,752	634	**24**	**0.69 (41 min)**
JARC	342	1,817	100	**5**	**0.29 (18 min)**

If Demand Response Trip Lengths Differ, Allocate by % Passenger Miles/Hours

% From Sample	Passenger Hours	Passenger Miles
General Public	33%	26%
Medicaid	58%	68%
JARC	9%	6%
	Vehicle Hours	Vehicle Miles
Total Annual	**17,700**	**347,000**
General Public	5,879	91,896
Medicaid	10,211	235,138
JARC	1,611	19,642

Drop Into Formula

	$20.89	$1.00		23.96%	
	Hours	**Miles**	**Total Variable Cost**	**Total Fixed-Cost**	**Total Cost**
Total DR	**17,700**	**347,000**	**$716,823**	**$171,748**	**$888,571**
General Public	5,879	91,896	$214,721	$51,446	$266,168
Medicaid	10,211	235,138	$448,485	$107,455	$555,940
Head Start	1,611	19,642	$53,293	$12,769	$66,061

Costs per Unit Differ

	Total Cost	Boardings	Cost per Boarding	Cost per Hour	Cost per Mile
Total	**$888,571**	**35,000**	**$25.39**	**$50.20**	**$2.56**
General Public	$266,168	17,500	$15.21	$45.28	$2.90
Medicaid	$555,940	8,750	$63.54	$54.45	$2.36
Head Start	$66,061	8,750	$7.55	$41.02	$3.36

Why go to the trouble?

Part 4. Analyzing Your Costs

Peer Comparison

- Performance measures across Texas transit districts
- Efficiency and effectiveness

What's driving your cost?

Excel Spreadsheet Tool

Cost Workshop Examples April 2014.xlsx - Microsoft Excel

Annual Operating Expense		Assigning Costs to Functions							Assigning Costs to Fixed and Variable				
											Variable Costs		
			70%	12%	17%	0%	1%						
Object Class Expenses	Total	Total	Operating	Maint.	Admin.	Purch. Transp.	Planning	Check	Total	Fixed Cost	Miles-Driven	Hours-Driven	Check
Total Operating Costs	**$1,474,500**	**$1,474,500**	**$1,037,000**	**$179,500**	**$244,500**	**$0**	**$13,500**	$0	**$1,474,500**	**$285,000**	**$500,000**	**$689,500**	$0
501. LABOR	$635,000	$635,000	$490,000	$35,000	$100,000	$0	$10,000	$0	$635,000	$110,000	$35,000	$490,000	$0
01. Operator Salaries and Wages	$400,000	$400,000	$400,000					$0	$400,000			$400,000	$0
02. Other Salaries and Wages								$0					$0
Dispatch Salaries and Wages	$60,000	$60,000	$60,000					$0	$60,000			$60,000	$0
Operations Supervision Salaries and Wages	$30,000	$30,000	$30,000					$0	$30,000			$30,000	$0
Maintenance Salaries and Wages	$35,000	$35,000		$35,000				$0	$35,000		$35,000		$0
Administration Salaries and Wages	$110,000	$110,000			$100,000		$10,000	$0	$110,000	$110,000			$0
502. FRINGE BENEFITS	**$226,750**	**$226,750**	**$172,500**	**$12,250**	**$38,500**	**$0**	**$3,500**	$0	**$226,750**	**$42,000**	**$12,250**	**$172,500**	$0
Fringe Benefits	$225,750	$225,750	$171,500	$12,250	$38,500		$3,500	$0	$225,750	$42,000	$12,250	$171,500	$0
13. Uniform and Work Clothing Allowance	$1,000	$1,000	$1,000					$0	$1,000			$1,000	$0
503. SERVICES	**$172,250**	**$172,250**	**$9,000**	**$122,250**	**$41,000**	**$0**	**$0**	$0	**$172,250**	**$62,000**	**$101,250**	**$9,000**	$0
03. Professional and Technical Services	$40,000	$40,000			$40,000			$0	$40,000	$40,000			$0
05. Contract Maintenance Services								$0					$0
Vehicle Maintenance	$101,250	$101,250		$101,250				$0	$101,250		$101,250		$0
Building Maintenance	$21,000	$21,000		$21,000				$0	$21,000	$21,000			$0
99. Other Services								$0					$0
Training	$6,000	$6,000	$5,000		$1,000			$0	$6,000	$1,000		$5,000	$0
Drug and Alcohol Testing	$3,000	$3,000	$3,000					$0	$3,000			$3,000	$0
Background Checks	$1,000	$1,000	$1,000					$0	$1,000			$1,000	$0
504. MATERIALS AND SUPPLIES CONSUMED	**$291,000**	**$291,000**	**$268,000**	**$10,000**	**$13,000**	**$0**	**$0**	$0	**$291,000**	**$13,000**	**$275,000**	**$3,000**	$0
01. Fuel and Lubricants	$250,000	$250,000	$250,000					$0	$250,000		$250,000		$0
02. Tires and Tubes	$15,000	$15,000	$15,000					$0	$15,000		$15,000		$0
99. Other Materials and Supplies								$0					$0
Vehicle Equip. and Parts Supplies	$10,000	$10,000		$10,000				$0	$10,000		$10,000		$0
Other Equipment and Supplies	$3,000	$3,000	$3,000					$0	$3,000			$3,000	$0
Office Equipment	$10,000	$10,000			$10,000			$0	$10,000	$10,000			$0
Admin. Supplies	$3,000	$3,000			$3,000			$0	$3,000	$3,000			$0
505. UTILITIES	**$45,000**	**$45,000**	**$15,000**	**$0**	**$30,000**	**$0**	**$0**	$0	**$45,000**	**$30,000**	**$0**	**$15,000**	$0
Telecommunication	$20,000	$20,000			$20,000			$0	$20,000	$20,000			$0
Utilities	$25,000	$25,000	$15,000		$10,000			$0	$25,000	$10,000		$15,000	$0
506. CASUALTY AND LIABILITY COSTS	**$41,000**	**$41,000**	**$39,000**	**$0**	**$2,000**	**$0**	**$0**	$0	**$41,000**	**$2,000**	**$39,000**	**$0**	$0
General Liability	$2,000	$2,000			$2,000			$0	$2,000	$2,000			$0
Auto Liability	$34,000	$34,000	$34,000					$0	$34,000		$34,000		$0
Physical Damage	$5,000	$5,000	$5,000					$0	$5,000		$5,000		$0
507. TAXES	**$37,500**	**$37,500**	**$37,500**	**$0**	**$0**	**$0**	**$0**	$0	**$37,500**	**$0**	**$37,500**	**$0**	$0

Assigning Costs | Cost Formula | Cost by Mode | By Route | By Program | What-ifs | Shared Ride | Example Report

Wrap Up – Summary

What We Hope You Take Away

- Identify the elements of effective cost-reporting framework
- Determine cost by function (what does that mean?)
- Determine fixed and variable cost (creating a cost formula)
- Apply the cost formula to allocate and cost services
- Apply cost formula to answer management questions
- Elements to consider when analyzing costs and comparing costs to peers

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