TTI: 0-7133

Managing System Costs: Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems

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Cooperative Research Program

TEXAS A&M TRANSPORTATION INSTITUTE
COLLEGE STATION, TEXAS

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Managing System Costs:

Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems

Version: FINAL Nov. 30, 2023

Objective of Workshop

This workshop aims to equip transit systems in Texas and beyond to understand and manage operational and capital costs and to provide a go-to-resource for cost management best practices.

Instructor Introduction

Attendee Introductions

- Name
- Role & organization
- Brief description of your transit agency
  - Type (e.g., rural, small urban, etc.)
  - Size and service area
  - Services provided
- What does cost management mean to you?
- What do you hope to gain by attending this workshop?

Workshop Development

- Developed between 2021 and 2024 by the Transit Mobility Program at Texas A&M Transportation Institute (TTI) in collaboration with Texas A&M University Kingsville.
- Sponsored by TxDOT's Research and Technology Implementation Division (RTI)
- Overseen by a TxDOT-staffed Project Monitoring Committee
- Reviewed and tested by TxDOT and Texas rural and small urban transit managers
- Guidebook → Workshop → Online Course

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Companion Guidebook

- Companion Guidebook available https://tx.ag/TransitCostsGuidebook
- Mirrors workshop content
  - Guidebook chapters are cross-referenced in Workshop
- Two main “routes” through Guidebook
  - Directly operated service
  - Outsourced service
- Toolkit included

Companion Online Course

- Companion self-paced Online Course available https://tx.ag/TransitCostsCourse
- Based on workshop content

Organization of Workshop

The workshop's contents are focused on the main cost drivers at Texas rural and small urban transit systems

Operational Cost Drivers in Texas Rural and Small Urban Transit Systems

Group	Operational Expense Category	Total[1]
Labor	Operators' salaries & wages	27%
	Operator paid absences[2]	2%
	Total operator pay	29%
	Other salaries & wages	19%
	Other paid absences[2]	2%
	Total other pay	21%
	Fringe benefits	20%
	Total labor	**70%**
Non-labor	Services	12%
	Fuel & lubricants	9%
	Tires & tubes	1%
	Other materials & supplies	6%
	Utilities	2%
	Taxes	0%

Based agency-reported data from FY 2017 – FY 2019.

Notes:

[1] The total column was calculated by summing the dollar values from all three fiscal years and then calculating the percentages based on that sum.

[2] Paid absences were not assigned a cost by the reporting rural transit systems. Also, there were no paid absence expenses reported to the NTD by urban systems in FY 2017

Capital Cost Drivers in Texas Rural and Small Urban Transit Systems

Capital Expense Category	Total[1]
Guideway	4%
Passenger stations	9%
Administration buildings	4%
Maintenance buildings	3%
Revenue vehicles	69%
Service vehicles	1%
Fare revenue collection equipment	0%
Communication & information systems	3%
Other	6%

Based on agency-reported data from FY 2017 – FY 2019.

Notes:

[1] The total column was calculated by summing the dollar values from all three fiscal years and then calculating the percentages based on that sum.

Organization of Workshop

The workshop is divided into six modules.

MODULE A:
Understanding Transit Cost Fundamentals

MODULE B:
Managing Operational Costs for Any Mode

MODULE C:
Managing Demand Response Costs

MODULE D:
Managing Fixed- and Flexible-Route Costs

MODULE E:
Managing Capital Costs

MODULE F:
Looking Ahead

Workshop Agenda

- See schedule handout
- 3 days
- Each day
  - Start at 9:00 am
  - End at 4:00 pm
  - Scheduled breaks
  - Lunch from 12:00 pm – 1:00 pm

Workshop Materials

Toolkit download:
https://tx.ag/TransitCostsToolkit

- Slides
- Handouts
- Tools
- Bus Garage
- Evaluation Forms

Evaluations

End of each module

End of workshop

What the Workshop Is and Isn't

The Workshop Is

A resource on practices and strategies for operational and capital cost management

A place to learn transit terms, techniques, and tools applicable to rural and small urban systems

The Workshop Isn't

A comprehensive transit management workshop

An accounting workshop

A workshop on sources of revenue or grant management

Ground Rules

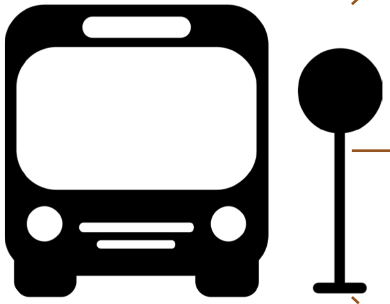
- Be respectful
- Ask questions
- Participate – be engaged!
- Vegas rules
- Prize questions!!

Alphabet Soup

- **U.S. DOT:** United States Department of Transportation
- **FTA:** Federal Transit Administration, a part of the U.S. DOT
- **NTD:** National Transit Database, FTA's web-based system for collecting transit data from all U.S. transit providers
  https://www.transit.dot.gov/ntd
- **TxDOT:** Texas Department of Transportation
- **PTN:** Public Transportation Division of TxDOT
- **PTN-128:** PTN's web-based system for collecting transit data from all transit systems in Texas
  https://ptn128.tti.tamu.edu/login.aspx
- **National RTAP:** National Rural Transit Assistance Program

See Chapter 1 in the Guidebook for a list of key terms and abbreviations used in the Guidebook and in transit.

Funding Sources for Texas Transit Systems



Federal

- U.S. DOT (FTA and FHWA)
- Non-U.S. DOT (e.g., Health and Human Services)

State

- Formula Funds
- Discretionary

Local

- Fares
- Local Governments
- Other

Key FTA Grant Programs:

- 5307 Urban Formula
- 5310 Enhanced Mobility for Seniors and People with Disabilities
- 5311 Rural Formula
- 5339 Bus and Bus Facilities

See Chapter 1 in the Guidebook for a review of federal, state, and local funding sources.

Questions?

Any questions about what to expect before we begin?

MODULE A: Understanding Transit Cost Fundamentals

Module Overview

- **One-sentence summary**
  Understand the foundations of transit service and transit cost management
- **Chapters**
  - 2: Factors Related to Service Models and Modes
  - 3: Cost Analysis and Reporting

Chapter 2: Factors Related to Service Models and Modes

Learning Objectives

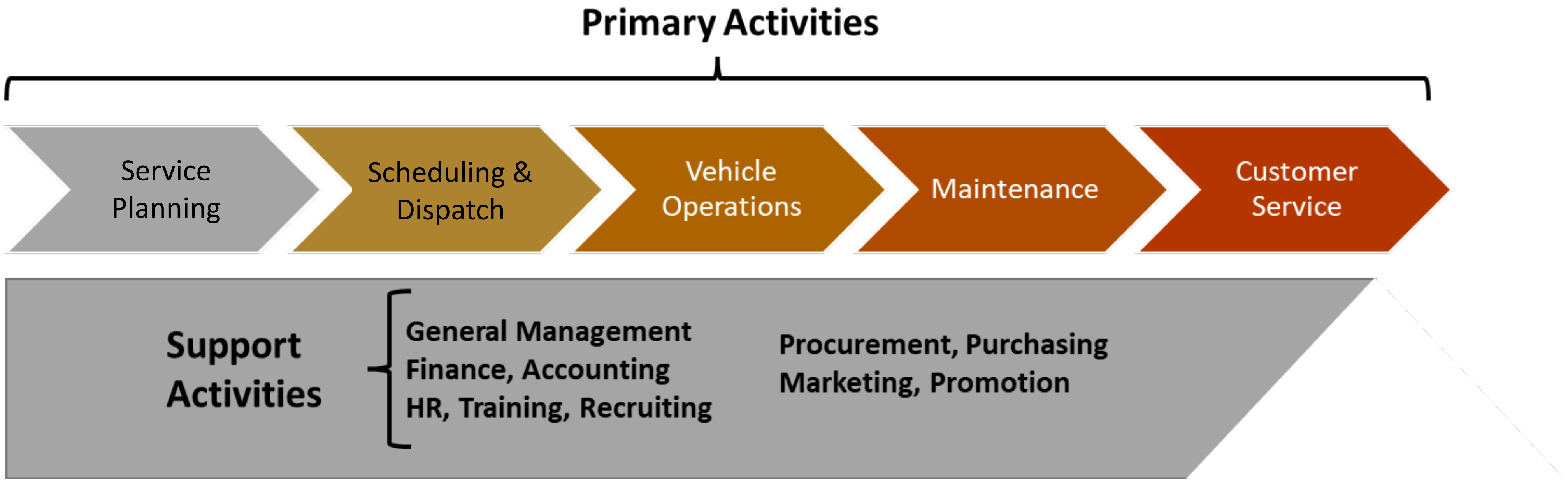
- Describe key elements in the transit cost chain
- Identify points in the transit cost chain to manage price and control consumption
- Identify external and internal factors that may influence transit costs
- Describe how different modes and services affect cost management
- Describe how contracting out vs. directly operating service models affects cost management

Topics

- Transit cost chain
- External and internal factors that influence costs
- Mode-specific factors that influence cost management
- Cost drivers when contracting out

The Transit Cost Chain

The Transit Cost Chain Model



Source: Adapted from value chain business model, (Porter, 2008)

Primary activities: Direct activities essential to daily transit services. **Foundation of primary activities are service plans and policies.**

Support activities: Help make the primary activities more effective and efficient. Increasing the efficiency of the support activities benefits the primary activities.

How to Use the Transit Cost Chain

Use to identify cost points at which the transit agency can seek to manage costs. The Cost Chain conveys that costs are driven by:

- The amount of service the agency seeks to operate
- How the desired service levels and/or requested trips are translated into scheduled service
- How scheduled service is actually operated
- How the hours, miles, and vehicles operated accrue costs

Create a Culture to Identify Each Activity's Crossover Influences

Crossover influence: A decision in one activity can influence the outcomes of another activity

Example #1: Maintenance purchases a vehicle without input from Planning and Operations. The vehicle purchased may be a minimal-maintenance, hardy, fuel-efficient vehicle but does not meet the capacity needs for the service, resulting in the need to operate additional service with increased operating cost.

Example #2: Deferring maintenance may save some money in the short term but will ultimately cost more from increased maintenance need and increased vehicle failures and downtime.

Can you think of an example of a crossover influence happened at your agency? That is, when someone's decision caused changes in the cost-efficiency or cost-effectiveness of a different unit / department?

Components of a Cost Activity: *Unit Price and Consumption*

- Cost of activities determined by two components:
  - Unit price (e.g., price per gallon)
  - Consumption (# of units; e.g., number of gallons)
- Basis of cost management is to influence either
  - The unit price of the item being purchased
  - The number of units purchased
- At virtually any point in the transit cost chain
- Hopefully without increasing other costs or reducing service quality

Exercise A-1: Small Group Breakout – Unit Price and Consumption

- Form small groups
- For the following examples:
  - *What are the units and what is the unit price?*
  - *What are some strategies for*
    - Managing units consumed
    - Managing unit price
- Examples
  - Operator Labor
  - Maintenance Labor
  - Health insurance for employees
  - Come up with an example of your own

Prize Question(s)

- Name one of the primary activities in the cost chain and how it influences costs.
- Name a support activity and describe how it can influence cost.

Factors That Influence Costs

- Internal vs. External Factors
- Transit Service Modes & Types
- Outsourcing vs. Directly Operating

External vs. Internal Factors

- Costs are not entirely within a transit agency's control
- External factors make it difficult to control unit price
  - Labor market
  - Energy market (e.g., fuel & electricity)
  - Vehicles market
  - Rules and regulations (e.g., Buy America)
- Internal factors are in transit agency control (to some degree)
  - Organizational structure
  - Labor hours
  - Energy consumed
  - Vehicles purchased
  - Service policies

Examples of Internal Factors That Influence Cost Management

- Organizational and operational structure
  - Independent agency or part of umbrella organization (e.g., council of governments, city/county government or human services agency)
  - Directly operated or outsourced service
- Administration—Indirect Cost Allocation
  - Centralized administration (support departments such as human resources, payroll, information technology)
  - Costs born by umbrella organization
- Service design and planning
  - Service policies
  - Scheduling efficiency
- Operations and maintenance
- Technology
- Service monitoring
- Cost monitoring and performance management

Transit Service Modes & Types

Demand response (DR)

- General Public DR
- ADA paratransit (type of DR—required by ADA law)
- Microtransit (App-based DR service)

See Handout 1 for definitions of these modes

Fixed- and flexible-route bus transit (Motor Bus—MB)

Operating Model Factor: Outsourcing vs. Directly Operating

- Cost drivers may be fundamentally different if outsourcing
  - Contract cost structure is main cost driver (e.g., $ per hour or mile)
- Costs related to contractor oversight and contract administration
- Different outsourcing approaches:
  - Contract with private company
  - Contract with another transit agency
  - Contract with human services agency or other public entity

Prize Question(s)

- Name an external factor that can influence costs.
- Name some internal factors (those where transit agencies have some control) that can influence costs.

Chapter Summary

- Key takeaways
  - The cost chain provides a structure for thinking about what influences transit costs
  - Not all transit costs are controllable
  - Transit costs differ by mode
  - If contracting out, costs driven largely by contract cost structure
- Additional information, additional resources, and references provided in Chapter 2 in the Guidebook
- Questions and discussion?

Break

Chapter 3: Cost Analysis and Reporting

Learning Objectives

- Describe fundamental tasks for staying financially whole
- Describe major characteristics of costs
- Construct and use a chart of accounts
- Describe purpose of service-based cost allocation
- Describe methods to measure and track costs
- Describe process of peer benchmarking

Topics

- Cost management foundations
- Cost characteristics
- Chart of accounts
- Service-based operational cost allocation
- Cost monitoring and cost performance measures
- Peer review and benchmarking

Cost Management Foundations

Cost Management Foundations

- **Cost management** is a set of processes required to maintain effective financial control, including planning and controlling the transit budget
- Successful operation of transit services requires knowing how much you are spending
  - Ensure financial stability
  - Support proactive planning
  - Identify efficiencies and inefficiencies
  - Make quicker decisions
  - Communicate more effectively with stakeholders

An effective cost management system supports long-term financial health.

Cost Management Foundations (*Continued*)

Key steps in cost management

1. Develop and implement financial structure to identify, track, monitor, and report costs
2. Develop plan that identifies goals and objectives for planned services and projects and all resources needed to provide the services and complete the projects
3. Develop budget (including costs and revenues) to carry out planned transit services and projects (by task and activity)
4. Control costs based on accurate and real-time cost reporting
   - Rely on regular and consistent monthly monitoring
   - Monitor and track cost variances
   - Take action to reduce overruns or accommodate

Open Discussion

- How do you employ cost management practices at your agency?
- Provide an example of a time when you successfully reduced or managed a cost to your satisfaction.

Cost Management Foundations (*Continued*)

- Accrual accounting
  - Required by NTD and USOA (and PTN-128)
  - Records expenses when incurred, even if services or supplies have not been paid for
- Cash-basis accounting
  - Records expenses when cash is paid out
  - Records revenue when cash is on hand or in bank account

Cost Management Foundations (*Continued*)

- Must have consistent and reliable processes for cost data:
  - Defining and categorizing costs
  - Gathering cost data
  - Reporting cost data (e.g., to board, PTN-128, to NTD)

Cost Characteristics

Major Cost Characteristics

- Object class
- Function
- Type (Variable vs. Fixed)
- Applicability
- Grant allowability
- Grant activity

When a transit agency's financial cost structure can identify costs by characteristic, transit agencies can more quickly and efficiently report out costs as needed.

This section will frequently reference the Uniform System of Accounts (USOA).

Example of Cost Characteristics Applied to Cost Records

Amount	Description	Object Class	USOA Function	Type	Applicability	Grant Allowable	Grant / Activity
$1,000	Monthly dispatching software fee	5039: Other Materials and Supplies	Vehicle Ops.	Fixed	Demand response mode	Yes	5311 / Capital
$10,000	Monthly operator wages (excluding maintenance activities)	5011: Operators' Salaries and Wages	Vehicle Ops.	Variable	All modes	Yes	5311 / Op. Assistance
$2,000	Monthly operator wages supporting maintenance activities	5011: Operators' Salaries and Wages	Vehicle Maint.	Variable	All modes	Yes	5311 / Preventative Maint.
$50	Speeding ticket	5090: Misc. Expenses	Vehicle Ops.	Variable	Fixed route mode	No	N/A
$3,000	Fuel for revenue vehicles	5031: Fuel and Lubricants	Vehicle Ops.	Variable	All modes	Yes	5311 / Op. Assistance
$500	Fuel for non-revenue vehicles	5031: Fuel and Lubricants	Vehicle Maint.	Variable	All modes	Yes	5311 / Preventative Maint.

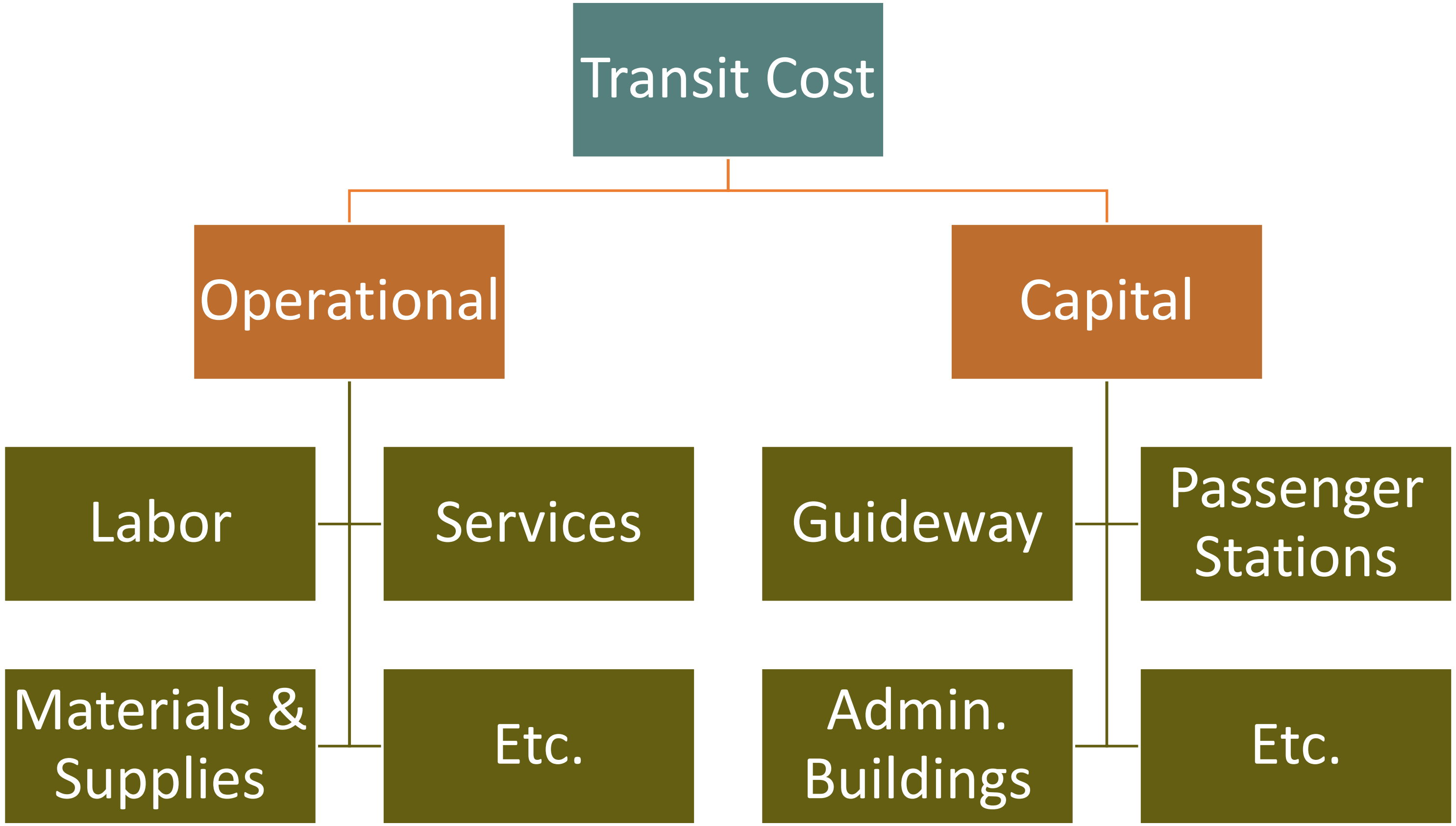
The USOA

- The public transit industry standard chart of accounts structure
- Defines cost object classes and functions
- Must be followed for NTD reporting (full reporters)

Major Cost Characteristic: Object Class

- Defines the *type of goods or services acquired by an expense*
- USOA provides industry standard for transit object classes
- Transit agency may have own object class codes but should aggregate/map to USOA object classes

Major Cost Characteristic: Object Class (*Continued*)



This figure only shows a handful of object classes in the USOA.

Operational vs. Capital

- Operational costs
  - Typically consumed within a year
  - Related to daily operations
  - Examples: labor, fringe benefits, fuel and lubricants, materials and supplies, office space, minor equipment, utilities, and administration
- Capital costs
  - Associated with long-term assets (buying or replacing)
  - Includes acquisition and leases of buses, garages, and maintenance facilities
  - NTD defines as costs >$5,000 or capitalization value established by local government

Remember!

Object class is determined by *what is purchased*, not

- How it is used
- How it will be reimbursed under a grant

Major Cost Characteristic: Function

- Defines how the things purchased from the cost *were used*
  - Vehicle operations
  - Vehicle maintenance
  - Facility maintenance
  - General administration

from the USOA

- Areas of accountability for costs by functional area
- Can be used to track grant costs
- Can be used to track actual costs of an activity

USOA Functions and Subfunctions

Vehicle Operations	Vehicle Maintenance	Facility Maintenance	General Administration
• Revenue Vehicle Operation • Scheduling • Dispatching and Supervising • Ticketing and Fare Collection • Security • Transportation Administration	• Servicing and Fueling Vehicles • Inspection, Maintenance, and Repair of Vehicles • Administration of Vehicle Maintenance	• Maintenance of Vehicle Operations Equipment • Maintenance of Roadway and Track • Maintenance of Tunnels, Bridges, and Subways • Maintenance of Passenger Stations and Stops • Maintenance of Operating and Maintenance Buildings, Grounds, and Equipment • Maintenance of Adminstrative Buildings, Grounds, and Equipment • Operation and Maintenance of Electric Power Facilities • Administration of Facility Maintenance	• Finance and Accounting • Purchasing and Stores • Real Estate Management • Customer Service • Promotion • Market Research • Planning and General Engineering • Preliminary Capital Project Planning • Risk Management • Safety • Human Resources • Legal • Information Technology • Office Management • General Management • General

PTN-128 Functions

PTN-128 Function	Matching USOA Function
Operating	Vehicle Operations, but excluding purchased transportation expenses
Maintenance	Vehicle Maintenance and Facility Maintenance, but excluding purchased transportation expenses
Administrative	General Administration, but excluding planning expenses
Planning	A portion of General Administration, including Market Research and Planning and General Engineering sub-functions Also includes Mobility Management expenses
Purchased Transportation	Not applicable, because there is no specific USOA function for purchased transportation. There is an object class for purchased transportation, and full NTD reporters must break purchased transportation expenses into the USOA functions annually (you should require your contractor to do this for you).

🛠 Tool #1: Operational Expenses by PTN-128 Function Guide

- Word document that helps you classify different transit costs into the appropriate functions as defined in PTN-128
- Available for download from Toolkit
- See Handout 2

Also see **Handout 3**, which displays similar examples, but for USOA functions.

Remember!

A cost object class should be reported in different functions, depending on how the cost was *used*

Object Class	PTN-128 Function: Operating	PTN-128 Function: Maintenance	PTN-128 Function: Administration	PTN-128 Function: Planning	PTN-128 Function: Purchased Transportation
5011: Operators' Salaries and Wages	Operators' driving time	Operators fueling vehicles Operators cleaning a garage	Operators taking customer service calls	Operators supporting a study of new services	Not applicable
5013: Other Salaries and Wages	Dispatching revenue vehicles Schedulers creating timetables, blocks, and runs	Mechanics repairing vehicles Custodians cleaning offices	Accountants writing a budget	Planners performing a study of new services	Not applicable
5031: Fuel and Lubricants	Fuel for revenue vehicles	Fuel for service vehicles	Not applicable	Not applicable	Not applicable

Major Cost Characteristic: Type

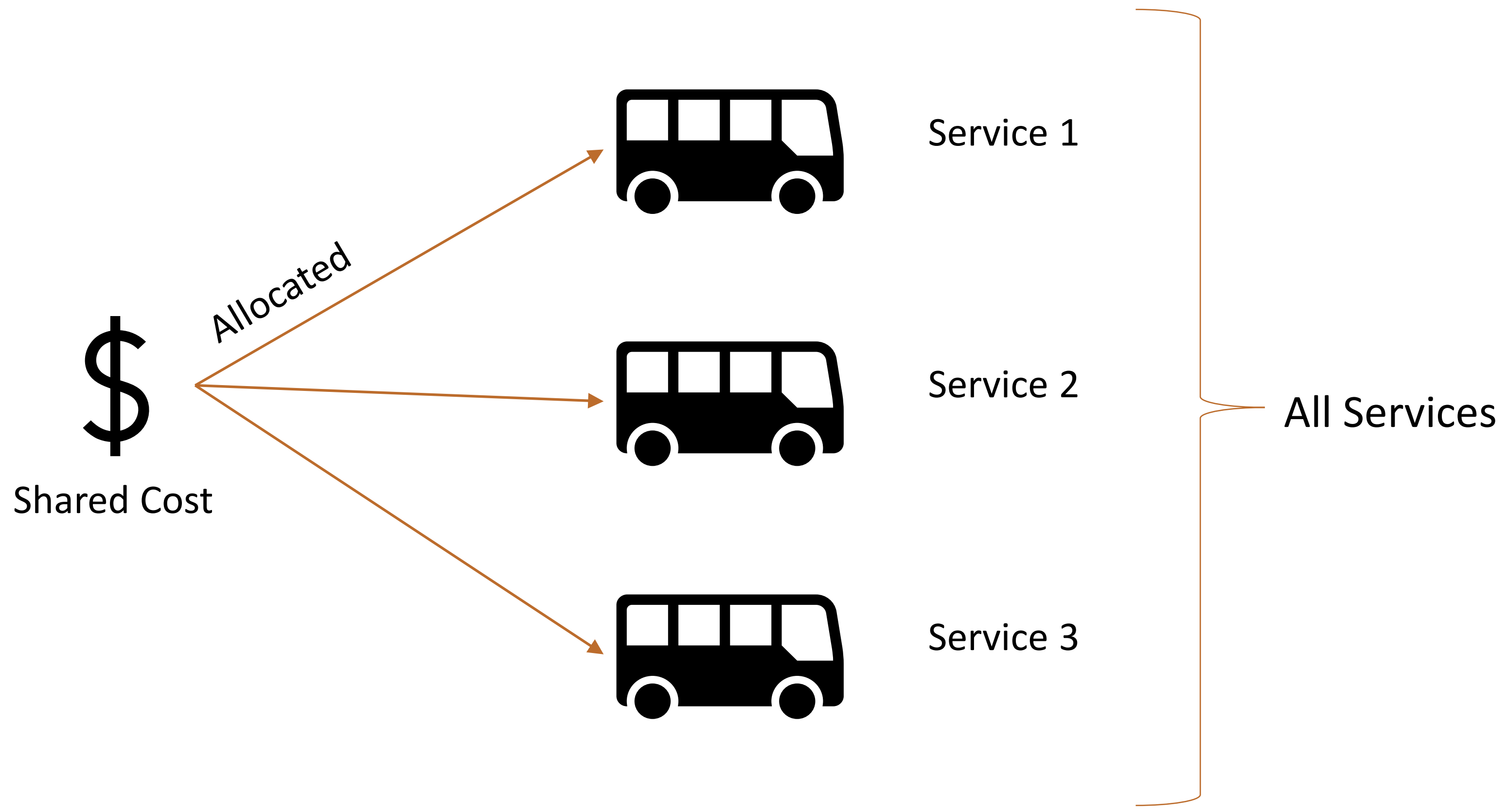
- Variable costs
  - Change when service levels change
  - Includes operator wages, fuel costs, and maintenance costs
- Fixed costs
  - Do not change when service levels change
  - Includes administrative salaries, insurance, and professional services

Major Cost Characteristic: Applicability

- Especially important with cost allocation
- Shared costs
  - Transit agency costs that apply to multiple services
  - Global shared costs vs. specialized shared costs
  - Must be allocated during cost allocation
- Direct costs
  - Can be assigned to a specific service
  - Does not have to be allocated

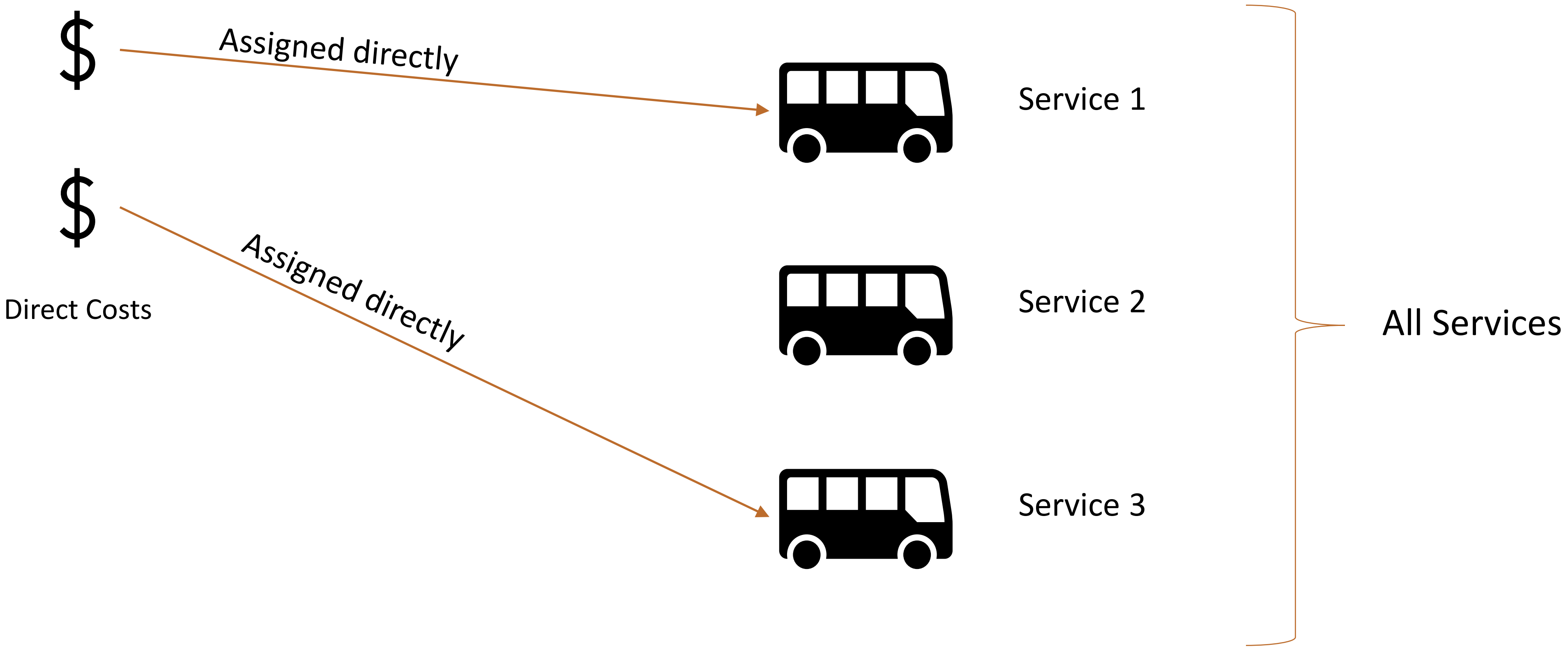
The transit agency's financial system or cost-allocation plan should stipulate what modes, services, and programs benefit each cost.

Shared Cost



Allocated
$
Shared Cost
Service 1
Service 2
Service 3
All Services

Direct Cost


$
$
Direct Costs
Assigned directly
Assigned directly
Service 1
Service 2
Service 3
All Services

Indirect Costs

- Generated when transit agency is a unit of a local government or other organization
- Cost benefits more than one program or department of the umbrella organization
- To be reportable and eligible for grant reimbursement, may require
  - Federally negotiated indirect cost rate (or using de minimus 10%)
  - Central services cost allocation plan
- See National RTAP *Fundamental Financial Management* Chapter 4

Capturing indirect costs can improve accuracy of cost reporting and possibly allow more use of FTA grants

Major Cost Characteristic: Grant Allowability

- Whether or not a cost can be reimbursed under a specific grant
- Allowable costs vs. unallowable costs
  - Federal grants often have limitations on costs that are allowable for reimbursement
  - Transit agencies should ensure unallowable costs are tracked and excluded from reimbursement requests
  - Unallowable public transit costs incurred should still be reported as a cost to NTD and PTN-128
- For guidance:
  - See applicable grant circular
  - See 2 CFR 200.403 and 2 CFR 200.420 et seq.

Major Cost Characteristic: Grant Activity

- Under what grant activity (i.e., grant line item) is the cost eligible for reimbursement
- FTA grant activity categories are Operating Assistance, Capital, Administrative, and Planning. There are more detailed line items in grant agreements, for example:
  - Preventive maintenance (a “Capital” grant expense)
  - Capital cost of contracting (also a “Capital” grant expense)
  - Mobility management (a “Planning” grant expense)
- Different grant activities have different federal share rates
- Categories should align with budget line items/activity codes in grant agreements

Remember!

FTA grant activity classifications not always the same as USOA classifications, for example:

- Preventive maintenance
  - Is reimbursable at the capital rate under FTA grants
  - Is an operational expense reported under the Vehicle Maintenance function for NTD and PTN-128
- Mobility management
  - Is reimbursable at the capital rate under FTA grants
  - Is reported as
    - General Administrative in the NTD
    - Planning in PTN-128

Exercise A-2: Small Group Breakout – Cost Characteristics

- Form small groups and complete the exercise
- 10 minutes to work
- 5 minutes for review and discussion

Lunch

Chart of Accounts

Establishing and Using a Chart of Accounts

- **Chart of accounts:** organizational tool that records financial transactions and classifies them allowing for aggregation and reporting
- A good chart of accounts provides:
  - Consistency in data reporting
  - Ability to track, monitor, and evaluate finances
  - Accountability to budget
  - Ability to make informed business decisions
  - Insight into transit system's financial health

A well-structured chart-of-accounts can help management more readily identify what functions and object classes are driving overall costs or changes in costs.

Characteristics of an Effective Chart of Accounts

Records all expenses	Contains standardized and agreed-upon definitions and data collection procedures	Uses the USOA to the extent possible	Reports costs using the accrual method of accounting
Separates capital costs from program operational costs	Assign costs to functions and modes	Includes overhead and indirect costs	

Reporting Requirements

- Cost reporting requirements differ for depending on transit agency type
- Rural transit districts (5311 subrecipients) in Texas
  - Districts report costs by PTN-128 function into PTN-128
  - PTN inputs data to NTD, classifying costs as operational or capital
- Urban transit districts (5307 recipients; full reporters only)
  - PTN-128: Districts report costs by PTN-128 function into PTN-128
  - NTD: Districts report costs into NTD
    - Report costs by object class
    - Report costs by function
  - Reduced reporter 5307 recipients have similar requirements as rural districts; however, they input data directly into NTD instead of PTN
- Even if object class and function not required for reporting, benefits include:
  - Segregating operating expenses by function (e.g., operating vs. vehicle maintenance vs. non-vehicle maintenance vs. general administration)
  - Providing financial reports by function (e.g., to hold management accountable by function)
  - Determined fixed and variable costs for cost allocation to services

Tool #2: Model Chart of Accounts

- Excel workbook that provides a model of a transit agency's chart of accounts, including reporting by object class and function.
- Available for download from Toolkit
- Class discussion/review

Prize Question(s)

How does budgeting help manage costs?

Explain why a good accounting structure helps manage costs?

Service-Based Operational Cost Allocation

Service-Based Operational Cost Allocation

- Distributes operational costs across services, modes, areas, funding sources, sponsors, etc.
- Used to estimate operational cost of a single service, route, or funding program
- Used to support analysis, service planning, performance monitoring, budgeting, financial planning, and reporting
- Particularly useful for transit agencies that operate across local boundaries or have multiple services, routes, or sponsors
- Two-variable cost allocation model is a recognized industry standard

Two-Variable Cost Allocation Model

- Classifies operational costs as fixed or variable
- Variable costs are classified as either hours-driven or miles-driven

Hours-Driven Costs	Miles-Driven Costs
Typically costs associated with the operating function (except fuel/ lubricants) because these costs correlate with the number of hours of transit service Example: Vehicle operator wages	Typically vehicle maintenance and fuel/lubricant expenditures because these costs correlate with the number of miles driven by transit vehicles Examples: Preventive maintenance and fuel

Service-Based Operational Cost Allocation (*Continued*)

- Steps
  - Categorize costs as fixed or variable. Variable costs categorized as miles-driven or hours-driven
  - Establish the cost allocation formula
    - Variable cost per mile = total miles-driven variable cost ÷ actual vehicle miles
    - Variable cost per hour = total hours-driven variable cost ÷ actual vehicle hours.
    - Fixed-cost rate (multiplier) = total fixed cost ÷ total variable cost.

    Cost formula = [(variable cost per mile × ____ miles) + (variable cost per hour × ____ hours)] × fixed-cost rate

  - Use cost allocation formula to determine service cost
- Be logical and consistent
- More resources:
  - Chapter 3 in Guidebook
  - National RTAP Advanced Topics in Financial Management
  - National RTAP Two-Variable Cost Allocation Calculator

Cost Monitoring and Cost Performance Measures

- Actuals vs. budget monitoring
- Cost performance measure monitoring

Actuals vs. Budget

- Analyze by line item (cost object class) and period (e.g., month and year-to-date)
- Compare actual spending vs. budget
- Explain differences between actual expenditures and budget

Transportation Department
For the Month Ended April 30, 2018

		This Period - April 2018				Year-to-Date			
Class Object	Description	Budget	Actual	Variance	Percent	Budget	Actual	Variance	Percent
501 LABOR									
501.01	Operator's Salaries & Wages	$ 82,106	$ 83,227	$ (1,121)	-1.4%	$ 985,275	$ 832,270	$ 153,005	15.5%
501.02	Other (Operating) Salaries & Wages	$ 5,852	$ 5,246	$ 606	10.4%	$ 70,225	$ 52,460	$ 17,765	25.3%
501.03	Dispatchers Salaries & Wages	$ 10,467	$ 10,223	$ 244	2.3%	$ 125,600	$ 102,230	$ 23,370	18.6%
501.04	Other (Administrative) Salaries & Wages	$ 19,207	$ 19,200	$ 7	0.0%	$ 230,480	$ 192,000	$ 38,480	16.7%
501.99	Other Salaries & Wages	$ -	$ -	$ -	0.0%	$ -	$ -	$ -	0.0%
502 FRINGE BENEFITS									
502.01	FICA	$ 7,293	$ 7,310	$ (16)	-0.2%	$ 87,518	$ 72,902	$ 14,615	16.7%
502.02	Pensions & Long Term Disability	$ 2,353	$ 2,265	$ 88	3.7%	$ 28,232	$ 21,117	$ 7,114	25.2%
502.03	Health Insurance	$ 10,587	$ 10,485	$ 102	1.0%	$ 127,042	$ 105,826	$ 21,216	16.7%
502.04	Dental Plans	$ -	$ -	$ -	0.0%	$ -	$ -	$ -	0.0%
502.05	Life Insurance	$ -	$ -	$ -	0.0%	$ -	$ -	$ -	0.0%
503 SERVICES									

Cost Performance Measures

- Cost-efficiency and cost-effectiveness measures
  - Track performance
  - Identify opportunities for improved cost management
  - Help communicate performance to stakeholders

Common Efficiency and Effectiveness Measures

Cost Efficiency Measures	Service Effectiveness Measures	Cost Effectiveness Measures
• Cost per Revenue Hour • Cost per Vehicle Hour • Cost per Revenue Mile • Cost per Vehicle Mile	• Passenger Trips per Revenue Hour • Passenger Trips per Vehicle Hour • Passenger Trips per Revenue Mile • Passenger Trips per Vehicle Mile	• Cost per Passenger Trip • Farebox Recovery Ratio

PTN-128 Line 141

Operational Cost per Revenue Hour

- A key cost-efficiency measure
- Assesses financial resources needed to produce a unit of service (hour of revenue service)
- Sensitive to service span, demand, vehicle availability, operator assignments, and scheduling
- Does not evaluate usage of service

Operational cost per revenue hour = total operational cost ÷ total revenue hours

What does the transit agency spend to put service on the street for one revenue hour?

PTN-128 Line 142

Operational Cost per Revenue Mile

- Useful for fixed-route route-level assessment and in DR
- Influenced by fluctuations in miles of service scheduled
- Improved by regular maintenance, efficient scheduling, and efficient staff management
- Does not evaluate usage of service
- Somewhat duplicative of cost per revenue hour

Operational cost per revenue mile = total operational cost ÷ total revenue miles

What does the transit agency spend to put service on the street for one revenue mile?

Passenger Trips per Revenue Hour

- A key productivity measure
- Often considered the most important single measure for DR
- Measures ability to serve trips effectively on specific routes or where passengers have similar trip-making patterns
- Affected by size of service area, land use patterns, commuting patterns, no-shows, late cancellations, scheduling efficiency, and operating environment
- Not a cost measure, but drives cost-effectiveness

Passenger trips per revenue hour = total passenger trips ÷ total revenue hours

How many passengers were served during an average hour of service?

PTN-128 Line 140

Operational Cost per Passenger Trip

- A key cost-effectiveness measure
- Relates productivity and operational cost
- Improved by reducing operating costs or by increasing passenger trips without increasing costs
- Improved by matching service levels to demand

Operational cost per passenger trip = total operational cost ÷ total passenger trips

What does it cost to provide a trip for one passenger?

Exercises

- Budget vs. actuals: Exercise A-3
- Cost performance measures: Exercise A-4

Peer Review and Benchmarking

- Knowing if a measure is "good" or "bad" requires a baseline for comparison
- Benchmarking against peers or past performance can be useful

More details available in Guidebook Chapter 3 and in TCRP Report 141

Steps in Peer Review and Benchmarking

Step 1. Identify the Purpose—What Question(s) Do You Want Answered?

Step 2. Determine Performance Measures for Comparison

Step 3. Identify Peers

Step 4. Collect Data & Compare Performance

Step 5. Contact Best Performers to Find Out Why

Step 6. Develop a Strategy to Enhance Performance

Prize Question

- Explain why using cost performance measures is important in comparing costs across time periods or between peers.

Chapter Summary

- Key takeaways
  - A good cost management foundation can ensure financial stability
  - A good financial cost structure allows agencies to readily report for a wide variety of purposes
  - A well-structured chart of accounts is a key tool in cost management
  - Service-based operational cost allocation is a method to allocate costs by mode, jurisdictions, and funding sources
  - Monitoring and tracking cost performance measures leads to positive performance results
  - Peer review and benchmarking is a tool for effecting positive change
- Additional information, resources, and references provided in Chapter 3 in the Guidebook
- Questions and discussion?

Module A Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module A

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

A) Please write and mark your selected answers clearly.
B) Only select one answer for questions with a circle: ○.
Select all that apply for questions with a square: ☐.
C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

Break

MODULE B:
Strategies for Managing Operational Costs for All Modes

Module Overview

- **One-sentence summary**
  Strategies for managing the operational costs of any directly operated service, regardless of mode.
- **Chapters**
  - 4: Directly Operated Labor Costs
  - 5: Fuel and Energy Costs
  - 6: Vehicle Maintenance Costs
  - 7: Additional Operational Cost Considerations

Chapter 4: Managing Directly Operated Labor Costs

Learning Objectives

- Describe the elements of operator labor costs for insourced labor
- List strategies for managing labor costs related to non-operator positions
- Describe medical and health benefits strategies to keep benefits costs under control
- List strategies for managing labor costs related to overtime

Topics

- Introduction to labor costs
- Managing operator labor costs
- Managing other labor costs
- Managing unscheduled overtime

Directly Operated Labor Costs

- Every transit agency employs or contracts staff to operate vehicles, conduct scheduling/dispatch, maintain assets, and manage service delivery
- Transit is labor-intensive, so labor is the most significant component of many transit agencies' operational costs
- Small efficiency and management adjustments can have a large financial impact

Key Labor Cost Types

- Operator labor costs
- Other labor costs
- Paid absences
- Fringe benefits
- Recruiting and training costs

There are always trade-offs with any cost management activity. For example, holding down hourly wages may help reduce labor costs but may also lead to more challenges recruiting and retaining staff.

Relevant Analyses and Measures

- How do you know you have the right number of staff in the right positions?
- How do you know if you are spending the right amount of money on labor?

DISCUSSION:

How have you sought to right-size staff counts and labor costs?

What labor cost metrics have you used or would you like to know more about?

Example Labor Cost Metrics
Ratio of revenue miles operated to number of mechanics
Ratio of vehicles (total or peak) to number of mechanics
Ratio or revenue hours operated to number of operators
Ratio of revenue hours operated to total number of employees
Overtime ratio
Pay-to-platform ratio
Turnover ratio

General Practices for Managing Labor Costs

- Make sure labor cost data are accurate and reliable
- Report labor costs in a standardized way
- Use peer evaluations to identify opportunities to reduce labor costs
- Conduct evaluations of historical labor cost data to (a) identify trends and (b) forecast labor costs
- Review salaries, wages, hours, staffing levels, and staff performance against relevant policies
- Adjust staffing levels based on demand
- Review contracts (if applicable) to identify opportunities to save labor costs by switching from outsourcing to insourcing or vice versa

Managing Operator Labor Costs

Managing Operator Labor Costs

- Includes pay (hourly or salaried) to operators as well as bonuses, premiums, overtime pay, paid absences, and fringe benefits
- Operators might be guaranteed a minimum number of hours per week, even if service was not provided for that many hours

Managing Operator Labor Costs: Key Topics

- Operator pay and incentives
  - Setting the optimal pay rate
  - Holiday and special work pay
  - Incentives and bonuses
- Hiring CDL vs. non-CDL operators
- Using part-time vs. full-time operators
- Operator retention

Tool #3: Vehicle Operator Labor Cost Calculator

- Excel workbook that helps you calculate the full cost of vehicle operator labor (including wages and benefits) across different mixes of runs, operator types, wages, and benefits
- Available for download from Toolkit

Operator Pay and Incentives

- Can vary by operator type/role
  - Fixed route or demand response
  - CDL or non-CDL
  - Part-time or full-time
  - Trainers
- Pay scales might not be identical due to type of vehicle operated, amount of assistance provided to riders, etc.
- Pay scales typically reward seniority
- Pay might be higher for less-desirable routes or shifts

Volunteer drivers will be addressed later in this module.

Setting the Optimal Pay Rate

- Depends on job market competition
  - Competing opportunities for professional drivers
  - Size of local job market
- Determine who your main competitors are (e.g., other transit systems, school districts, etc.)
- Determine competitive pay rates through market studies and peer comparisons
- Review postings for competing local job opportunities
- Industry norms may be available through organizations like National RTAP, APTA, CTAA, and state and regional transit associations
- Review the balance of wage rates and benefits (e.g., lower wages could be balanced by better benefits)

Incentives and Bonuses

- Types of incentives and bonuses
    - Attendance
    - Safety
    - Tenure/longevity
    - Referral
    - Sign-on
- Costs of incentive and bonus programs might be offset by the benefits of such programs
- Program clarity is critical if a lower base wage is offset by incentives and bonuses
- Program documentation crucial for consistency, transparency, and for cost allowability (can't willy-nilly provide a bonus payment)
- Ensure operators receive full description of program upon implementation, upon hire, and annually

Incentives and Bonuses (*Continued*)

- Programs can achieve multiple objectives

Reduce absenteeism	Reduce overtime	Encourage operator retention	Reduce crashes and injuries	Reduce impacts of no-show operators on service delivery	Reduce maintenance costs
Reduce insurance costs	Improve service delivery	Improve operator recruiting	Reduce recruiting, hiring, and training costs	Improve stability of work environment	Improve transit agency reputation

- Understand objectives when designing the program
- Design with input of operators and use data to assess

Hiring CDL vs. Non-CDL Operators

- Industry data shows that operators without a CDL are paid an average of $6,000 less than operators with a CDL
- Using non-CDL operators might reduce operator labor costs
  - Can also increase the pool of operator candidates
  - Can also reduce hiring/training cost and time
  - But it can impact fleet mix and maintenance needs/costs
  - Fleet mix approaches discussed in Chapter 15 in the Guidebook

CDL not required when vehicle is small enough and is designed to carry less than 16 passengers (including the driver).

Using Part-time vs. Full-time Operators

- An option for more effectively managing labor costs is employing a mix of full-time and part-time operators
- Agency needs to understand how much demand there is for part-time operator work

Using Part-time vs. Full-time Operators (*Continued*)

Advantages of Using Part-Time Operators	Disadvantages of Using Part-Time Operators
• Lower operator costs if part-time operators do not qualify for benefits • Operators who want more flexibility in their schedule might prefer part-time work • Might be easier to staff less-desirable shifts • Might be more efficient to schedule and roster • Operator could pair part-time driving with a part-time role in another agency function • Transition from training to service might be easier for new operators if they are first assigned to part-time shifts	• Operators might not qualify for benefits, incentives, or bonuses • Turnover might be higher due to lack of benefits • New operators might not apply if they want benefits • Part-time operators might not be able to get as many hours as they want • Might be more challenging to train an operator who is not available full-time

Exercise B-1: Small Group Breakout – Operator Labor

- Form small groups
- Discuss these questions (20 minutes)
  - Do you use a mix of CDL and non-CDL operators? Why? Why not? What is working well or not-so-well?
  - Do you use a mix of part-time and full-time operators? Why? Why not? What is working well or not-so-well?
  - What's your operator pay rate / scale and benefits package? How did you determine the pay rate and benefits? What is working well or not-so-well?
- Report out (10 minutes)

Break

Operator Retention

- A key aspect of managing labor costs is managing operator turnover
- Not all turnover is bad
- Not all turnover can be avoided

Improving operator retention is often one of the most significant opportunities for more effectively managing operator labor costs.

Cost Impacts of Operator Turnover

Direct cost impacts of operators leaving the agency

- Remaining operators working overtime to cover open runs
- Recruitment, hiring, and training costs associated with replacing operators

Cost Impacts of Operator Turnover (*Continued*)

Indirect cost impacts of operators leaving the agency

- Lower average tenure/experience of operators potentially impacting customer service, service quality, and safety
- Weaker peer relationships among operators as a group = reduced motivation to stay with agency
- Need to maintain a larger extra board, adding cost without adding service
- Higher levels of stress experienced by operations staff (e.g., trainers, dispatchers, and supervisors)

Strategies for Retaining Operators

- Paying higher wages
- Offering more benefits
- Offering attractive incentives and bonuses
- Offering opportunities for career advancement and personal growth
- Investing in improvements to working environment
- Conducting employee surveys, communicating the results, and acting on the results

A program of perks for operator seniority might or might not improve operator retention.

Strategies for Retaining Operators (*Continued*)

- Making agency leaders more accessible
- Improving internal communications and procedures
- Marketing your transit agency and the value of transit
- Focusing on the job's key positives (e.g., security, serving the community, etc.)
- Providing full compensation statements annually and during recruitment
- Modifying recruitment strategies
  - Recruiting the right individuals as operators
  - Providing preview of job responsibilities and challenges
  - Hiring from non-traditional applicant pools

DISCUSSION:
What strategies have you employed or think would help?

🛠 Tool #4: Vehicle Operator Hiring Cost Calculator

- Excel workbook that helps you calculate the full cost of hiring a vehicle operator, including recruiting, training, and selection costs
- Available for download from Toolkit

Managing Other Labor Costs

Managing Administrative Labor Costs

- Focus: receptionists, security staff, revenue management staff, and similar positions
- Many considerations applicable to managing operator labor costs also applicable to managing costs of administrative staff
- Key differences:
  - Administrative staff may be exempt from FLSA
  - Administrative staff less likely to be unionized
  - Administrative turnover typically not as high

Strategies for Managing Administrative Labor Costs

- Consolidating administrative office locations
- Using paid internships
- Relying on central services (where applicable)
- Partnering to share technical and staff resources (e.g., with an MPO)
- Contracting out specific staff functions
- Continually reviewing staff responsibilities
- Leveraging technology to streamline processes
- Hiring a smaller number of more-experienced individuals rather than a larger number of less-experienced individuals

Peer comparison can provide insights into managing administrative labor costs.

Managing Medical and Health Benefits Costs

Strategies

- Right-sizing staffing levels; medical/health benefits are typically a fixed cost per employee and do not depend on hours worked
- Frequently going out to bid for benefits programs (though this may be disruptive to employees)
- Negotiating with providers when agency's liability is lower
- Participating in risk pools
- Implementing wellness programs
    - Can address health issues
    - Can reduce absenteeism and incidents

Managing Unscheduled Overtime

Managing Unscheduled Overtime

- **Unscheduled Overtime:** Overtime that employees (typically operators and mechanics) work in addition to the hours needed to complete assigned schedules
- Typically occurs when other employees are absent or agency is short-staffed
- Not always used to actually run transit
- Excessive unscheduled overtime can adversely impact employees and service delivery
- Overtime pay rates result in higher labor costs

Managing Unscheduled Overtime (*Continued*)

Two things incentivize agencies to rely on unscheduled overtime:

- Faster to assign overtime than hire new employees
- Cost of benefits paid to employees do not increase if current employees are assigned overtime, while hiring new employees would increase total benefits cost

Strategies for Managing Unscheduled Overtime

Managing unscheduled overtime is a balancing act that requires continual monitoring.

- Monitoring unscheduled overtime by department, job type, and employee
- Training dispatchers on
  - How to determine the optimal number of backup operators
  - When to call them in and when to release them
- Scheduling mechanics when buses are available to be serviced
- Holding management accountable for unscheduled overtime
- Training management on strategies for managing productivity and the working environment
- Reducing service levels to an amount that is sustainable by the current number of employees

Prize Question

- Name three considerations in managing labor costs.

Chapter Summary

- Key takeaways
  - Labor costs are significant – typically the most significant component of transit agency operating costs
  - Operator turnover is costly
  - Managing labor costs is a balancing act; consider the long term as well as the short term
- Additional information, resources, and references provided in Chapter 4 in the Guidebook
- Questions and discussion?

End of Day 1

- Any remaining questions or comments?
- Stand and deliver

Day 2

Managing System Costs:

Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems

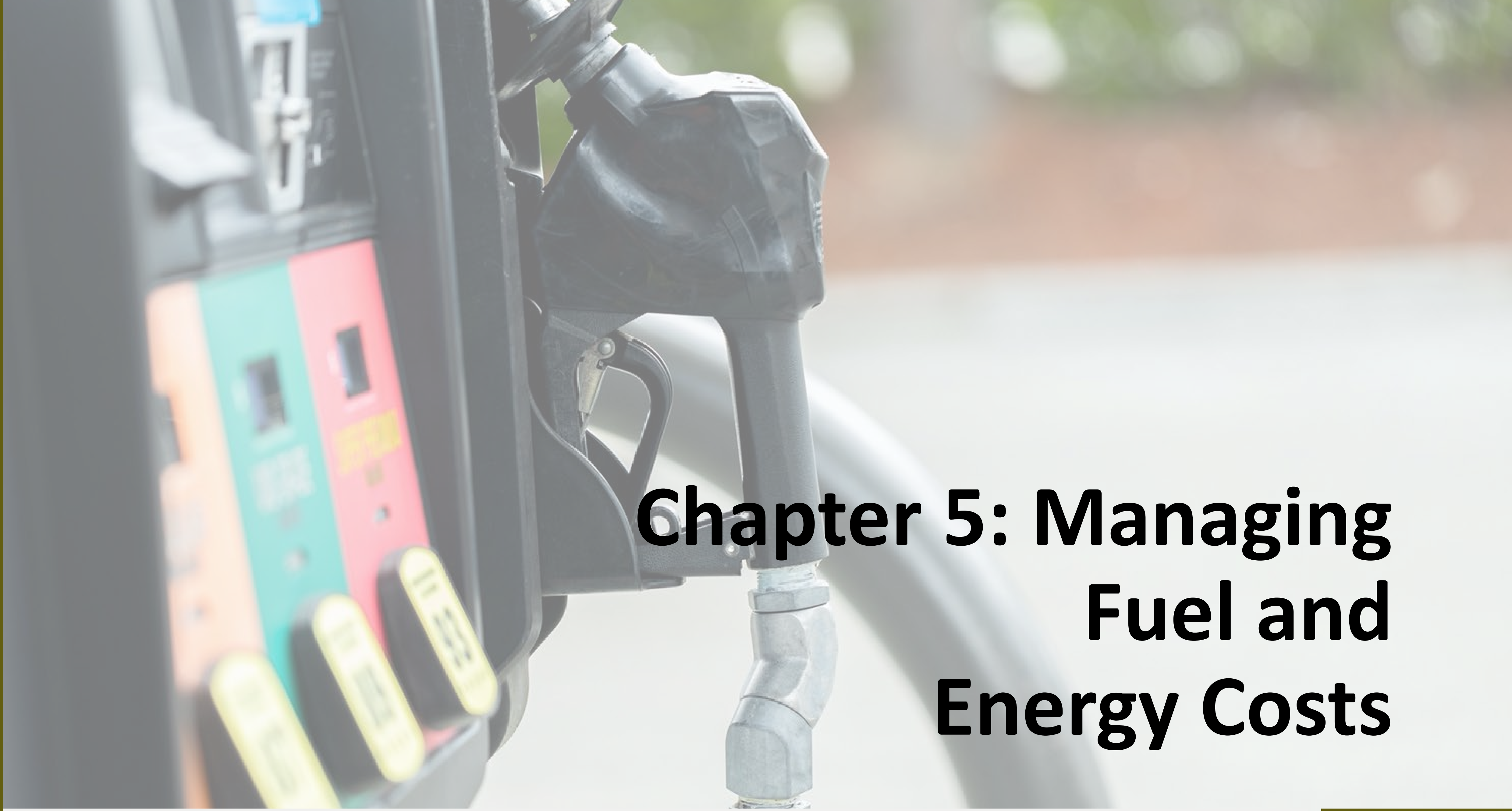
Today's Agenda

- See schedule handout

Module/Content	Start Time	End Time	Duration
Day 2 Introduction	9:00 AM	9:15 AM	0:15
Module B: Strategies for Managing Operational Costs for All Modes (Continued)	9:15 AM	12:00 PM	2:45
Lunch	12:00 PM	1:00 PM	1:00
Module C: Managing Demand Response Costs	1:00 PM	3:50 PM	2:50
Day 2 Closeout	3:50 PM	4:00 PM	0:10

Review – Prize Questions!

- Name and define one of the PTN-128 transit functions.
- What is the USOA?
- What is service-based operational cost allocation?
- Name one cost-related performance measure and describe what it tells you.
- Name two strategies to help retain operators.
- What is unscheduled overtime and what are some ways to manage it?
- Describe a possible bonus or incentive program for operators.
- What are some of the disadvantages and advantages of hiring a mix of CDL and non-CDL operators?



Chapter 5: Managing Fuel and Energy Costs

Learning Objectives

- Describe major factors impacting fuel and energy consumption and costs
- Identify which types of energy sources and fuel prices are most volatile
- Identify important performance measures to determine or compare fuel energy efficiency
- Name major bus fleet characteristics to consider when determining Total Cost of Ownership
- Describe strategies for managing gasoline and diesel costs

Topics

- Managing energy consumption
- Managing diesel and gasoline costs
- Alternative energy options

Managing Energy Consumption

- Fuel and energy costs are significant operating budget items
- Fuel consumption is primarily a function of:
  - Number of miles driven
  - Vehicle fuel efficiency
- Managing energy consumption is done by managing
  - Miles driven
  - Vehicle fuel efficiency

The primary metric to measure is cost per (revenue) mile.

Managing Vehicle Miles Driven

- Revenue miles + deadhead miles + non-service miles
- Optimize each component

Revenue Miles	Deadhead Miles	Non-Service Miles
• Efficient planning • Efficient scheduling • Efficient dispatching	• Optimal siting of vehicle storage locations • Deadhead routes as direct as possible	• Vehicles used only as needed and only for agency-related purposes • Decentralized maintenance (if cost-effective)

- No-show and late cancellation policies helpful for DR
- Audit vehicle usage periodically
- Difficult to control and lead to more miles:
  - Larger service areas
  - Lower-density areas

Managing Energy Use and Efficiency

- Vehicle energy use mainly based on vehicle-specific factors
  - Energy efficiency
  - Vehicle weight
- Also impacted by:
  - Operator behaviors and dwell time (controllable by agency)
  - Climate and topography (not controllable by agency)

Vehicle Efficiency

- Transit vehicles range from sedans to full-size buses
- Ideally: Fill up each vehicle with passengers
  - DR constrained by max ride time policies, so unlikely to fill larger vehicles
- Possible fuel and energy cost benefits to using smaller, lighter vehicles
  - Smaller vehicles typically more maneuverable as well
  - But fleet mix must include accessible vehicles
- Monitor vehicle fuel efficiency over time
- Vehicle maintenance program affects fuel efficiency

Operator Behaviors

Fuel-efficient driving techniques

- Reduce excess idling
- Maintain consistent vehicle speed (at optimum level)
- Accelerate and decelerate smoothly
- Use momentum to maintain cruise speed
- Avoid filling gas tank to the very top
- Avoid riding the brakes
- Avoid hard turning

Operator training programs can improve fuel economy for a given operator.

Incentive programs for fuel-efficient driving may be useful.

🛠 Tool #5: Fuel-Efficient Driving Checklist

- Excel workbook containing a checklist of several fuel-efficient driving behaviors. The checklist could be used during training, during ride-alongs, or as an operator self-assessment
- Available for download from Toolkit

Energy Theft

- Focus: gasoline and diesel theft
- Occurs when agency's fuel or fueling mechanisms are used to pay for fuel used in non-transit-agency vehicles
- Put in place strategies to detect and deter
  - Electronic fuel monitoring system
  - Operator/vehicle ID required for fueling
  - Monitoring fuel efficiency for sudden changes
  - Monitoring operators' fuel efficiency for outliers
  - Surveillance systems
  - Limited number of fuelers
  - Comparing fuel dispensed vs. fuel delivered

Prize Questions

- Name two operator driving behaviors that could help improve fuel efficiency.
- Name and define the three categories of vehicle miles.
- Name a strategy to help deter energy theft.

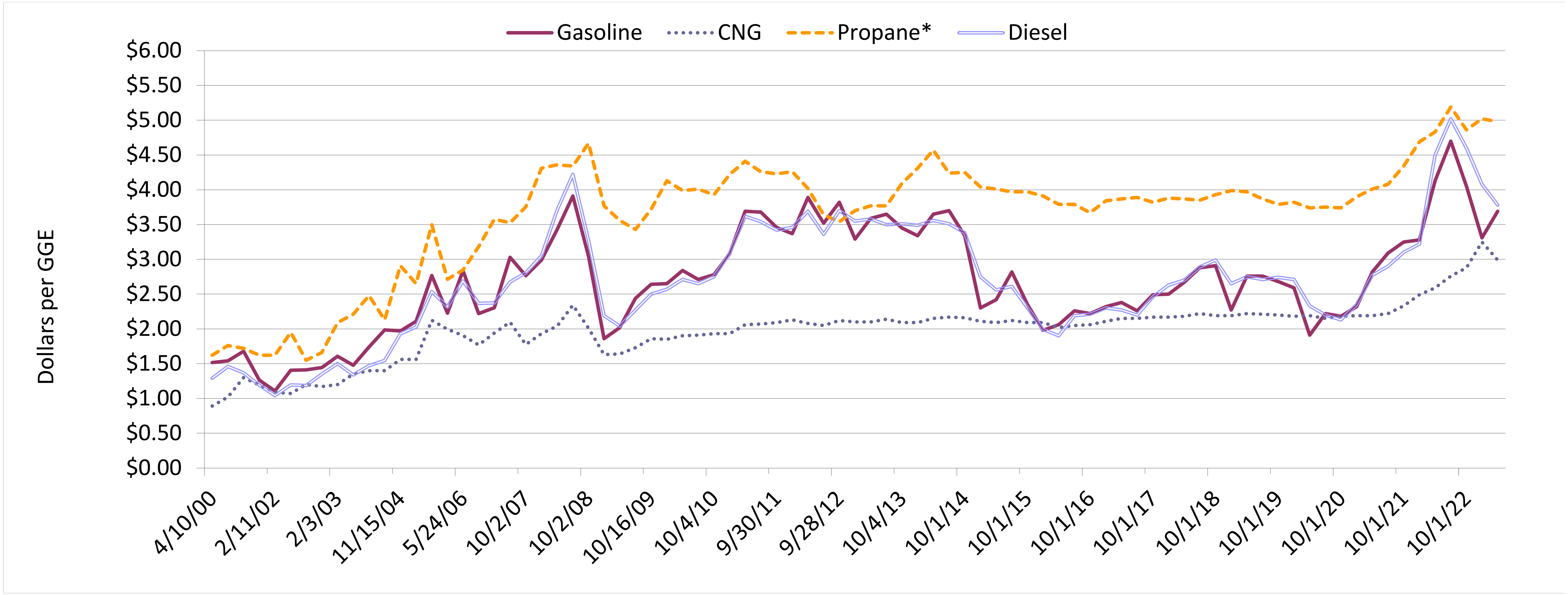
Managing Gasoline and Diesel Costs

Basics

Manage two variables:

- Gallons consumed
- Unit price per gallon, which can be highly volatile (see next slide)

Fuel Price Volatility



GGE = gasoline gallon equivalent.

* Propane prices reflect the weighted average of "primary" and "secondary" stations. Primary stations have dedicated vehicle services and tend to be less expensive. Secondary stations are priced for the tanks and bottles market and tend to be more expensive.

Managing Gasoline and Diesel Costs

- Work to control unit price volatility
- Be prepared for unit price volatility (use historical data or price projections)
- Typical fueling options:
  - Non-dedicated fueling facilities (shared, might be public)
  - Dedicated fueling facilities (on-site)
  - Delivery service (third-party fueling on site)

Non-Dedicated Fueling Facilities

- May be more practical where demand is low and/or service area is large
- Facility types
  - Retail gas stations
  - Agreements with entities that have dedicated fueling facilities
- Fuel card program can be beneficial
  - Discount on market price (might be tax-exempt)
  - Easier fuel administration
  - Customizable (e.g., can limit hours of use)
  - Must train operators on how to use
  - Could also be a backup fuel payment option (if have dedicated facilities)

Dedicated Fueling Facilities

- More common for urban services, in denser areas, when utilizing alternative fuels, and/or when operate fixed routes and ADA paratransit
- Offers increased control over unit prices via competitive procurements for fueling vendors and ability to purchase in bulk
- Agency must build, maintain, and operate
- Disadvantages include spillage, cost of building/maintaining/operating site and tank, and risk of energy theft

Alternative Energy Options

Alternative Energy Options

The U.S. Dept. of Energy's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool (https://afleet.es.anl.gov/home) provides a spreadsheet to estimate TCO

- More options than gasoline and diesel
- To be considered in fleet decision-making
- Evaluate options using total cost of ownership (TCO), including fuel and capital costs

Example Total Cost of Ownership Estimates

Heavy-Duty Bus + Infrastructure	Diesel	Battery Electric Bus	CNG
TCO Single HD Bus 15,000 miles per year	$937,812	$1,248,569	$921,660
TCO Single HD Bus 25,000 miles per year	$1,173,041	$1,340,276	$1,146,122
TCO Single HD Bus 45,000 miles per year	$1,643,499	$1,523,691	$1,595,045

Zero-Emission Buses (ZEBs)

- *TCRP's Guidebook for Deploying Zero-Emission Transit Buses*, published in 2021
- Supports decision-making and emphasizes importance of building and maintaining relationships with technology providers, utility companies, fuel suppliers, contractors, etc.

ZEB Deployment Considerations

- Cost and uncertainty
- Workforce (operators, mechanics, schedulers, etc.)
- Route and service planning
- Infrastructure right-sizing
- Fleet and route analysis: right-sizing batteries and charging
- Charging infrastructure and energy strategy
- Working with energy provider

Exercise B-2: Small Group Breakout – Fuel and Energy

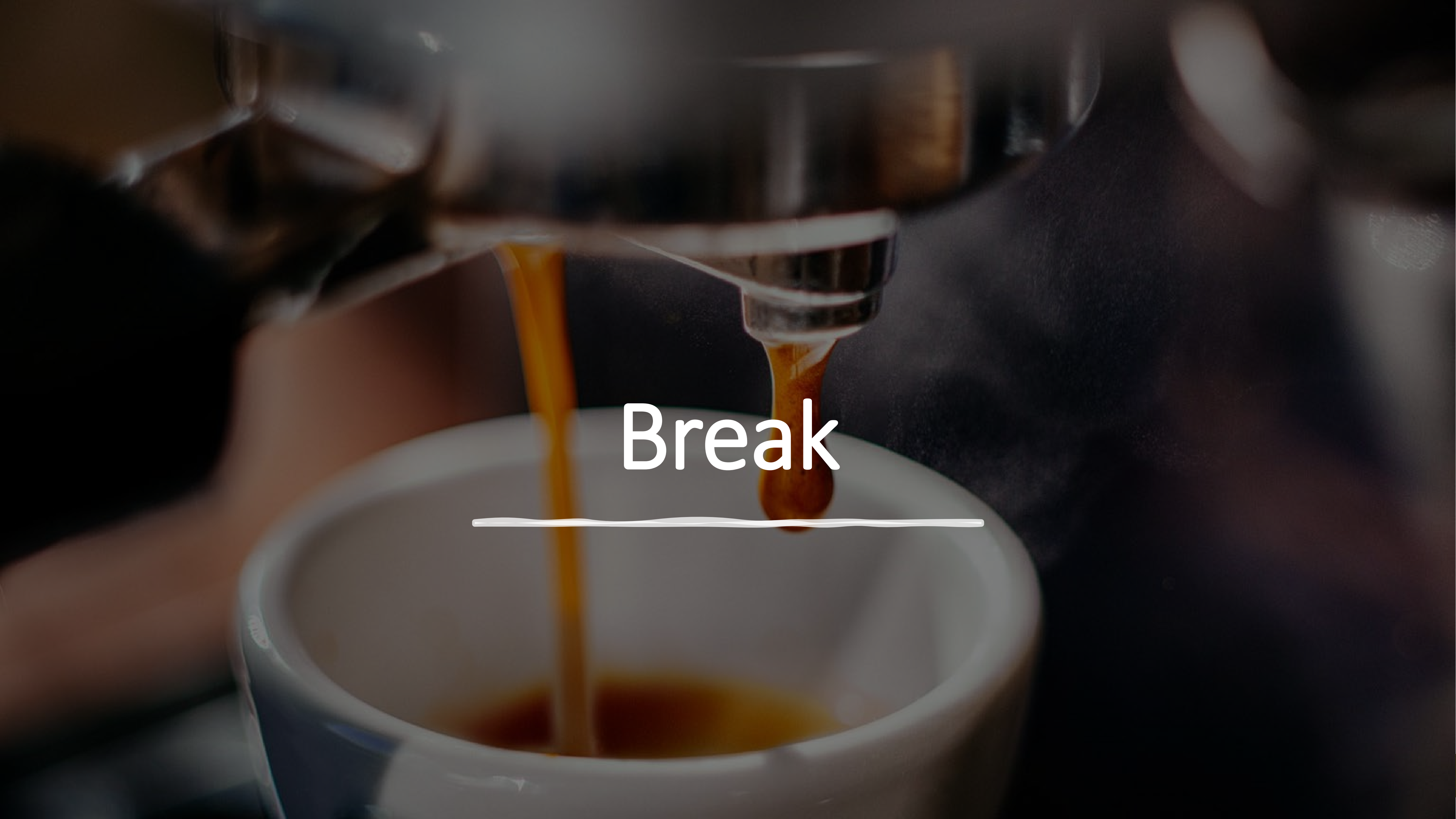
- Form small groups
- Discuss (20 minutes):
  - What fuel and energy types do you use?
  - What, if any, strategies discussed today have you employed already? How did they work?
  - What, if any, strategies discussed today would you like to implement or increase?
  - What other strategies for managing fuel and energy costs would you like to share?
- Report out (10 minutes)

Chapter Summary

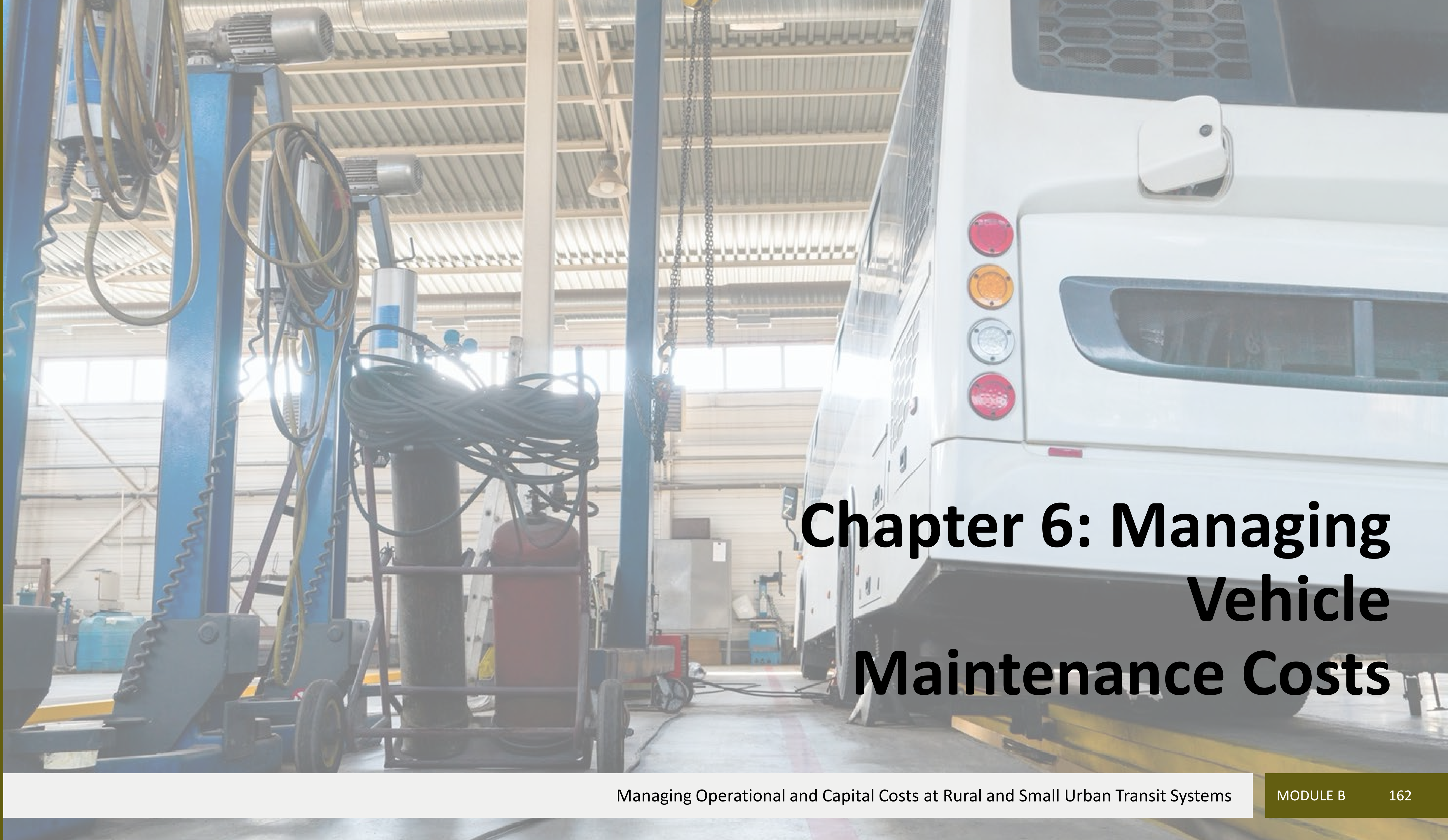
- Key takeaways
  - Fuel is one of the highest transit agency cost drivers
  - Fuel prices can be extremely volatile
  - Key fuel and energy cost management strategy is managing miles driven
  - Vehicle fuel efficiency can be improved with:
    - Smaller vehicles
    - Regular vehicle maintenance
    - Operator training
  - Energy theft is a risk to be proactively managed

Summary
Continued

  - Fuel card programs can manage costs when using non-dedicated fueling facilities
  - Evaluating alternative energy options should include the total cost of ownership
  - Deploying ZEBs requires careful planning, analysis, workforce training, and ongoing monitoring
- Additional information, resources, and references provided in Chapter 5 in the Guidebook
- Questions and discussion?



Break



Chapter 6: Managing Vehicle Maintenance Costs

Learning Objectives

- Identify factors that influence vehicle maintenance costs
- List and describe maintenance cost reduction strategies
- Describe potential pros and cons of outsourcing some or all maintenance functions
- Identify vehicle maintenance performance measures and vehicle data management systems

Topics

Reducing maintenance demand

Other strategies
(e.g., parts, labor, outsourcing)

Reducing Maintenance Demand

Reducing Maintenance Demand

- Reducing maintenance demand can reduce maintenance costs
  - Reduce maintenance demand by optimizing miles driven
  - Miles driven is a direct predictor of amount of maintenance needed
- Other strategies:
  - Robust preventative maintenance practices
  - Consistent fleet replacement
  - Balancing mileage across the fleet
  - Optimizing fleet size

🛠 Tool #6: Maintenance Self-Assessment

- Excel workbook containing a checklist to help evaluate your maintenance management
- Available for download from Toolkit

Preventive Maintenance Practices

- Minimize malfunctions with systematic, regularly scheduled maintenance procedures
  - Less costly than corrective maintenance
  - Less costly than road calls
- Tailor procedures to specific vehicle types
- Use a system to ensure timely preventive maintenance
- Track on-time preventive maintenance as a performance measure
- Program should be adaptable to new vehicle types and changes in operating conditions

Preventive Maintenance Practice Considerations

Consideration	Benefits
Establish all the service intervals as multiples of a common denominator.	• Minimizes vehicle downtime by minimizing the number of times the vehicle has to go in for maintenance. • Improves work and labor efficiency.
Consider seasonal/environmental conditions that can impact maintenance and service intervals.	• Optimizes vehicle performance by adapting standard maintenance practices to environmental factors.
Include a regular schedule for washing and cleaning your vehicles.	• Improves public appearance of vehicles (and, thereby, your agency's public image). • Prevents acceleration of standard vehicular degeneration (e.g., rust).

Predictive Maintenance

- Look for patterns of problems in vehicles of same type (e.g., same year, manufacturer)
- If problem exists in one vehicle, likely may exist or be developing in other similar vehicles
- Repair or replace before problem becomes major repair or road call

Consistent Fleet Replacement

- Helps maintain a low fleet age
- Avoids peaks and valleys in vehicle procurement
- Levels peaks in maintenance demand
- Fleet replacement plan
  - Provides annual targets for retirement/replacement
  - Identifies targets for overall fleet growth
- Replacement of a given vehicle type depends on manufacturer, state/federal guidelines, and local operating environment
  - A vehicle's Useful Life Benchmark (ULB) is the target of years and/or miles at which to replace a vehicle
- FTA State of Good Repair and minimum service life

The best way to have consistent fleet replacement is to develop and follow a fleet replacement plan

Balancing Mileage across the Fleet

- Ideally: It is best to have a fleet age proportionally across the fleet
  - Vehicles' miles accrued are in line with their age
  - No individual vehicles are accruing a disproportionate number of miles
- Goal: Ensure that vehicles do not reach one useful life milestone (e.g., miles) far before reaching the other (e.g., age)
- Exceptions: Some agencies may have policies that dictate specific usage (e.g., using newer vehicles on longer-distance trips)

Imbalances in Vehicle Mileage

ID	Type	In-Service Year	Age in Years	Odometer Miles	ULB Years	ULB Miles	% to ULB Age	% to ULB Miles
1	Light-Duty Van	2018	5	50,000	6	150,000	83%	33%
2	Light-Duty Van	2020	3	100,000	6	150,000	50%	67%
3	Light-Duty Van	2022	1	10,000	6	150,000	17%	7%
4	Heavy-Duty Small Bus	2019	4	125,000	12	420,000	33%	30%
5	Heavy-Duty Small Bus	2019	4	125,000	12	420,000	33%	30%

ULB = Useful Life Benchmark

Optimizing Fleet Size

- Scheduled service and passenger demand largely dictate number of active vehicles needed to deliver peak service
- Agencies can:
  - Implement strategies to optimize the amount of service provided
  - Control the spare ratio (recommended 10-20% but depends on fleet size)
- Discussed further in other modules (especially Module E)

Prize Questions

- Describe how consistent fleet replacement can help manage maintenance costs.
- Why is it important to balance mileage across your fleet?
- What are some considerations for an effective preventive maintenance program?

Other Strategies

- Parts cost efficiency
- Maintenance labor hour efficiency
- Outsourced maintenance

Improving Parts Cost Efficiency

- Commonly replaced parts are those that wear out with regular use (e.g., tires, brakes, fuses, and transmissions)
- **Parts cost efficiency** is miles driven per dollar spent on parts
- Can be increased by:
  - Having robust preventive maintenance practices
  - Carefully choosing parts and parts suppliers
  - Tracking and leveraging parts warranties
- Typically a tradeoff between part cost and part longevity
- Careful record-keeping is important
- Possible to conduct parts tests
- Evaluate cost-effectiveness of tire leasing programs
- Other strategies in Chapter 6 of the Guidebook

Improving Maintenance Labor Hour Efficiency

- Labor hour efficiency = getting the most maintenance benefit for every hour of maintenance
- Challenge: Knowing you have the right number of mechanics
- Strategies and a tool in Chapter 6 of the Guidebook

🛠 Tool #7: Mechanic Staffing Calculator

- Excel workbook that helps you calculate the necessary number of maintenance staff, given your fleet's maintenance requirements and the number of hours available for maintenance work
- Available for download from Toolkit

Using Outsourced Maintenance

- Common practice for managing costs
  - Major repairs (e.g., engine overhauls, bodywork, and HVAC work)
  - Some agencies may not have sufficient specialized expertise
  - Should consider vehicle transport costs
- Can also work with nearby agencies/governments able to perform needed repairs
- If maintenance is contracted, be sure to monitor the contractor for efficiency and effectiveness
- Best value consideration includes getting quotes or bids

Prize Questions

- Name and describe a strategy for managing parts costs.
- Why might a transit agency want to outsource some maintenance?
- Name one or more considerations when outsourcing maintenance.

Chapter Summary

- Key takeaways
  - Track and evaluate fleet and maintenance performance measures
  - Conduct pre- and post-trip vehicle inspections
  - Have a robust, standardized preventive maintenance program
  - Have a vehicle replacement plan
  - Keep vehicle miles in line with vehicle age
  - Maintain a target spare ratio
  - Maintain detailed records of parts and parts use
  - Maximize maintenance performed for every hour of maintenance labor paid
  - Outsourcing maintenance can improve cost-effectiveness
- Additional information, resources, and references provided in Chapter 6 in the Guidebook
- Questions and discussion?

Chapter 7: Additional Operational Cost Considerations

Learning Objectives

- Describe how managing property and casualty insurance impacts costs
- Explain potential cost management benefits of volunteer drivers
- Explain potential cost management benefits of in-kind or contributed services
- Describe factors in a robust fare collection process and its costs

Topics

- Insurance
- Volunteer driver programs
- In-kind contributions
- Fare collection

Managing Insurance Costs

Managing Insurance Costs

- Insurance coverage carried by transit agencies can include Worker's Compensation, general liability, automobile, errors and omissions, property, and cyber events
  - Requirements might be different for agencies and contractors
  - Costs might be split between agencies that share resources
- Agencies concerned for years about rising costs of insurance
- Important to consult with legal professionals regarding requirements and risks

Managing insurance costs means managing risk.

Strategies for Managing Insurance Costs

- Consistent participation in risk management/safety training
- Comprehensive understanding of risks
- Education of insurance providers on agency policies and procedures
- Continual collaboration with insurance providers to identify ways to lower risk and premiums
- Coordination with other public agencies in the region to share approaches, learn, and establish consistent insurance requirements across the region

Strategies for Managing Insurance Costs (*Continued*)

- Participation in risk pools
- Regular bid process (e.g., every 3-5 years) for better rates
  - Going out to bid too frequently may be counter-productive
- Contracting for service (risks shifted to contractor)

Risk management and safety training for transit agencies on diverse topics and in diverse formats is often available through entities like APTA, CTAA, National RTAP, the National Safety Council, and NTI.

Volunteer Driver Programs

Volunteer Drivers

- Volunteer drivers = individuals who donate their time to operate vehicles that provide public transportation service
- Might also provide critical passenger assistance and positive socialization experiences
- May or may not be owner of vehicle used
- Programs emerged from the need to provide transportation service for seniors
- Modern volunteer driver programs serve other ridership markets as well

Volunteer Drivers (*Continued*)

See CTAA National Volunteer Transportation Center: https://ctaa.org/national-volunteer-transportation-center/

- Effects on operating costs
  - Volunteer labor can be used as local match ✚
  - Volunteer drivers can be used in place of paid drivers ✚
  - Programs dependent on the schedule of volunteers ✚ **or** ━
  - Typically recruited, trained, and scheduled by sponsoring agency ✚
  - Additional insurance coverage might be required of the transit agency or the volunteer drivers ━
- Key to success is recruiting enough volunteers

Volunteer drivers are not necessarily “free.” While some participate without reimbursement, some might receive mileage reimbursement or log trips or travel time that they can apply to their own use of transit.

In-Kind and Contributed Services

In-Kind and Contributed Services

- Items and services donated or lent to transit agency by other parties
  - Labor contributions (e.g., skilled laborers)
  - Donated office space
  - Donated land and buildings
  - Equipment
  - Goods and services
  - Indirect costs
  - Travel expenses
- Not cash contributions, but have cash value

In-Kind and Contributed Services (*Continued*)

- Often represent operational costs that agency would otherwise bear (e.g., leasing of office space)
- Can make up a shortfall in local match or allow agency to qualify for higher level of grant funding
- To be eligible as local match, in-kind and contributed services must be "integral and necessary"
- In-kind and contributed services must be documented as sources of match *in the grant application*

Consult your FTA and/or TxDOT representative if you're thinking of using in-kind and contributed services, especially as match.

Agencies interested in using in-kind and contributed services for local match should analyze the effort (e.g., staff hours) required to track, get approval for, and claim contributed services and compare it to the expected local match benefit.

Fare Collection

Fare Collection Costs

- Typically include:
  - Acquisition of fareboxes or other fare collection equipment
  - Production of fare media
  - Enforcement of fare payment
  - Securement of fares on board vehicles and at facilities
  - Counting and reconciliation of collected fares
  - Audit of fare revenues to eliminate fraud
- Fare collection costs can be significant

Fare collection processes should be well understood by transit agency staff, fare revenues should be carefully tracked, and procedures should be in place to reduce fraud.

Fare Collection Costs (*Continued*)

Other impacts on operational costs:

- Time operators spend on fare collection–related activities is time not spent keeping service on schedule or performing other duties
- Dwell times might be significantly increased by fare collection–related activities and agency might need to add a vehicle to service
- Maintenance staff are responsible for maintaining fare collection equipment
- Planners responsible for developing, implementing, and administering fare structures and fare programs; changes to fare structures and fare programs require labor and materials

Fare Collection Costs (*Continued*)

- Reducing the burden/cost
  - Measure costs and benefits of fare collection practices to see which aspects deliver the most value and make adjustments
  - Compare costs of fare collection against fare revenues obtained (and other benefits of fare collection, like ridership data collection)
  - Consider electronic fare collection
  - Consider fare-free service
- Fare collection technologies discussed in Module E

Chapter Summary

- Key takeaways
  - Carefully managing insurance costs, using volunteer driver programs, and making use of in-kind and contributed services can reduce operating costs
  - Fare collection costs can be a significant contributor to operating costs; can also impact dwell times, operator workload, and maintenance costs
- Additional information, resources, and references provided in Chapter 7 in the Guidebook
- Questions and discussion?

Exercise B-3: Small Group Breakout – Cost Management Strategies

- Form small groups
- Pick a topic:
  - Vehicle maintenance
  - Insurance
  - Fare collection
- For the selected topic, discuss these questions:
  - What are some of your biggest cost-related challenges in this topic?
  - What notable practices does your agency do <u>now</u> that you think helps manage costs?
  - What new practices or strategies are you considering or would you like to pursue?
- Timing
  - Discussion: 15 minutes
  - Report out: 10 minutes

Module B Evaluation

- Please fill out the <u>Module Evaluation Form</u>
- Write in the date and location
- Select <u>Module B</u>

Module Evaluation Form

Managing System Costs: <u>Module Evaluation Form</u>

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.

Select all that apply for questions with a square: ☐.

C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

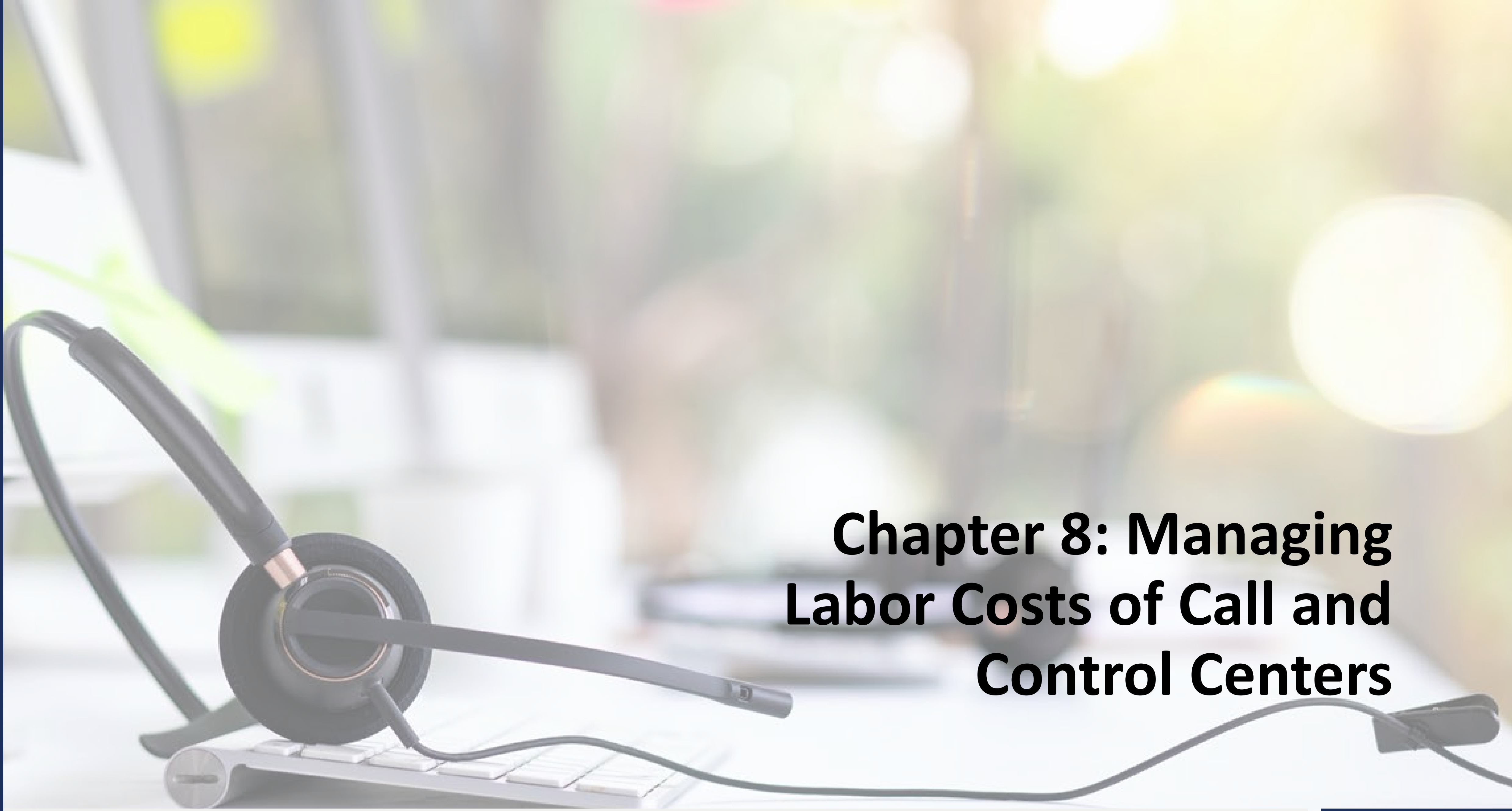
You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

Lunch

MODULE C:
Managing Demand Response Costs

Module Overview

- **One-sentence summary**
  Specific strategies for managing costs of demand response costs
- **Chapters**
  - 8: Managing Labor Costs of Call and Control Centers
  - 9: Managing Demand Response Service Costs
  - 10: Specific Strategies for ADA Paratransit
  - 11: Contracting Out Demand Response Service



Chapter 8: Managing Labor Costs of Call and Control Centers

Learning Objectives

- Discuss strategies for optimizing staffing levels across call and control center functions
- Understand role of customer-facing apps and automated booking systems in cost management
- Discuss considerations for outsourcing different call and control center functions

Topics

- Optimizing staff levels and availability
- Use of customer apps and automation
- Outsourcing

Optimizing Staff Levels and Availability

Call and Control Centers Basics

- Four call and control center functions
  1. Reservations
  2. Scheduling
  3. Dispatching
  4. Customers' service day calls ("Where's my ride?")
- Many different ways to manage DR service and operate a call and control center
  - In-house, outsourced, or a mix of both
  - Staff assignments

At smaller agencies, it often is difficult to justify having separate staff for separate functions. As the size of the system grows, staff can be specialized.

Open Discussion

- How are the four call and control center functions staffed at your agency?
- What are the weaknesses of this approach?
- What are the strengths?

DISCLAIMER!

- This chapter mentions technology (i.e., apps and software) to help manage costs and improve cost-effectiveness of call and control centers and demand response service
- HOWEVER:
  - All software has a learning curve – don't overlook the increased workload and cost associated with training
  - All software requires proper installation, set up, and maintenance to be effective
  - All software requires someone to interact with it and to be trained to fully utilize the software's capabilities
  - Software requires qualified staff to maintain the IT infrastructure, imports, exports, reports, configurations, etc.

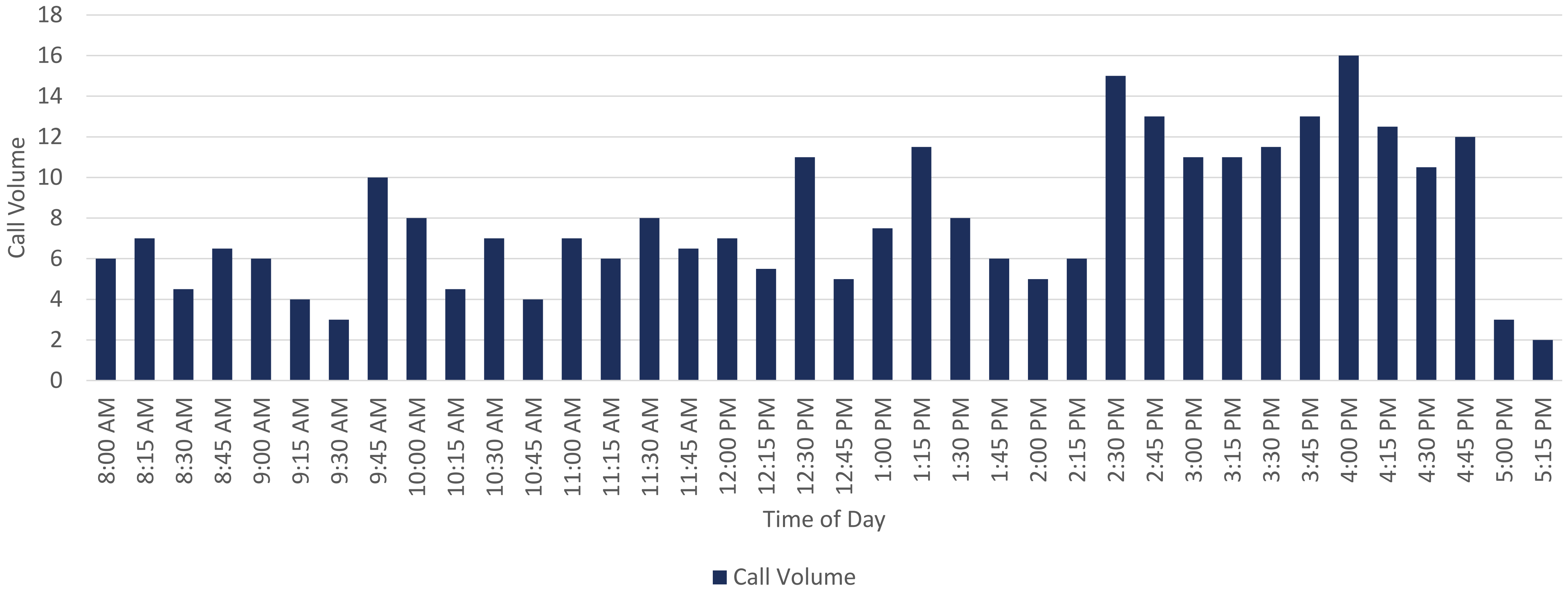
Call and Control Center Labor Costs

- Example analyses and measures
  - Call and control center labor cost per call answered
  - Call and control center labor cost per call center service hour
  - Call and control center labor cost per passenger trip
  - Agent productivity metrics (e.g., calls answered per hour or agent average call length)
- Track over time
- Use with peer reviews to streamline
- Balance cost-efficiency and service quality
- *Note:* May need phone system software to allow for detailed tracking of call and control center metrics

Call-Taking Staff

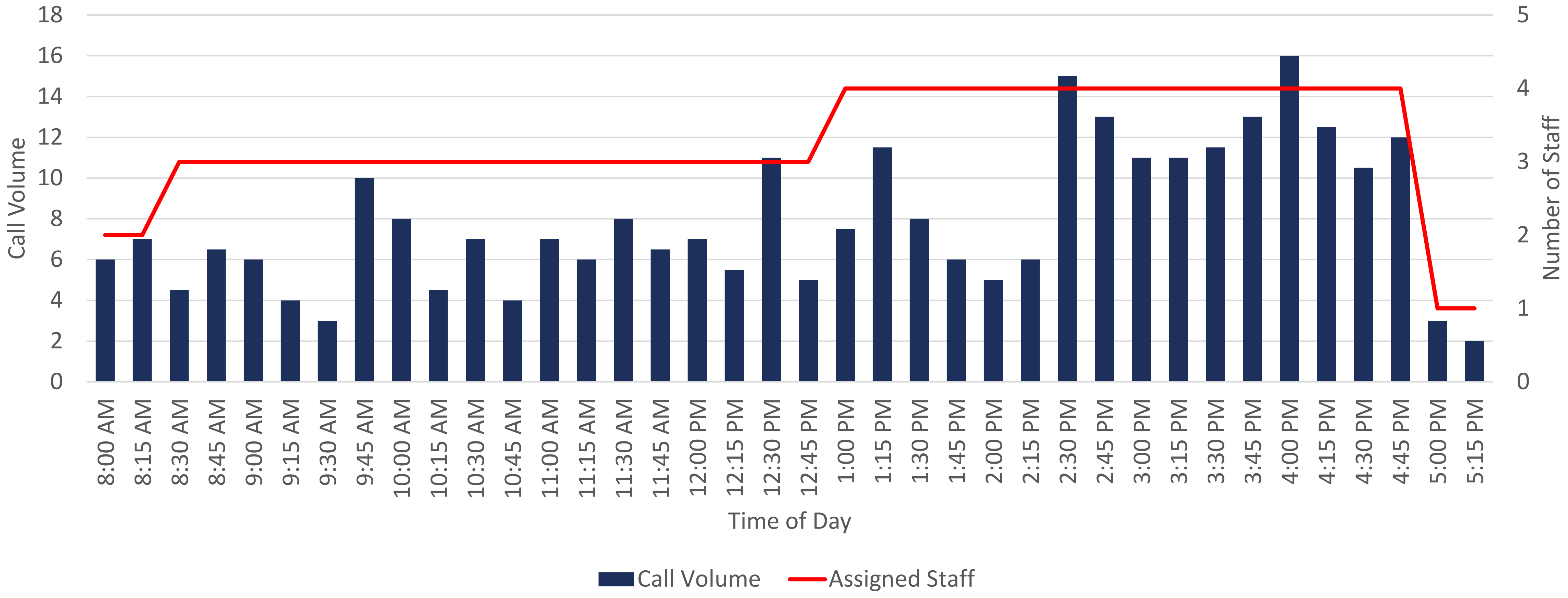
- Directly interface with customers
- Size call-taking staff to handle peaks and valleys of call demand
  - Try to match staffing with call demand to minimize average call hold time
  - Setting not-to-exceed standards for average and maximum hold time per day and per hour. Maximum hold time is important
  - Stagger call-taker shifts or supplement with cross-trained staff
- Establish individual standards or performance guidelines for call-taking staff (e.g., target call handling time or calls answered per hour)
- Service-day calls might be assigned to reservations staff or dispatchers or both

Example of Call Volumes by Time of Day



Example of Optimizing Staff Availability

This is the "ideal." Often, the ideal solution is not possible.



Remote Call-Taking Staff

- Post-pandemic, new telephone technologies have made remote-working call-taking staff more commonplace
- Possible for increased retention of remote of call-taking staff = less time/cost is spent on recruiting and training
- New tech also facilitates real-time monitoring of call-takers
- Can Use to bolster call-taking resources during high-demand times

🛠 Tool #8: Call and Control Center Staffing Calculator

- Excel workbook to help calculate the number of call and control center staff needed across the day based on call demand and other tasks performed by call and control center staff
- Available for download from Toolkit

Scheduling Staff

Remember, automation and software may help, but still need qualified schedulers to interact with and use software!

- Scheduling can be carried out in different ways
  - Automated scheduling technology, manual scheduling, or a mix
  - At the end of booking period (e.g., day before) or in real time
  - Various optimization capabilities and processes
  - Lead scheduler oversight
- Approach to scheduling directly impacts number of call and control center staff
  - Fewer schedulers typically needed when software assists
  - Reduced scheduler workload allows support of other functions
  - Reducing number of unassigned trips eases dispatcher workload on day of service

Dispatching Staff

- Dispatching can be organized in different ways with basic parameters
  - Dispatcher shifts should be aligned with operator shifts
  - Need to ensure adequate vehicle-to-dispatcher ratio
  - Ratio needs to be adequate during peaks
  - Dispatchers can be assigned to specific vehicle groups or areas
  - Lead dispatchers can provide proactive dispatching
- Approach to dispatching directly impacts number of staff
  - Fewer dispatchers typically needed when software assists
  - Dispatching and handling service-day calls often peak at the same time, so it can be more effective to dedicate staff to each function
- "Today's scheduler is tomorrow's dispatcher"

Use of Customer Apps and Automated Booking Systems

- Increasingly part of DR/paratransit services, especially on-demand services
- Customers might be able to self-book, cancel, and get ETAs and notifications
- Apps and automated booking systems reduce booking calls and service-day calls—and potentially call-taking staff need
- Must consider equity, Title VI, and accessibility
- Must consider access by individuals without smart phones or internet (call-in option)
- Consider providing training to customers (e.g., training at senior centers)
- *Note:* your agency may have a policy that prioritizes person-to-person communication, so, automated booking is not a priority

Outsourcing Call and Control Center Functions

Common Outsourcing Options for Call and Control Center Functions

- Use contractor for some or all call and control center functions
  - Reducing costs
  - Taking advantage of contractor expertise
- Turnkey: All functions contracted out as a package

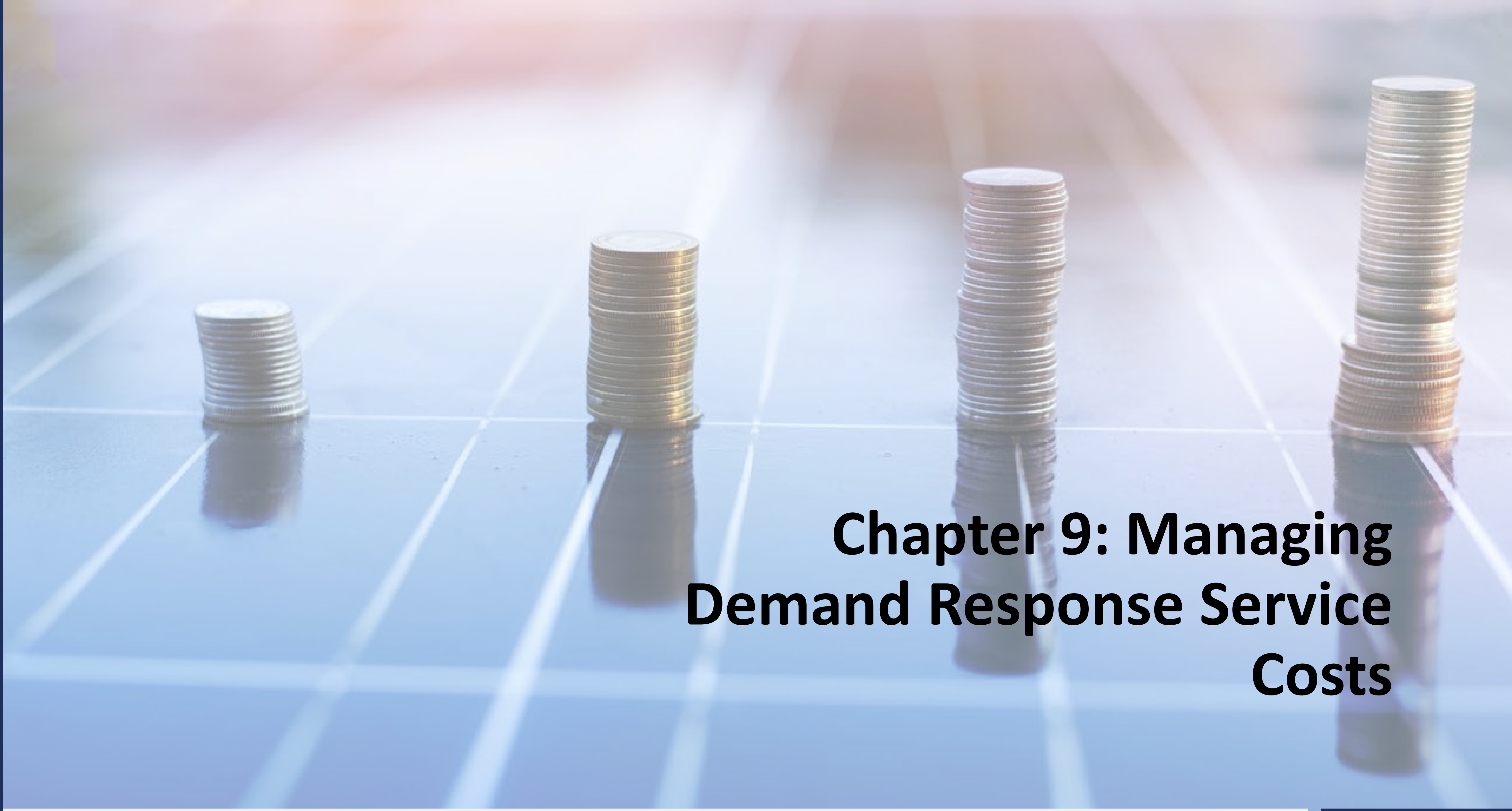
Common Call and Control Center Outsourcing Arrangements

1. Retain customer-facing functions in house and outsource scheduling and dispatching
2. Retain customer-facing and scheduling functions in house and outsource dispatching
3. Retain advanced book and scheduling functions in house and outsource service-day functions (including dispatching and same-day booking)

Performance-related contract incentives and disincentives can help ensure productivity and quality of service. Without such controls, contractors' strategies may be to maximize revenue.

Chapter Summary

- Key takeaways
  - Right-size amount of available call-taking labor to match call volume on an hour-by-hour basis
  - Provide customers with self-service apps and technology to reduce call volume and call-taking labor costs
  - Scheduling software can perform real-time optimization processes and can help reduce costs if tuned to local needs and policies
  - Give reservation agents tools to handle service-day calls
  - Organize dispatch labor based on specific tasks
- Additional information, resources, and references provided in Chapter 8 in the Guidebook
- Questions and discussion?



Chapter 9: Managing Demand Response Service Costs

Learning Objectives

- Describe how service policies can impact demand response transit (DRT) productivity
- Explain the cost management benefits of efficient scheduling and dispatching
- Describe the cost management strategies associated with DRT fleets and facilities

Strategies specific to ADA paratransit will be discussed in Chapter 10.

Topics

- Service policies
- Efficient run structures, scheduling, and dispatching
- Vehicle and facility strategies

DISCLAIMER!

- This chapter mentions technology (especially scheduling and dispatching software) to help manage costs and improve cost-effectiveness of demand response service
- HOWEVER:
  - All software has a learning curve – don't overlook the increased workload and cost associated with training
  - All software requires proper installation, set up, and maintenance to be effective
  - Scheduling software *especially* must be "tuned" to local needs and policies to achieve maximum benefit
  - All software requires someone to interact with it and to be trained to fully utilize the software's capabilities
  - Software requires qualified staff to maintain the IT infrastructure, imports, exports, reports, configurations, etc.

Service Policy Impacts on Service- and Cost-Efficiency

ADA Service Policy Impacts on Productivity

- ADA-required service policies associated with service equivalency
- With DRT, the comparison is between the experiences of (1) a person with a disability using the service and (2) a non-disabled person using the service
- Seven characteristics for determining service equivalency

Response time	Fares	Geographic area of service	Hours and days of service	Trip purpose restrictions or priorities	Availability of information and reservations capability	Any constraints on capacity or service availability

Eligibility and Eligibility Determination Policies and Practices

- A service eligibility process may be required for specific DRT programs
- Good eligibility process: Ensures agencies are using resources to provide quality, sustainable service to meet demand
- Providing service to individuals who truly meet eligibility criteria helps agencies ensure service sustainability

Fare Policies, Sponsor Rates, and Subsidies

- Generally, fare level (as well as municipal/agency sponsor rates and subsidy levels) can be used to encourage use or dampen use
- ADA paratransit: Fares can be no more than twice local fixed-route fare
- Other DRT: Agencies may set fares at the level that seems appropriate or as sponsoring (funding) entities dictate

Fare Policies, Sponsor Rates, and Subsidies *(Continued)*

- Coordinated (commingled) services
  - Sometimes transit agency can negotiate the rate paid by sponsoring entity to provide trips
  - Sometimes the rate is fixed by a state agency or broker
  - Transit agency can decide to serve trips or not
    - Are trip costs fully covered?
    - Or does serving the trips increase system productivity (cost/trip)?
  - Transit agencies should strive to recoup as much of the cost of serving sponsored trips as possible
    - Can require sponsor to cover full cost
    - But the higher the sponsor rate, the fewer trips are likely to be purchased

Advance Reservation Policies

- Most DRT systems have advance reservation policies
- Advance reservations are a convenience to riders as some DRT services are capacity-constrained
- In the past, advance reservations gave schedulers more time to find scheduling solutions; advances in technology increasingly support real-time scheduling

A major consideration that ultimately impacts productivity (cost/trip) is how far in advance to allow advance bookings.

An advance reservation window of 3-7 days reduces speculative "placeholder" trips that can result in sub-optimal scheduling.

Same-Day Reservation Policies

- A feature of on-demand microtransit and alternative services
- Rate for other DRT services
- Other DRT systems that allow for same-day reservations tend to do so on a space-available basis
    - Works if the agency has automated capability to determine whether the trip can fit into a run schedule or not
    - To minimize disruptions, many agencies require 2 hours notice for same-day reservations

Subscription Trip Policies and Practices

- Subscription trips are "standing orders"
- Typically in the best interest of transit agencies to maximize subscription trips
  - Passengers don't have to reserve trips one at a time
  - Productivity typically improves when scheduling the same client trips with the same driver or run from day to day
  - Fewer passenger calls
- Re-optimization of subscription trip schedules at least once a month is important: subscription trips change over time

Will-Call Returns Policies

- Certain types of return trips (especially medical trips) frequently result in either no-shows or long wait times for passengers
- To reduce no-shows, many agencies allow will-calls for trips more likely to have a no-show
  - Rider can "call when ready"
  - Common response time for will-calls is 60 minutes
- The agency could rely on a non-dedicated service provider (NDSP) instead of disrupting the dedicated fleet and decreasing its productivity
- Some agencies have “on-call” operators to help with will-call trips. For example, on-call operators must be able to report to work in 1 hour, if needed to operate will-call trip

No-shows are costly. No-shows will be discussed later in this module.

Denial Policies

- Denials will happen when capacity of dedicated vehicles is taken up and/or trip time negotiation is unsuccessful
- Ideally: Adjust supply from days/times when service is oversupplied to days/times when service is undersupplied
- Some agencies have zero-denial policies but that can result in trips that are late or excessively long
- Capacity constraints due to patterns of denials on ADA paratransit services are prohibited; definition of denials is more specific

Recording of denials is important because it provides information about when more service is needed.

Pickup and Dropoff Window Policies and Response Time Standards

- For trips scheduled in advance: pick-up windows and drop-off windows define when the DRT vehicle is on-time
- For on-demand services and will-call return pick-ups: response time standards define when the vehicle is on-time
- Defined by agency, sometimes with community input
- Important to educate customers on these policies
- Affects productivity and on-time performance

Wider Windows or Longer Response Times	Narrower Windows or Shorter Response Times
More opportunities to improve productivity	Fewer opportunities to improve productivity but preferred by passengers

No-Show/Late Cancellation Policies

- No-shows and late cancellations have an adverse impact on DRT service productivity and cost per trip
- If agency has more than 5% no-shows/late cancellations, a solution is a policy that progressively suspends service for passengers who no-show/cancel late
- Another proven solution: Provide customers with confirmation and imminent arrival and arrival calls/texts via Interactive Voice Response (IVR) system or app
- Some agencies allow riders to directly book and cancel trips, which can reduce number of call-takers needed

Service Area Policies

- Larger DRT service areas typically result in longer average trip lengths
- The longer the trips, the less productive the service and the higher the cost per trip
- Common solution: Split large service area into regions/zones
  - Works best where majority of trips originating from a particular region/zone are destined for same region/zone
  - Develop policies for transfers between regions/zones

Dedicated vs. Non-Dedicated Service Provider (NDSP)

Transit agencies have implemented NDSPs to increase cost efficiency

- Pros of NDSPs:
  - Augment transit agency fleet—overflow to prevent denials, serve low-demand periods and areas, react to unexpected demand
  - Serve long, out-of-the-way trips
  - Use in subsidy programs—limit financial exposure
  - Provide will call service to maintain system productivity
  - Use to introduce new or under performing service
  - Cover peak supply service to create straight shifts for operators
- Cons of NDSPs:
  - Subject to fleet supply sufficiency and coverage
  - Administration/ oversite required to ensure quality, prevent fraud, manage demand
  - Lack of accessible vehicles

Service Days and Hours Policies

- Policies that lead to serving low-demand service days and hours require more budget and can have an adverse impact on systemwide dedicated fleet productivity and cost per trip
  - Some transit agencies rely on NDSPs for these areas and times
  - Transit agency then pays only for trips served and not for extra slack time on dedicated vehicles
- Can start service on new days or at new hours with NDSPs or a mix of dedicated and non-dedicated

Inter-Carrier Transfer Policies

- Can increase productivity if timed connections are consistent and reliable
- Unreliable connections play havoc with schedules and productivity of dedicated-vehicle services
- Two common transfer policies

"Drop and Go" Policy	Driver-to-Driver Handoff Policy
• Usually limited to transfer points • Goal of not delaying first vehicle (i.e., not decreasing productivity)	• Avoids duplicate service (decreased productivity) by requiring first vehicle to wait for arrival of second vehicle

- "No strand" policy means that rider making a transfer is not stranded is 2nd vehicle is late/no show. In a drop-and-go
  - First vehicle would go back and pick up rider or
  - NDSP would be dispatched (duplicate service)

Driver Assistance Policies

- Curb-to-curb service: Operator assists rider in getting into and out of vehicle
- Door-to-door service
  - Operator assists rider in getting to/from the vehicle
  - Usually limited by number of steps, remaining in sight of vehicle, and not entering buildings
- Studies inconclusive on which approach is more productive
  - Curb-to-curb vs. door-to-door is not proven more productive and most likely a wash in time difference
  - But rider is not always waiting at the curb when vehicle arrives
  - Door-to-door theoretically helps passengers get to/from vehicle faster

Stop Type Policies

Requested Pick-Up Stop	Virtual Stop	Physical Stand
• Vehicle routed directly to rider's location (akin to traditional DRT) • Provides customers with increased convenience • Tends to decrease productivity because it is not conducive to shared rides	• Customer required to travel to/from a dynamically created pickup point (virtual stop) based on their location and the vehicle's location • Tends to increase productivity because riders are grouped to streamline routing and maximize efficiency • Usually located at an intersection within a specified distance of rider's requested pick-up and drop-off	• Located at scheduled anchor point or other designated place as a permanent stop • Can increase ridership through walk-on trips and perceptions of available travel connections to key attractors • Can also enhance the safety of the rider in difficult-to-serve areas • Can reduce no-shows and increase productivity because they facilitate grouping of riders

Policy Follow-Through

- Having a policy is only the first step
- Policies must be continually
  - Enforced
  - Evaluated
  - Updated

Exercise C-1: Small Group Breakout – DRT Policies

- Form small groups
- Select 2 or 3 DRT policies (see box) & answer these questions overall: (20 minutes)
  - What policy area has the biggest positive impact on cost management? Biggest negative impact?
  - What policy area is the most difficult to implement / adhere to?
  - What changes would you group members like to see in their own policies to help with cost management?
- Report out (10 minutes)

Policy Areas

- Fares
- Sponsored service rates (coordinated transportation)
- Advanced reservation/same day reservation
- Will call
- No shows/late cancellations
- Transfers

Break

Efficient Run Structures, Scheduling, and Dispatching

Efficient Run Structures (Dedicated Service)

- Run structure: how many runs are in service at any period of time during the service day
- Usually defined in one-hour or half-hour increments
- Flat run structures may have undersupply of service during peaks and oversupply of service during off peak periods
- Should build a run structure that mirrors demand profile
  - Typically has two peaks
  - Could convert straight shifts to split shifts (which has pros and cons)
- Could also supplement peak service with NDSPs

Efficient Scheduling

- DRT scheduling can be labor-intensive and challenging
- Most services today use computerized scheduling systems
  - Real-time scheduling
  - Batch optimization
  - Or both
- Approaches vary in labor-intensiveness and quality of scheduling solutions
  - Can affect scheduler workload
  - Can affect staffing levels

Efficient Scheduling (*Continued*)

- Some transit agencies erroneously do not tune scheduling software to their service area, policies, or desired balance between service quality and efficiency
  - Productivity and on-time performance of dedicated-vehicle DRT service tend to have an inverse relationship
  - Impactful parameters include defined load/unload time and maximum on-board time
  - Scheduling solution can be scored based on minimizing total hours/ miles traveled, minimizing deadhead hours/ miles traveled, etc.
  - Can prioritize and weight various factors
- Tuning software appropriately in scheduling system can be iterative and time-consuming—an art
- Software *only knows what you tell it*! (Make sure data feeds, maps, etc. are up-to-date)

Efficient Dispatching

- Except with on-demand services, dispatching takes over after the schedule is complete
- DRT dispatching typically involves several functions

Monitoring the dispatch screen	Re-assigning trips as needed	Communi-cating changes to operators	Processing no-show requests	Assigning re-emerging no-shows to runs	Responding to operators requests for help	Monitoring "performed" arrivals and departures	Responding to service-day calls

- Dispatching module of DRT scheduling/dispatching systems usually supports most functions

Efficient Dispatching (*Continued*)

- Proactive dispatching: Process of looking ahead in the day's schedule to take advantage of opportunities and to identify and solve problems before they materialize in real-time
- Often overlooked or not prioritized but can have a profound impact on productivity
- Many transit agencies designate a dispatcher to be the proactive dispatcher
  - Proactive dispatching requires dedicated attention and focus
  - Some scheduling/dispatching systems can assist/automate

Vehicle and Facility Strategies

Remote Vehicle Storage and Fueling Strategies

- Many agencies serving large areas station vehicles at satellite parking or operators' homes
  - Minimizes nonproductive and deadhead time, and can significantly reduce fuel costs, labor costs, and vehicle wear and tear
  - Might also be more convenient for operators and ability to recruit
  - Written policies and protocols for vehicle remote storage is a good practice
  - Cons: loss of in-person contact with operators; potential liability issues, and maintenance may not have ready access
- How vehicles are fueled is central to the strategy
  - Works well if vehicles are fueled at gas stations with fuel cards
  - Not so well if vehicles are fueled at a central facility (unless vehicles travel there while delivering service)

Using NDSPs to Augment Dedicated Fleet

- Can serve peak overflow at reduced cost
- Can serve lower-demand areas or lower-demand times more cost-effectively
- Can serve will-call return trips, re-emerging no-show trips, long-distance single trips, interrupted trips, or any other trip that would adversely impact productivity of dedicated fleet
- Service mix: the split between trips scheduled on dedicated vehicles and trips assigned to NDSPs; 95%/5% to 85%/15% is typical

The transit agency must be strategic in the types of trips that are assigned to NDSPs.

Diversifying the DRT Fleet

- Uniform fleets
  - Provide flexibility to schedulers and dispatchers
  - Minimize breadth and expense of parts inventory
  - Uniform accessible fleet can be beneficial with NDSPs strategically used for overflow
- Diverse fleets (i.e., adding smaller vehicles)
  - Reduced capital cost
  - Reduced operating cost
  - Opportunity to hire non-CDL operators (which might reduce labor costs and improve recruiting)
- Must consider percent of trips requiring a wheelchair-accessible vehicle as well as supply chain issues

Prize Questions

- Name the four DRT call and control center functions.
- Describe the cost-management benefits of customer-facing apps and/or automated booking systems.
- Name and describe at least two DRT service policies, including how they influence cost management.
- Describe proactive dispatching.
- What value does scheduling software add to DRT scheduling and *what's important to do when using scheduling software?*

Chapter Summary

- Key takeaways
  - Revisit and modify policies that adversely impact the balance between service/cost efficiency and service quality
  - Serving/adding sponsored trips may improve productivity and decrease cost per trip
  - An alternative to serving sponsored trips on same service platform is providing vehicles to human service agencies
  - Matching supply of service to demand profiles will result in improved service/cost efficiency
  - Using paratransit scheduling/dispatching software to full capabilities can improve service/cost efficiency if:
    - Scheduling parameters are properly tuned
    - Scheduling and dispatching staff are adequately trained and motivated
    - Software data feeds and base maps are accurate

Chapter Summary (*Continued*)

- Proactive dispatching results in higher productivity and quality of service
- Remote vehicle parking and fuel cards can reduce deadheading and driver pay hours
- Using NDSPs for overflow and other trips may help improve service/cost efficiency by lowering overall cost/trip
- Altering fleet configuration to include smaller vehicles can reduce capital and operational costs

- Additional information, resources, and references provided in Chapter 9 in the Guidebook

Chapter 10: Specific Strategies for ADA Paratransit

Learning Objectives

- Describe how ADA service policies, service area and hours, fares, and eligibility criteria influence cost management
- Explain considerations related to setting ADA paratransit fares
- List strategies to help encourage ADA paratransit customers to use fixed-/flexible-route services
- Define alternative services and their potential role in ADA paratransit cost management

Topics

- General service requirements and policy choices
- Conditional eligibility
- Encouraging use of fixed-route service
- Providing alternative services
- Opt-In Agreements

Policies Dictated by FTA/ADA Requirements

Transit agencies must provide ADA paratransit service where and when local fixed route bus (or rail) is provided.	The minimum ADA paratransit service area is ¾-mile route corridors as well as small areas surrounded by the corridors. Origin to destination service must be provided.	Customers must be allowed to book a trip on the day before the trip during normal business hours.	ADA paratransit fares cannot exceed twice the fare of the local bus route that would be used to make the same trip at that same time.	Trips cannot be prioritized or restricted based on trip purpose.
The number of trips made by an individual cannot be limited; nor can there be a waiting list.	A transit agency may conduct trip negotiations for ADA paratransit trips but only within one hour of the requested pick-up time and within reason.	There cannot be an operational pattern or practice that significantly limits the availability of service to an eligible customer	All drivers must be trained to proficiency and must be drug and alcohol tested.	Transit agencies must provide solutions for reasonable accommodations.

Policy Choices

- Providing premium service (e.g., extended service hours at a higher fare)
- Curb-to-curb vs. door-to-door level of driver assistance
- Subscription trip policies
- Alternative processes for requesting trips
- Charging fares for companions (not personal care attendants)
- Paratransit-to-paratransit transfers
- Paratransit-to-fixed-route transfers

Managing Demand through Conditional Eligibility

- An eligibility process that involves in-person interviews and functional assessments can help identify applicants who are truly eligible for ADA paratransit services
  - 100% paper processes tend to be more lenient and inaccurate
  - In-person assessments also better indicator of persons who are conditionally eligible for ADA paratransit services
- Conditionally eligible = eligible for certain trips or under certain conditions
- Reservation agents need to be able to readily identify which trips are eligible and which trips are not
- Eligibility of specific trips needs to be ruled on in advance

Encouraging Use of Fixed-Route Service

- Goal: Divert trips from an expensive service to one where serving that trip yields no additional cost
- Potential strategies (from TCRP Report 163)
  - Improve bus stop and pedestrian facility accessibility
  - Marketing and public information
  - Trip planning and travel training
  - Fare incentives (e.g., discounted or free fares on fixed route for conditionally-eligible ADA paratransit customers)
  - Alternative service designs (e.g., flexible-route, paratransit-to-fixed-route feeder service, etc.)
  - Robust eligibility program/conditional eligibility
- Note: if offering fare incentives on fixed route, agency must have strong ADA eligibility determination/certification program to prevent abuse

Providing Alternative Services

- Alternative service = an on-demand or same-day transportation option subsidized and offered to ADA paratransit riders
  - An alternative to next-day service ADA paratransit
  - Typically uses taxis or TNCs under contract
  - Sponsoring agency subsidizes costs (provider-side or user-side)
  - Must provide equivalent service for ADA compliance
- Same-day service provides ADA paratransit customers greater travel flexibility
- Can reduce overall paratransit costs; trip limits might be needed

Opt-In Agreements

- Customer opt-in program: Customers agree to allow transit agency to assign an ADA paratransit trip request to service provider with drivers who are not ADA–paratransit certified
- Uses operators who do not have same training and drug/alcohol testing standards
- Goal: Expand the supply of lower-cost overflow providers
- ADA paratransit trip request converted to non-ADA paratransit trip request

Prize Questions

- Name at least 2 strategies to help encourage people with disabilities to use of fixed-route service.
- What is an “alternative service?”
- What is conditional eligibility?

Chapter Summary

- Key takeaways
  - Conditional eligibility works if operationalized
  - Free fixed-route service may provide greater mobility options for ADA paratransit customers
  - Alternative services may reduce costs and increase ADA paratransit customer mobility
  - Opt-in programs can help improve supply of NDSPs
- Additional information, resources, and references provided in Chapter 10 in the Guidebook
- Questions and discussion?

Chapter 11: Contracting Out Demand Response Service

Learning Objectives

- Describe different options for outsourcing DRT service, including pros and cons
- List key considerations when outsourcing DRT service
- Explain strategies and procedures for contractor management and oversight

Topics

- Options for outsourcing
- Procuring DRT service

Options for Outsourcing

- Turnkey contract
- Turnkey contract with overflow providers
- Turnkey contract with agency assets
- Operations contracts with the transit agency or a third party performing the call and control functions
- Operations contracts that include some call and control center functions
- Brokerage and call and control center contracts

These options are described in more detail in Chapter 11 in the Guidebook.

Procuring DRT Service

- The four most important elements of procuring a DRT contractor are defining/providing in the request for proposals (RFP):
    1. A detailed description of the service, historical service data, and contractual responsibilities
    2. The contract term and schedule for implementation
    3. How the contractor is paid
    4. Service standards tied to balance of service/cost efficiency and service quality, matched with performance-based incentives, penalties, and liquidated damages

Procuring DRT Service

Element	Selected Guidance
1. A detailed description of the service, historical service data, and contractual responsibilities	Give proposers an accurate picture of functional responsibilities in consideration of the size of the service. The more comprehensive the description, the less risk a proposer will face. Generally, contractors will build in a risk factor to their rates to compensate for the unknown. The more they know, the less risk, and the more accurate (and lower) their proposed rates.
2. The contract term and schedule for implementation	Be clear about the contract term. There are three contract phases: implementation, service delivery, and transition to a new contractor. Generally, an implementation period should be no less than 6 months to ensure that a new contractor has sufficient time to get ready.

Continued on next slide

See Chapter 11 in the Guidebook for more information about procuring a DRT contractor.

Procuring DRT Service (*Continued*)

Element	Selected Guidance
3. How the contractor is paid	The two most prominent payment structures for dedicated DRT service are rates per revenue vehicle hour and rates per passenger trip. A common variation is to use those rates to cover a contractor's variable costs and also include a monthly rate to cover a contractor's fixed rates. In this way, a contractor is assured that its fixed costs will be covered, regardless of the fluctuations in service (i.e., contractor risk is reduced). Payment type can have a profound impact on the proposed rate as well as contractor behavior; up to 70% of DRT cost structure is tied to driver wages and fringe benefits, which are based on hours.
4. Service standards tied to balance of service/cost efficiency and service quality, matched with performance-based incentives, penalties, and liquidated damages	Productivity has long been a metric by which the efficiency of DRT service has been measured; percent of shared rides and cost per passenger trip are alternative metrics. The transit agency should clearly state how its efficiency metric(s) is to be measured and reported. Further, the transit agency should clearly state the standard that the agency expects to be achieved. The standard should be accompanied by incentives and/or penalties tied to that standard. Ensure balance between cost-efficiency/productivity metrics and on-time performance standards.

Chapter Summary

- Key takeaways
  - A comprehensive RFP for a DRT contractor can reduce risks
  - Recognize that transition activities have additional costs
  - Consider a longer contract term to reduce cost
  - Contract payment structures should match responsibilities; match the payment structure to the type of service and contractor's responsibilities
  - Include incentives and/or penalties for cost efficiency and on-time performance
- Additional information, resources, and references provided in Chapter 11 in the Guidebook
- Questions and discussion?

Exercise C-2: Small Group Breakout – DRT Strategies

- Form small groups
- Each group select one Chapter from Module C (Strategies for DRT)
  - Chapter 8: Call and Control Center Labor
  - Chapter 9: Demand Response Service Costs
  - Chapter 10: ADA Paratransit
  - Chapter 11: Outsourcing Demand Response
- For your chapter, answer the following: (10 minutes)
  - What is the <u>most important</u> take away (in your opinion)?
  - What strategy(ies) or takeaways would you like to apply or implement?
  - What's one thing you'd like to know more about?
- Report out (5 minutes)

Module C Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module C

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.

Select all that apply for questions with a square: ☐.

C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

End of Day 2

- Any remaining questions or comments?
- Stand and deliver

Day 3

Texas Department of Transportation

Managing System Costs:

Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems

Today's Agenda

- See schedule handout

Module/Content	Start Time	End Time	Duration
Day 3 Introduction	9:00 AM	9:15 AM	0:15
Module D: Managing Fixed- and Flexible-Route Costs	9:15 AM	12:00 PM	2:45
Lunch	12:00 PM	1:00 PM	1:00
Module E: Managing Capital Costs	1:00 PM	3:25 PM	2:25
Module F: Looking Ahead	3:25 PM	3:40 PM	0:15
Workshop Closeout	3:40 PM	4:00 PM	0:20

Review – Prize Questions!

- Name one cost-related performance measure and describe what it tells you.
- Name two strategies to help retain operators.
- Why is it important to balance mileage across your fleet?
- Name one or more considerations when outsourcing maintenance.
- Name at least one DRT policy decision and its implications on cost management.

MODULE D:
Managing Fixed- and Flexible-Route Costs

Module Overview

- **One-sentence summary**
  Specific strategies for managing costs of fixed- and flexible-route service
- **Chapters**
  - 12: Cost-Effective Route Planning, Scheduling, and Operations
  - 13: Contracting Out Fixed- and Flexible-Route Service

Chapter 12: Cost-Effective Route Planning, Scheduling, and Operations

Learning Objectives

- Describe how service policies can impact fixed- and flexible-route productivity and cost effectiveness
- Explain cost-efficient approaches when planning, scheduling, and operating fixed and flexible routes
- Describe how to evaluate route performance

Topics

- Service policy impacts on cost management
- Planning and scheduling routes
- Operating routes
- Reviewing route performance

Service Policy Impacts on Cost Management

Types of Flexible-Route Transit

Route deviation	Can work well where deviations are a small part of overall trip demand, most riders do not have time-sensitive trips, and there are defined origins and destinations
Point deviation	Can allow driver more routing options for maintaining the schedule
Request stops	Falls between fixed-route bus transit and route deviation
Flexible route segments	Hybrid of fixed-route bus transit and flexible-route bus transit

Types of Fixed-Route Bus Transit

- Local
- Feeder
- Circulator
- Express
- Park-and-ride (P&R)
- Bus rapid transit (BRT)

Service Policy Impacts on Cost Management

- Service policies help determine:
  - Where to provide service
  - How much service to provide
  - How to integrate routes to make a network
  - Where to place bus stops and provide amenities
  - How to respond to service requests
  - How to evaluate route performance
  - What corrective actions to take
- Can be used to decide where service can be added, improved, reduced, or eliminated
- Can inform capital investment decisions

Transit agencies should have documented service policies.

Service Standards and Service Changes

- If service standards have been established, service policies can guide transit agencies toward implementing/maintaining service only in locations where service is cost-effective
- Service standards help make the case
- Service standards provide objectivity and transparency

Example: If an existing fixed route is carrying 2.0 passengers per revenue hour on average (a low level of productivity), it might be more cost-effective for the agency to discontinue the route and serve the passengers with DRT instead.

One service standard might not be enough to inform service change decisions.

Performance Measurement

- If the right key performance metrics are being tracked—and tracked accurately—the agency will be collecting data that can be used to help identify opportunities to streamline fixed- and flexible-route operations
- Agency might track productivity, cost-effectiveness, on-time performance, and passenger load metrics
- Regularly looking for patterns in performance data provides chances to meaningfully improve service delivery and better manage operating costs

See Chapter 3 in the Guidebook for more information.

"Core" Transit Performance Measures

Performance Measure	Category
Annual boardings per capita	Mobility
Revenue miles between service disruptions	Service Reliability
Average fleet age	Passenger Comfort, Service Reliability
Average vehicle miles per gallon	Fuel Economy
Boardings per revenue hour	Productivity
Farebox recovery ratio	Cost-Effectiveness
Operating cost per revenue hour	Efficiency
Percent of bus stops accessible	Accessibility
On-time performance	Reliability
Revenue miles per revenue hour	Average Speed
CO_2 emissions per mile	Environment
Crashes per thousand miles of revenue service	Safety

Source: *Oregon DOT Transit Development Plan Guidebook*

Tool #9: Fixed- and Flexible-Route Service Policy Template

- Word document that can serve as a template for a service policies document for fixed- and flexible-route service
- Based on existing service policy documents from multiple Texas transit districts
- Available for download from Toolkit

Planning and Scheduling Routes

Planning Fixed and Flexible Routes

- Generally:
  - Route planning decisions should be made to balance available resources, service policies, and community needs
  - Operating costs are lower when routes are more productive
- Chapter 12 in the Guidebook provides fixed-route service planning rules of thumb as a starting point
- Transit planning software
  - Can help with the planning process
  - Helps agencies iterate through multiple scenarios to try to identify optimal service plan
  - Can provide rapid demographic analysis (e.g., people served and their characteristics, jobs served, etc.)

Planning Fixed and Flexible Routes (*Continued*)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Understanding the market	If a route does not meet users' needs, they will not use it, and the route will not be productive.
Understanding resources available	It is important to have a thorough understanding what resources (e.g., funding, staff, and vehicles) are available to provide the service and under what conditions.
Understanding the street network	It is important to consider street network characteristics. A street network with lower connectivity is one in which travel times are likely to be longer.
Optimizing vehicle usage	Transit agencies can minimize non-productive time (e.g., layovers) by adjusting headways and/or routing.
Matching vehicles to demand	A smaller vehicle might be more cost-effective on a route where ridership is low, if the smaller vehicle is cheaper to operate and maintain than a larger bus.
Keeping routes as direct as possible	Minimizing out-of-direction travel reduces travel time and travel distance.

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Planning Fixed and Flexible Routes (*Continued*)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Using timed transfers	In low-demand areas, planning for timed transfers at key hubs can be more cost-effective than increasing route frequencies.
Optimizing bus stop spacing	Longer distances between stops can help speed up service and reduce operational and capital costs associated with installing and maintaining bus stops and/or shelters.
Using flexible-route service – route deviation	A fixed route could be transitioned to a flexible route by adding a route deviation component to the service. The primary advantages of this are (a) meeting ADA requirements without implementing a separate ADA paratransit service and (b) increasing service coverage. There are also disadvantages to weigh.
Using flexible-route service – point deviation	A fixed route could be transitioned to a flexible route by transforming it into a point deviation route. The primary advantages of this are (a) having no ADA requirements to meet and (b) increasing service coverage. There are also disadvantages to weigh.
Managing deviations	For flexible-route service, each deviation off the “base” alignment of the route adds travel time and cost.

Continued on next slide

Planning Fixed and Flexible Routes (*Continued*)

Service Planning Strategies That Can Positively Impact Costs

Strategy	Notes
Using fixed-schedule service	A fixed-schedule route is a route that operates in different parts of the service area on different days. Serving users in one part of the service area only on, say, Mondays and Thursdays, might be enough to satisfy those users' transportation needs at lower cost to the agency.
Using service routes	A service route is one that is designed to connect a particular user group to a specific set of destinations on specific days (e.g., a "shopper shuttle"). Service routes might meet users' needs at lower cost to the agency as well as attract sponsorship from the destinations.
Diligently adhering to service standards	Service standards provide an objective and defensible starting point for allocating resources to routes.
Reviewing route performance regularly	Reviewing route performance on at least a quarterly basis can identify opportunities for productivity improvements and cost savings.

Scheduling Fixed and Flexible Routes

- Scheduling fixed and flexible routes: the process of determining how routes will be operated and assigning vehicles and operators to routes
- Four steps
  1. Trip building
  2. Blocking
  3. Run cutting
  4. Rostering

  Outcome: a scheduling solution
- In an optimal scheduling solution, the most of every operator's paid time is used to provide revenue service

Software systems are available to automate various scheduling steps and allow for finding multiple scheduling solutions.

Scheduling Fixed and Flexible Routes (*Continued*)

Scheduling Strategies That Can Positively Impact Costs

In general, placing restrictions on the scheduling process leads to less efficient scheduling solutions.	Schedulers' familiarity with the service area is critical.
Matching operators with vehicles consistently and assigning them to routes they know can promote system efficiency through familiarity.	Schedulers should be well-trained, experienced, and detail-oriented.
It can be more difficult to build trips for complex routes.	Interlining can be used to eliminate route overlaps, reduce excessive recovery/layover time, and access better layover locations.
Providing significantly more recovery/layover time than needed (e.g., to ensure on-time performance) can result in inefficient use of operators and vehicles.	Flexible-route scheduling is less efficient if deviations are unpredictable in timing and/or duration.

Continued on next slide

Scheduling Fixed and Flexible Routes (*Continued*)

Scheduling Strategies That Can Positively Impact Costs

Agencies should have access to reliable travel time data for different times of day to inform trip building.	To optimize use of operators and vehicles, deadhead travel time and deadhead mileage should be minimized.
The more pull-outs and pull-ins there are at the yard, the more deadhead travel time and mileage are accrued. Where possible, driver relief should occur on the route, not at the yard.	Headway-based routes might not be as efficient as schedule-based services if the former requires vehicles to wait excessively at recovery/layover points to maintain the headway.
The more blocks there are, the more opportunities there are to optimize. However, more blocks typically means more deadhead and potentially more vehicles to operate.	Traditional rostering tends to produce more cost-effective schedules, and agencies have more control over overtime.
Balance scheduling operators for more overtime work with the risk of lower levels of performance and higher turnover.	Agencies can more effectively manage productivity and optimize costs by monitoring trends and patterns over time and adjusting staffing levels to meet targeted service goals.

Exercise D-1: Small Group Breakout – FRT Planning and Scheduling

- Form small groups
- Discuss the following questions (20 minutes)
  - Do you have service standards/guidelines/policies for your fixed- or flexible-route services?
    - If so, how do they help you cost management? How do they challenge cost management?
    - If not, why not?
  - Discuss the hard and soft rules used when creating fixed- or flexible-route schedules. Which help and which hinder cost management?
- Report out (10 minutes)


Break

Operating Routes

Operating Fixed and Flexible Routes

Optimal extra board size

- Extra board: the pool of operators who do not have assigned runs
- Sizing extra board correctly is a key to managing costs of operator labor
- Ideally should be sized to minimize the amount of overtime worked by regular operators
- Spreadsheet tool developed by Dallas Area Rapid Transit estimates operator staffing needs, including size of extra board

Operating Fixed and Flexible Routes (*Continued*)

Proactive dispatching techniques

- Dispatchers have to make sure operators and vehicles are available to provide service
- Being proactive in making decisions about covering operator absences can reduce operating costs
  - Affects how overtime is used
  - Affects how quickly a replacement operator can start providing service
- Proactivity requires well-trained, experienced dispatchers who have a strong knowledge of available resources (labor and vehicles)
- Ideally, operators are incentivized to communicate absences and late reports as far in advance as possible

Operating Fixed and Flexible Routes (*Continued*)

Proactive service oversight

- Creates opportunities to address delays and service issues as soon as they arise or as soon as they become likely to occur
- Can mean the difference between having to send out another revenue vehicle (which would increase operating costs) or not
- Can lessen adverse impacts of disrupted/delayed service on riders
- Street supervisors play an important role
- Robust communication systems and dispatcher and street supervisor training are essential
- Technology can facilitate real-time monitoring

Operating Fixed and Flexible Routes (*Continued*)

Monitoring delays

- Can occur as part of proactive service oversight
- Agencies should also review historical data about times, locations, extents, and causes of delay
- Goal: streamline service and make it more cost-effective

Reviewing Route Performance

Reviewing Route Performance

- Managing routes' fiscal performance (cost-efficiency and cost-effectiveness)
- Service policies are strategic starting point for selecting performance measures

Typical Cost-Efficiency Measures	Typical Cost-Effectiveness Measures
Cost per revenue hour Cost per revenue mile	Cost per passenger Cost per passenger-mile Farebox recovery ratio

- Productivity measures might also be useful
- See Chapter 3 in Guidebook for more information

Reviewing Route Performance (*Continued*)

- Collect passenger trips by route
- Collect revenue and total hours and miles by route
- Allocate costs to routes. Options include:
  - Allocate all costs based on revenue hours or revenue miles
  - Use a cost allocation model (recommended)
- Route-level performance measures can be used to inform decisions about route changes

Example Route Performance Report

Route	2022 Goal	2022 Actual	2023 Goal	2023 Actual
1	9.00%	21.30%	10.00%	20.66%
2*	**9.00%**	**8.81%**	**10.00%**	**9.07%**
3	9.00%	22.10%	10.00%	21.88%
10	9.00%	17.55%	10.00%	17.37%
11	9.00%	17.19%	10.00%	16.16%
12	9.00%	11.33%	10.00%	11.10%
20*	**9.00%**	**5.97%**	**10.00%**	**6.15%**
21	9.00%	19.38%	10.00%	19.77%
22	9.00%	22.28%	10.00%	24.39%
23	9.00%	18.47%	10.00%	17.73%
24	9.00%	21.78%	10.00%	22.22%
26	9.00%	22.38%	10.00%	21.48%
30	9.00%	15.34%	10.00%	15.49%
31	9.00%	23.43%	10.00%	23.66%
41	9.00%	26.45%	10.00%	23.71%
42	9.00%	21.77%	10.00%	22.21%
43	9.00%	18.97%	10.00%	18.21%
44	9.00%	10.45%	10.00%	10.66%
50*	**9.00%**	**7.56%**	**10.00%**	**7.33%**
52	9.00%	9.97%	10.00%	10.87%

- Route-level fare recovery ratios report
- Bold text and * denote routes that may be candidates for modification because they do not meet the goal in 2023

Open Discussion

- What are some activities you might do if you were presented with this information?

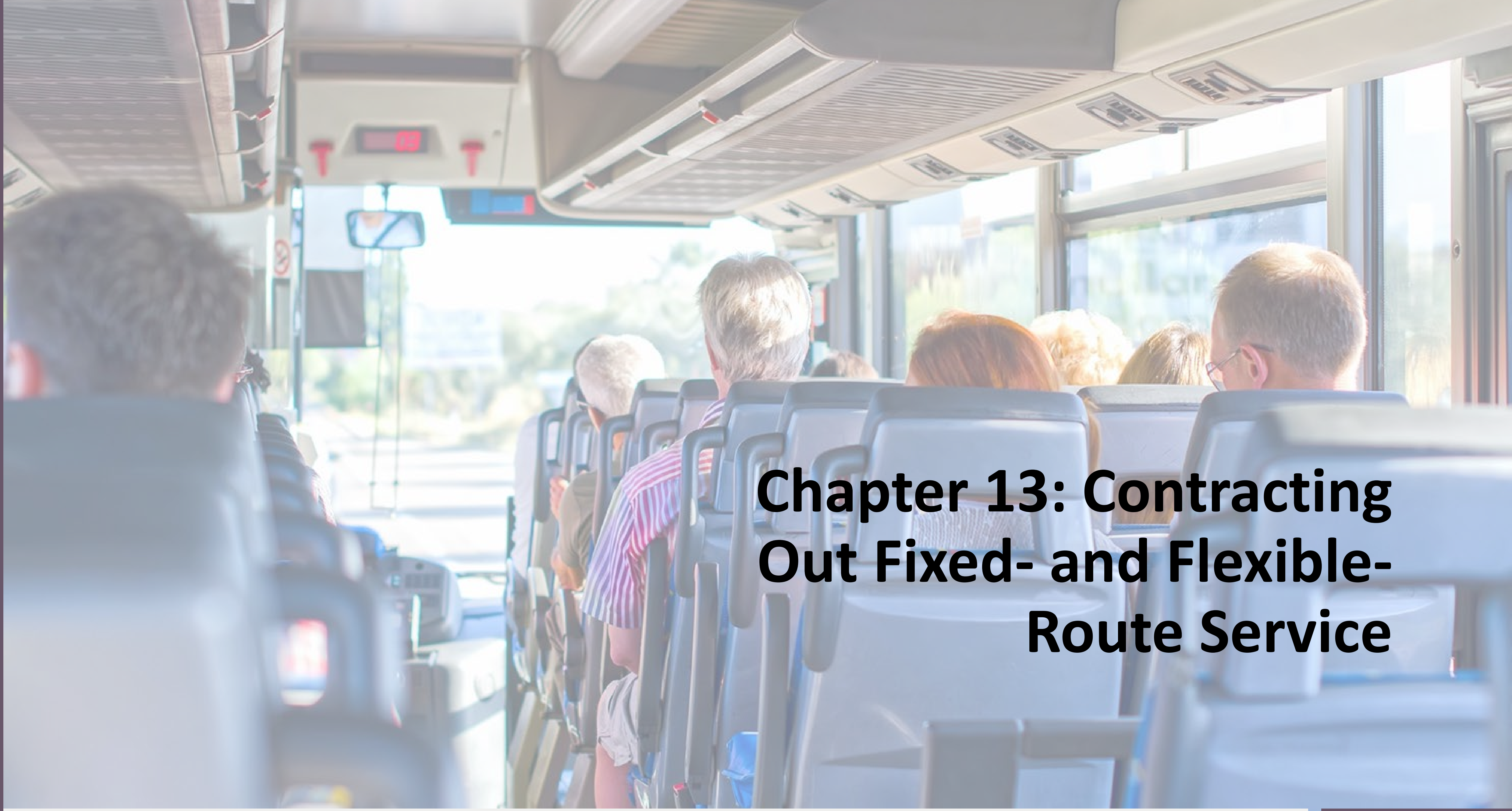
Route	2022 Goal	2022 Actual	2023 Goal	2023 Actual
1	9.00%	21.30%	10.00%	20.66%
2*	**9.00%**	**8.81%**	**10.00%**	**9.07%**
3	9.00%	22.10%	10.00%	21.88%
10	9.00%	17.55%	10.00%	17.37%
11	9.00%	17.19%	10.00%	16.16%
12	9.00%	11.33%	10.00%	11.10%
20*	**9.00%**	**5.97%**	**10.00%**	**6.15%**
21	9.00%	19.38%	10.00%	19.77%
22	9.00%	22.28%	10.00%	24.39%
23	9.00%	18.47%	10.00%	17.73%
24	9.00%	21.78%	10.00%	22.22%
26	9.00%	22.38%	10.00%	21.48%
30	9.00%	15.34%	10.00%	15.49%
31	9.00%	23.43%	10.00%	23.66%
41	9.00%	26.45%	10.00%	23.71%
42	9.00%	21.77%	10.00%	22.21%
43	9.00%	18.97%	10.00%	18.21%
44	9.00%	10.45%	10.00%	10.66%
50*	**9.00%**	**7.56%**	**10.00%**	**7.33%**
52	9.00%	9.97%	10.00%	10.87%

🛠 Tool #10: Route Performance Template

- Excel workbook to help calculate performance measures for fixed- and/or flexible-route service for ongoing performance monitoring
- Available for download from Toolkit

Chapter Summary

- Key takeaways
  - Service policies can achieve cost effective service goals
  - Tracking the right metrics can result in good cost management decisions
  - Route productivity can translate to cost effectiveness
  - Service policies and standards can impact schedule performance
  - Highly trained schedulers and dispatchers are critical
- Additional information, resources, and references provided in Chapter 12 in the Guidebook
- Questions and discussion?



Chapter 13: Contracting Out Fixed- and Flexible-Route Service

Learning Objectives

- Describe considerations and the options available in outsourcing fixed- and flexible-route service and those options' pros and cons.
- Describe important elements to include in the procurement of fixed- and flexible-route service.
- Explain cost and quality management considerations when procuring, managing, and overseeing outsourced fixed- or flexible-route services.

Topics

FRT = Fixed- or Flexible-Route Transit

- Models & Options for Outsourcing FRT
- Decision to Outsource FRT
- Procurement of FRT
- Management & Oversight of Outsourced FRT

Open Discussion: Outsourcing FRT

- If you currently outsource FRT:
  - Why do you outsource?
  - What have been the benefits?
  - What have been the challenges?
  - Have you ever thought about insourcing?
- If you currently operate FRT in-house:
  - Why do you insource?
  - What have been the benefits (vs. outsourcing)?
  - What have been the challenges?
  - Have you ever thought about outsourcing?

Models and Options for Outsourcing FRT

Models (Structure) for Outsourcing FRT

- Model used is based on transit agency needs and resources
- Models include:
  - **Management Contract**—contractor provides general manager (+ additional key staff). The transit agency retains capital asset ownership, operations, and maintenance.
  - **Turnkey Contract**—contractor provides management team, capital assets, operations, and maintenance.
  - **Function Contract**—contractor provides specific transit functions—such as operations only, vehicle maintenance only, or combination of functions.

In all cases, the transit agency continues responsibility for applying for and administering grants, establishing policies, and overseeing contract.

Options for Outsourcing

- No one-size-fits-all solution for outsourcing FRT
- Variety of contracting options:
  - Contracting for specific services or portions of service
    - For all routes or a subset or routes
    - By service type—e.g., peak service, park & ride, urban or rural
  - Contracting to different contractor types—another transit agency, a human services agency, a private for-profit company
  - Contracting to one or multiple contractors

Decision to Outsource FRT

Factors to Consider & Evaluate in Outsourcing FRT

- Specific service or function cost drivers and overall cost
- Availability of staff and the level of expertise
- State or local laws, union work-rules
- Larger planning strategies
- Control over operations, customer service, and training standards

Organization's mission, vision, and long-range plans should guide the decision-making process

Potential Benefits of Contracting Out

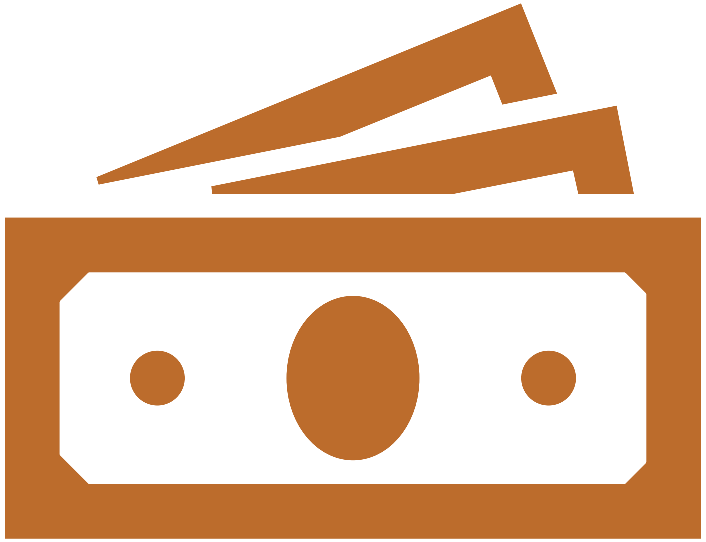
- Cost efficiency (more service at a lower cost),
- Elimination or reduction of pension and benefits costs,
- Increased flexibility to make changes to service and service levels,
- Overall contractor competency and excellence in delivering high-quality service,
- Access to a national reservoir of best practices, and
- Reduced need to be engaged in day-to-day operations and bus operator management.

Potential Challenges of Contracting Out

- Costs of service increasing over time,
- Operator shortages, especially recently,
- Billing disagreements,
- Turnover of key personnel (e.g., contractor management staff),
- Inadequate documentation of performance measures or NTD data,
- Quality training of contractors’ employees, and
- Quality of maintenance.

Other Possible Cons of Contracting

- Loss of control over operations
- Reduced quality of workforce
- Employee turnover of operators and mechanics/low wages
- Poor customer service
- Time and effort to ensure contractor performs up to expectations
- Less savings over time
- Local environment might not be competitive; therefore, low anticipation of cost savings and little reason for changing practices



Contracting to Reduce Costs

- Lower labor cost and/or less costly fringe benefits
- Less stringent work rules and schedule flexibility
- Less administrative staff and/or lower supervisor to staff ratios
- Specialized expertise may provide cost efficiency
- Maintenance expertise efficiencies
- Change flexibility (e.g., quicker procurement, new hires)

Costs That May Offset Savings

- Procurement cost to contract
- Contract oversight
- Performance monitoring
- Service coordination

Other considerations:

- Service quality
- Workforce motivation and morale
- Response to changing service demands or ability to add new services

Procurement of FRT

Before You Start on the RFP
To Do List before Development

DETERMINE CONTRACT TERM PERIOD

PROJECT SERVICE LEVELS OVER CONTRACT TERM (HOURS, MILES, VEHICLES)

FINALIZE PERFORMANCE MEASURE THRESHOLDS AND STANDARDS

DETERMINE TECHNOLOGY REQUIREMENTS

DETERMINE PAYMENT STRUCTURE

Scope Elements

Model/Options Are the Determining Factors of What to Include

- Background and purpose
- Overview of each service
- Service levels by year
- Technology/communication
  Key and general personnel
- Organization structure
- Training requirements
- Vehicle operator requirements
- Control center operations
- Window dispatch duties
- Road supervision duties
- Facility/equip. maintenance
- Vehicle requirements
- Vehicle maintenance
- Policies and procedures
- Fare collection requirements
- Safety/security requirements
- Data reporting requirements
- Complaint procedures
- Emergencies and disruptions
- Service quality/performance
- **Performance Incentives & Penalties**
- **Liquidated damages**
- NTD reporting
- Drug and alcohol policies
- Marketing and public relations
- Contractor oversight
- **Mobilization/transition**

Incentives & Penalties vs. Liquidated Damages

Incentives and penalties are tied to performance standards and can have a motivational force and are very common in transit service contracts. Common incentives/penalty performance metrics include:

- Schedule adherence (OTP)
- Missed trips or blocks
- Crash/accident rate
- Complaint rate
- Pull-out adherence

Liquidated damages (LDs) are a means to recover when certain contract requirements are not met. Common LDs include:

- Key staff vacancy
- Failure to report complete NTD
- Violation of DOT/FTA Drug and Alcohol policy program
- Vehicle maintenance compliance
- Customer complaint response

Example Incentive/ Penalty Matrices

On-Time Performance Range	Bonus	Assessment
88.0% or better	$7,500	
86.0% to 87.99%	$5,000	
85.0% to 85.99%	$2,500	
84.0% to 84.99%	-----	-----
81.0% to 83.99%		($7,500)
Less than 80.00%		($10,000)

Prev. Accidents per 100K Miles	Bonus	Assessment
0.90 or lower	$20,000	
0.91 – 1.10	$10,000	
1.11 – 1.20 (Neutral)	-----	-----
1.21 – 1.60	-----	($5,000)
1.61 or higher		($10,000)

Mobilization and Transition Five-to-Six-Month Period

The mobilization requirements may include:

- Recruit and hire employees.
- Provide start-up training
- Acquire and inspect new assets
- Stand-up the routes and runs to ensure design, tested, and training is working.
- Software setup and deployment (scheduling, dispatch, maintenance, payroll)

The transition requirements may include:

- Contractor's management to participate in weekly meetings
- Vehicle list and plan for vehicles inspection in time for training
- Facility inspection
- Driver training plan and evaluation—to include technology training specific needs
- Driver drug and alcohol testing plan
- Fueling schedule coordination plan
- Scheduling and dispatch training and evaluation
- Training plan for new mechanics and operations staff
- Reporting requirements to include data for start-up incentives (if desired) such as drivers hired by date, on-time pull-outs completed, on-time performance

Procurement Process Elements

Before Releasing the RFP

- Determine procurement evaluation team and technical experts
- Determine format, structure, and process for RFP response
- Plan the advertisement campaign and strategies for outreach to ensure participation
- Determine evaluation criteria
- Develop the pricing template structure
- Calculate independent cost estimates
- Develop pre-proposal presentation for potential proposers

During Response Period

- Hold pre-proposal conference
- Respond to proposer questions during question/answer period

After RFP Is Closed

- Analyze and compare price submittals
- Complete reference checks
- First round evaluation of team assessment and scoring
- Interviews and presentations of finalist
- Final evaluation and recommendation
- Develop presentation of final recommendation for Board or governing body for approval

Management and Oversight of Outsourced FRT

Inspect What You Expect

Activities to assess the quality of contracted services include:

- Periodic reports and meetings
- On-site inspections
- Performance metrics
- Real time monitoring

Strategies for management and oversight include:

- Consistent transit agency and contractor interaction and communication
- Adequate and dedicated staffing to the oversight activities with defined responsibilities
- Performance monitoring of measures and standards

Monitoring By Performance Measure

Performance Measure	Not Monitored	Daily/ Weekly	Monthly	Quarterly	Total That Monitors
Crash / Accident Rate*	0%	41%	50%	9%	100%
Schedule Adherence	3%	51%	40%	6%	97%
Missed Trips or Blocks	3%	63%	31%	3%	97%
Complaint Rate	6%	40%	51%	3%	94%
Passenger / Employee Injury Rate*	6%	29%	56%	9%	94%
Cost-Efficiency	11%	11%	63%	14%	89%
Complaint Response Time	14%	49%	31%	6%	86%
Cost-Effectiveness	14%	6%	60%	20%	86%
Service Effectiveness	14%	14%	51%	20%	86%
Pull-Out Adherence	17%	49%	26%	9%	83%
Customer Satisfaction	17%	34%	34%	14%	83%
First Time Point On-Time Performance	20%	43%	31%	6%	80%
Headway Adherence or Headway Reliability	23%	40%	31%	6%	77%
Overcrowding	31%	46%	23%	0%	69%
Operator Absenteeism / Call Outs	37%	37%	14%	11%	63%
Operator Overtime Usage	60%	11%	20%	9%	40%

Note: Percentages are rounded and may not add up.
*These measures had 34 respondents.

Chapter Summary

- Key takeaways
    - Consider multiple models and options prior to deciding on one approach
    - Guide the decision-making process with the transit agency's long-range plans and evaluate factors
    - Weigh benefits with tradeoffs and transaction costs in the decision to contract
    - The scope of work provides the opportunity to clarify expectations, rules, requirements, and agency goals
    - Take time to plan an effective procurement process
    - Requirement for communication is needed in performance management
- Additional information, resources, and references provided in Chapter 13 of the Guidebook
- Questions and discussion?

Prize Questions!

- Describe the role that service policies have in FRT cost management.
- FRT scheduling software – how does it help? What does it need to succeed?
- Name and define two performance measures for monitoring route performance.
- Name one daily operational strategy that helps with cost management. How does it help?
- What is the difference between a penalty and a liquidated damage in a contract for service?

Module D Evaluation

- Please fill out the Module Evaluation Form
- Write in the date and location
- Select Module D

Module Evaluation Form

Managing System Costs: Module Evaluation Form

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.

Select all that apply for questions with a square: ☐.

C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

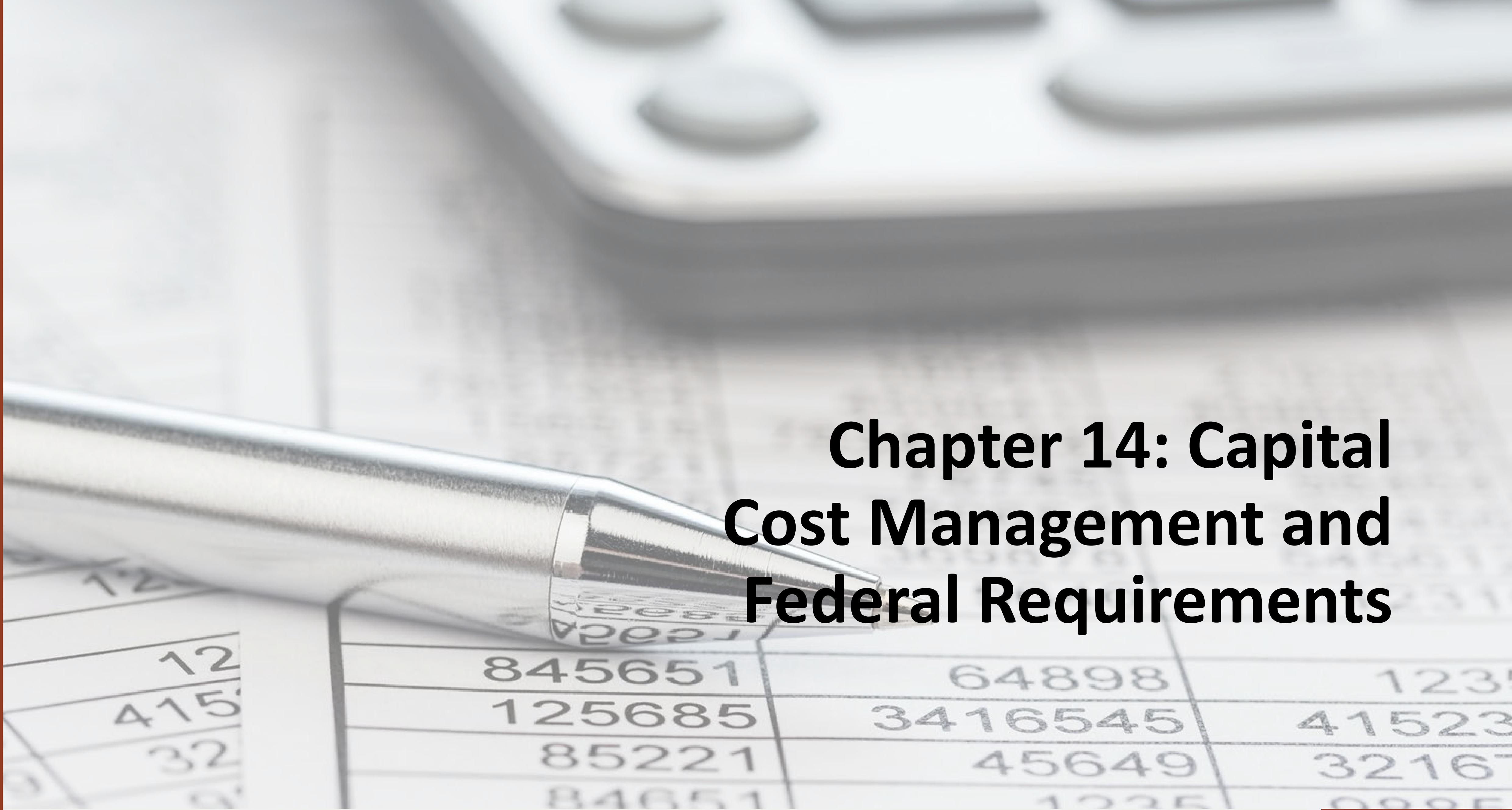
You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

Lunch

MODULE E: Managing Capital Costs

Module Overview

- **One-sentence summary**
  Strategies for managing capital costs
- **Chapters**
  - 14: Capital Cost Management and Federal Requirements
  - 15: Managing Vehicle Capital Costs
  - 16: Managing Technology Costs



Chapter 14: Capital Cost Management and Federal Requirements

Learning Objectives

- Describe categories of capital cost expenditures
- Identify major components of a capital improvement plan
- Discuss upper-level strategies for managing capital costs
- Discuss importance of transit asset management (TAM)
- Outline federal requirements under the TAM rule

Topics

- Overview of capital expenses
- Capital cost estimation and management
- Capital improvement plans
- Transit asset management

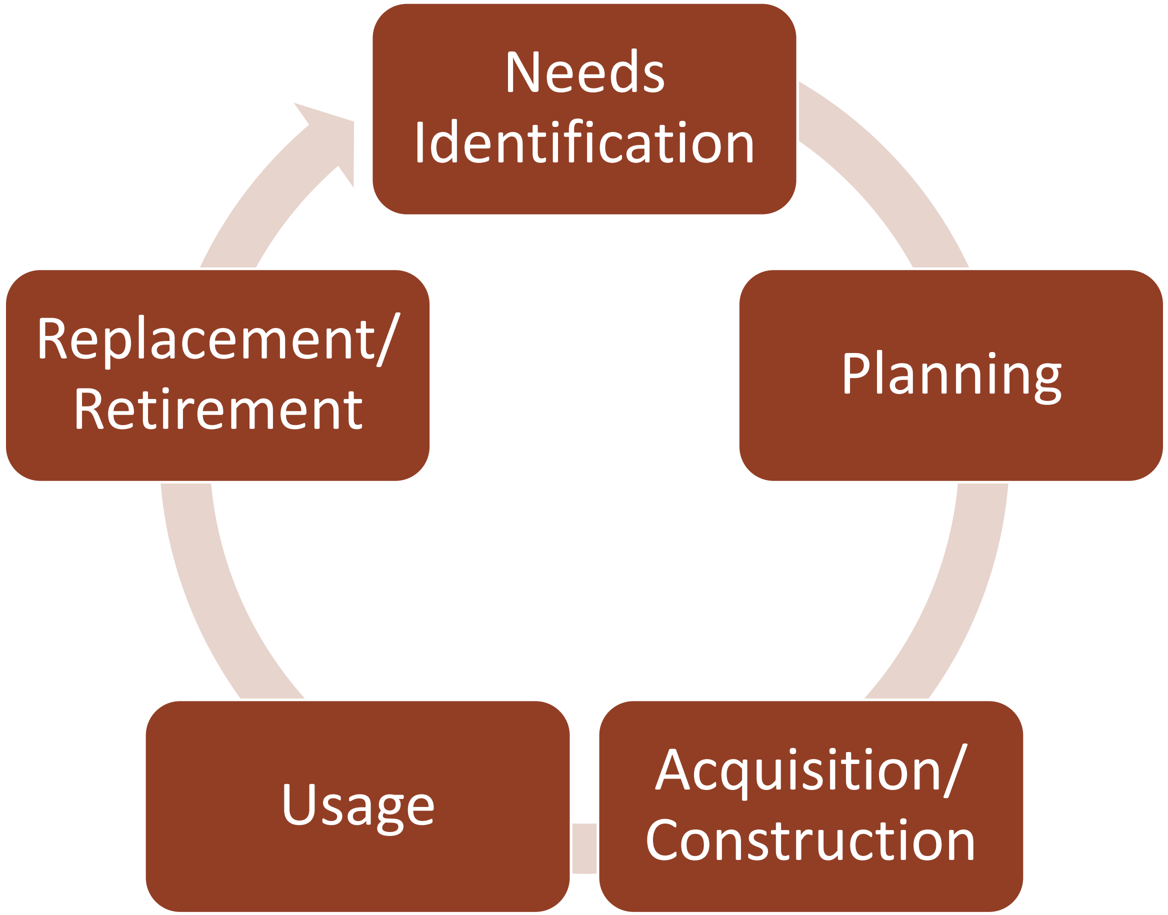
Overview of Capital Expenses

Capital Investments

- One of the cornerstones of enhancing and maintaining level of service of transit system
- Include a wide range of one-time expenditures on physical assets (office buildings, stations, terminals, equipment, vehicles, right-of-way, etc.)
- In FY2017-19, most significant capital cost driver for Texas rural and small urban transit systems was revenue vehicles (69% of capital costs across all three fiscal years)

Chapter 14 provides basic capital cost management strategies for all asset types. Chapter 15 focuses on revenue vehicles.

Capital Asset Life Cycle



Drivers of Capital Costs

- Important to understand what is included in capital cost
- Important to have agency-wide categorization schema
- USOA uses two categories
  - Rehabilitation, reconstruction, replacement, and improvement of existing service
  - Expansion of service
- USOA uses nine asset types (object classes)

Guideway	Passenger Stations	Admini-strative Buildings	Maintenance Buildings	Revenue Vehicles	Service Vehicles	Fare Collection Equipment	Commu-nication/ Information Systems	Other Capital Expenses

Capital Cost Estimation and Management

Cost Estimation and Decision-Making

- Estimating capital costs accurately is important and difficult
  - Avoiding budgetary problems
  - Maintaining public and stakeholder trust in the project
- Volatility of capital costs and project returns
  - Supply chain challenges
  - Evolving market conditions

Cost Estimation and Decision-Making (*Continued*)

- Evaluate capital costs with respect to procurement strategy, training/consulting costs, maintenance costs, investments in related infrastructure, useful service life, and end-of-life salvage value
- Select options with highest return on investment
  - Take into account time value of money
  - Consider interest rates on loans

Cost Pressures and Overruns

- Expect to encounter continuous pressures toward increasing cost of capital projects
- Cost overrun: increase in capital cost above initial estimate, resulting from factors unrelated to the economy
    - Usually result from poor cost estimation, expansions in project scope, and poor cost control
    - Extremely common in transit projects
- Cost escalation: unexpected increases in capital costs related to the economy
    - Beyond the agency's control
    - Major driver is above-average inflation
    - Conditions of high market demand or low supply in some cost categories

Avoiding Overruns

- Transparent, structured process for estimating capital costs can help prevent overruns
- Spend time and resources clearly defining project scope
- Obtaining as much capital cost detail as possible in early planning
- Cost estimate review by independent consultants
- Cost comparison with recently completed similar projects
- Peer review of cost estimates
- Identify capital cost risks and set aside contingency
- Consider historical price fluctuations, not just average inflation rates

Capital Improvement Plans

Creating a Capital Improvement Plan

- Capital improvement plan (CIP): primary instrument for planning, estimating, and controlling capital expenditures
- Two aspects
  - Analysis of each specific potential project
  - Project selection and development of 20-year capital plan
- Usually includes information about ongoing management of current capital assets and provides a combined overview of major funding sources and costs for all projects
- CIP is a compilation of selected project capital plans

Creating a Capital Improvement Plan (*Continued*)

- Project capital plan should describe, in detail:
  - Methods used to acquire or construct the asset
  - Estimated life-cycle costs
  - Timeline for acquisition
  - Funding sources

Level of detail to be refined as project moves into new phases

- Project capital plan needs a funding source analysis
  - Document funding commitments, including alternative funding when sources are variable or unreliable
  - Conducted separately from cost estimation

Transit Asset Management (TAM)

Transit Asset Management and Federal Requirements

- Final TAM rule published in 2016
- Applies to recipients of Chapter 53 funds that "either own, operate, or manage capital assets used in providing public transportation services"
- Compliance tasks depend on provider size and operation (Tier I or Tier II)
- Generally, all agencies develop a TAM plan and submit TAM reports to NTD
    - Some develop their own TAM plan
    - Some participate in a group TAM plan (under state DOT)

TAM Tiers

Tier 1	Tier 2
Operates rail **OR** 101 or more peak vehicles across all fixed-route modes **OR** 101 or more peak vehicles in one non-fixed-route mode	Subrecipient of 5311 funds **OR** American Indian Tribe **OR** 100 or fewer peak vehicles across all fixed-route modes **OR** 100 or fewer peak vehicles in one non-fixed-route mode

Transit Asset Management Plan

- Tier I plan
- Tier II plan
  - Inventory of capital assets
  - Asset condition assessment
  - Decision support tools
  - Investment prioritization
- Asset condition relies on FTA-defined performance measures in four asset categories:

The overall goal of a TAM plan is to identify capital asset maintenance or replacement needs, report performance targets, and create an investment schedule.

Rolling Stock	Equipment	Facilities	Infrastructure

Prize Questions

- What is a capital improvement plan?
- What is one strategy for helping reduce the likelihood of not underestimating the cost of a capital asset or project?
- How many tiers (system size categories) are there in the TAM rule? What defines a Tier 2 system?

Chapter Summary

- Key takeaways
  - Acquiring a capital asset comes with operational costs as well
  - Start the process of detailed cost estimation when planning a capital investment project; account for cost escalation and carefully avoid cost overruns
  - Implement performance-based TAM and integrate project plans into an agency 20-year plan
  - Transit agencies receiving Chapter 53 funding are required to comply with the TAM rule
- Additional information, resources, and references provided in Chapter 14 in the Guidebook
- Questions and discussion?

Chapter 15: Managing Vehicle Capital Costs

Learning Objectives

- Describe relevant federal TAM rules and requirements
- Explain Useful Life Benchmark (ULB), its relationship to TAM, and its relationship to minimum service life requirements under FTA grants
- Explain strategies for optimizing size of fleet and spare ratio
- Understand potential benefits of having a mixed fleet and using non-dedicated vehicles
- Recognize strategies and requirements for vehicle procurements

Topics

- TAM for vehicles
- Optimizing fleet size and mix
- Procuring vehicles

TAM for Vehicles

Transit Asset Management for Vehicles

- Federal regulations require revenue vehicles purchased with federal funds be maintained in State of Good Repair (SGR)
- Maintenance program must include:
  - Documented maintenance plans
  - Preventive maintenance inspections and services
  - Accessibility provisions
  - Management of maintenance resources
  - Warranty compliance and recovery
  - Standards for maintenance subcontractors

Effective maintenance procedures and practices are powerful tools for managing maintenance costs. Effective maintenance also helps with managing capital costs.

Transit Asset Management for Vehicles (*Continued*)

- Useful Life Benchmark (ULB): expected lifespan of a transit capital asset
  - Used to guide transit agencies in deciding when to replace/upgrade assets
  - Based on original design life, current technology, and historical data for similar assets
  - Not the same as the minimum service life requirement for retiring vehicles purchased with federal funds
- Useful performance measure: percentage of vehicles expected to be within ULBs in upcoming years

Transit Asset Management for Vehicles (*Continued*)

Minimum Service Life and ULB for Vehicle Types in TxDOT Group TAM Plan

Category	FTA Minimum Life	TxDOT ULB
Heavy-Duty Large Bus (35’ to 40’ and all articulated buses)	12 years or 500,000 miles	14 years or 600,000 miles
Heavy-Duty Small Bus (30’ to 35’)	10 years or 350,000 miles	12 years or 420,000 miles
Medium-Duty and Purpose-Built Bus (25’ to 35’)	7 years or 200,000 miles	9 years or 260,000 miles
Light-Duty Small Bus and Cutaways (20’ to 25’)	5 years or 150,000 miles	7 years or 210,000 miles
Light-Duty Van, Modified Van, Automobiles (16’ to 20’)	4 years or 100,000 miles	6 years or 150,000 miles

Transit Asset Management for Vehicles (*Continued*)

- Consistency in fleet replacement is a key cost management strategy
  - Avoid higher maintenance costs associated with older vehicles
  - Avoid large peaks and valleys in vehicle procurement needs
  - Avoid surges in staff training and maintenance needs
  - Spread out vehicle purchases to balance distribution of costs
  - Create continuity in level of service and quality of vehicles customers experience
  - Gradually introduce new technologies and vehicle forms and features to improve public perception of transit service

Optimizing Fleet Size and Mix

Optimizing Fleet Size

- Active vehicles
  - Intended for regular use in revenue service
  - Number dictated by scheduled service and passenger demand
- Contingency vehicles
  - Not intended for regular use in revenue service
  - Often older vehicles kept for emergencies or special events
- Number of spare vehicles in fleet is difference between total number in active fleet and number needed for peak service

Spare Ratio = (Total Active Fleet – Peak Vehicle Requirement) ÷ Peak Vehicle Requirement

Optimizing Fleet Size (*Continued*)

- Increase reliability by providing viable backup vehicles
- Smaller spare ratios generally better so long as maintenance and service needs can be met
  - Limits capital expenditures
  - Limits vehicle maintenance and storage needs
- FTA states transit agencies with 50+ fixed-route revenue vehicles should not exceed 20% spare ratio
- FTA has not set a threshold for smaller fleets beyond stating it must be "reasonable"
- Very little spare ratio guidance or guidelines otherwise
- Guidebook recommends 10-20% (higher for very small fleets)

Optimizing Fleet Size (*Continued*)

Discussion Question: What is your spare ratio? Is your spare ratio proactively managed/evaluated?

Factors Influencing Number of Spare Vehicles Needed

Operating environment	Annual bus mileage	Bus operating speeds	Ridership fluctuations	Planned service/route adjustments
Age of fleet	Peak-to-base ratio	Fleet mix of bus makes and models	Service modes	Road calls
Vehicles per mechanic	Alternative fuel buses	Management and finance	Bus purchase/ retirement schedule	Inventory management

Exercise E-1: Calculating Spare Ratios

Scenario	Total Active	Peak Vehicle Requirement	Number of Spares	Spare Ratio
Calculate Spares and Spare Ratio	5	3		
Calculate Total and Spare Ratio		20	5	
Calculate Spares and Spare Ratio	55	40		
Same agency as above, but determine how many spares and total vehicles needed to reduce to 20% spare ratio		40		20%
Calculate Spares and Spare Ratio	60	45		
Same agency as above, but determine new peak vehicle requirement to reduce to 20% spare ratio	60			20%

Optimizing Fleet Mix

- Fleet mix: the quantity of different vehicle sizes and body types in the fleet
  - Can also refer to vehicles using different energy sources
  - This chapter focuses on vehicle sizes and body types

Homogeneous Fleet Example

20 cut-aways

Mixed Fleet Example

20 cut-aways

10 minivans

5 sedans

Advantages of Mixed Fleets	Disadvantages of Mixed Fleets
Saving fuel and costs	More-complex maintenance
Flexibility to meet demand	Larger parts inventories
Less wasted capacity	Inconsistent branding

Optimizing Fleet Mix (*Continued*)

- Optimizing fleet mix means having the best number of each type of vehicle to meet service demands while minimizing capital and operating costs
  - Different vehicle types have different purchase and maintenance costs
  - Generally, smaller vehicles cost less and vehicles with fewer customizations cost less
  - Generally, heavy-duty vehicles have longer ULBs
- Selecting vehicle types for fixed-route service is often more straightforward than for DRT

Optimizing Fleet Mix (*Continued*)

- Considerations for optimizing fleet mix
  - Analyze current average peak productivity with respect to simultaneous passengers on board and check if smaller vehicles could accommodate it
  - Prepare hypothetical DRT schedules and see if trip demand from busier days can still be met
  - Smaller, lighter-duty vehicles may have more maintenance costs under heavy, continuous use
  - Change fleet mix slowly and learn as you go

Using Non-Dedicated Vehicles to Supplement a Dedicated Fleet

- Applicable to DRT
- Relying on NDSPs (taxi companies, TNCs, etc.) under contract
  - Provide additional capacity during peaks
  - Provide additional capacity at all times
  - Provide alternate service
- Limitations
  - Might be few NDSPs in rural areas, if any
  - NDSPs might have different service policies and procedures than transit agency
  - NDSPs might require guaranteed minimum number of trips

Procuring Vehicles

Fleet Procurement Strategies

- Revenue vehicles typically replaced using a mix of federal, state, and local funds
- Federal regulations and state policies and procedures apply
- TxDOT has a web site with requirements and resources
- Strategies for maximizing success of vehicle procurements
  - Participating in group procurements to reduce costs
  - Less customization of vehicles generally equates to lower cost
  - Have clearly defined specifications; know what you need and be as specific as possible
  - Have discussions with manufacturers to learn their pain points and cost drivers
- Investigate and evaluate cost-effectiveness of vehicle leasing

Fleet Replacement Challenges

- Post-COVID supply chain challenges causing long delays
- Lack of funding for capital may cause deferring replacements

Discussion: What have been some of your biggest challenges procuring/replacing vehicles? How have you overcome or mitigated those challenges?

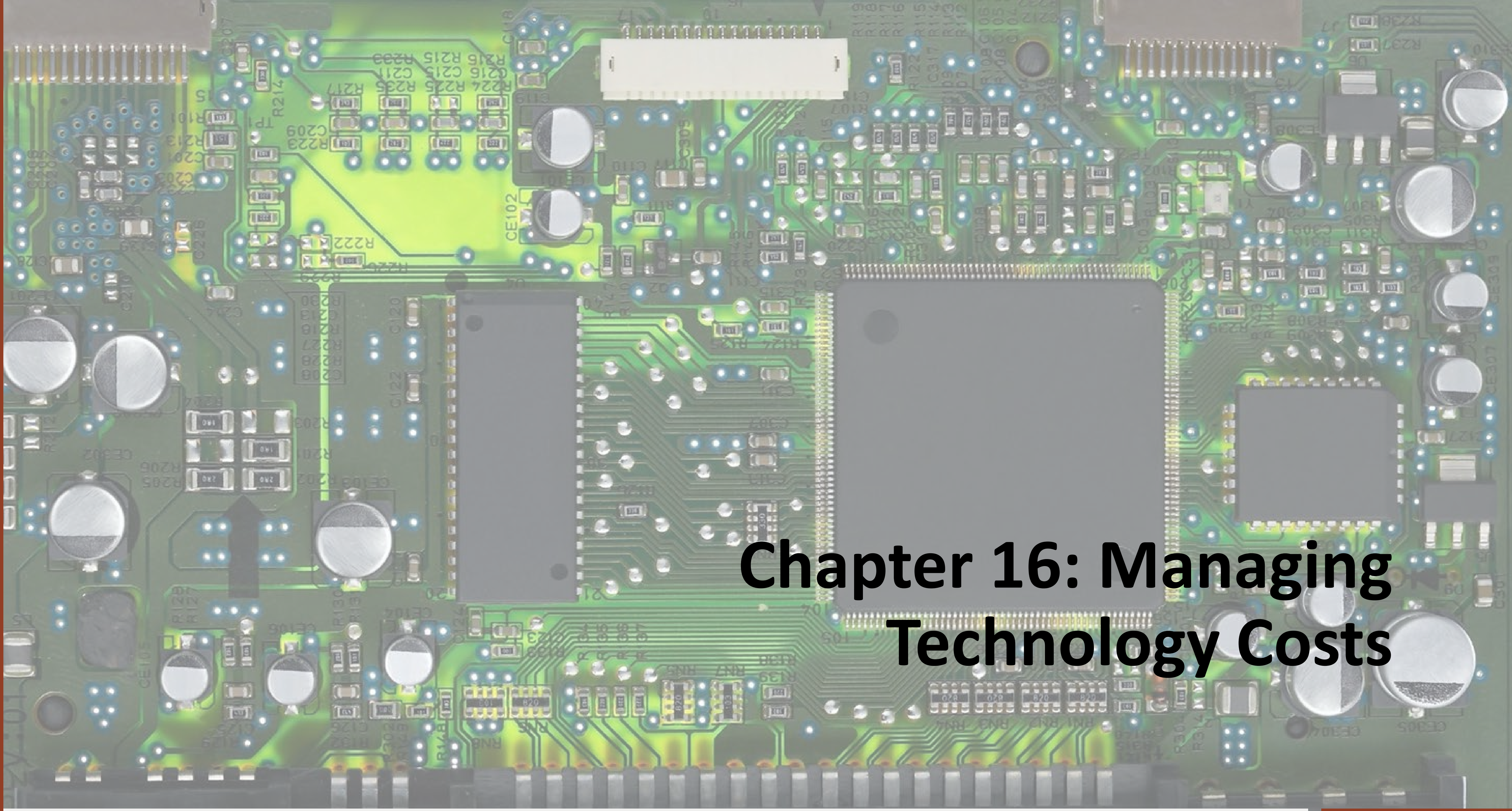
Exercise E-2: Small Group Breakout – Vehicle Management

- Form small groups
- Pick **one scenario**: You are a transit agency that:
  - Wants to see if it can save money by reducing its fleet size
  - Wants to see if it can save money by introducing a mix of vehicles
  - Wants to procure vehicles to replace its vehicles exceeding their ULB
- As a group discuss (20 minutes)
  - What steps would you take?
  - What are some important considerations to keep in mind during the process?
- Report out (10 minutes)

Chapter Summary

- Key takeaways
  - Key strategy for managing vehicle capital costs is maintenance
  - TAM rule requires that transit agencies have their own TAM plan or participate in a group plan
  - Consistent vehicle replacement helps avoid large peaks and valleys in vehicle-related capital expenses and increases in maintenance requirements
  - Optimizing number/type of vehicles is a capital cost management strategy
  - Control vehicle capital costs by having the optimal spare ratio
  - Use existing resources (e.g., group procurement contracts) to help maximize value of vehicle procurements
- Additional information, resources, and references provided in Chapter 15 in the Guidebook
- Questions and discussion?

Break



Chapter 16: Managing Technology Costs

Learning Objectives

- Describe importance of effective technology planning for managing technology costs
- Explain cost management considerations related to DRT scheduling and dispatch software, fixed-route scheduling and operations software, and fare collection
- List low-cost technologies available to support transit agencies

Topics

- Managing technology costs
- Software
- Fare collection

Managing Technology Costs

Managing Technology Costs

- Technology investments usually have costs of procurement, implementation, training, and replacement/upgrade
  - May also have costs of managing data security/privacy
  - Not all are capital costs
- Focus of Chapter 16 is non-energy technology costs

Non-Energy Transit Technologies

• Computer-aided scheduling and dispatch technology • Rider communication and information technology • Fare collection technology • Automatic vehicle location (AVL) • Maintenance and asset management technology	• Safety and security technology • Business administration technology • Mobility as a Service (MaaS) apps • Hardware and communication systems to support all listed technologies

Technology Planning and Management

- Leveraging technology to better manage costs requires preparation
  - Know what is available
  - Know how technology can help you
  - Know skill sets needed to deploy and maintain
  - Know how to adapt technology to your circumstances
  - Know what supporting infrastructure is needed

Technology Planning and Management (*Continued*)

- Strategies for acquiring, managing, and getting the most out of technology investments
  - Contract out service to a technology-capable contractor
  - Develop and use a technology plan
    - Better coordination of investments
    - More cost-effective and impactful investments
  - Phase implementation (for easier adaption to changes)
  - Use innovative procurement approaches (e.g., performance-based)
  - Maximize training opportunities (peers and vendor)
  - Work with vendor to configure technology to local needs/procedures
  - Work with partners to share costs, resources, and knowledge
  - Educate the public and partners about your technology investments

Software

- Demand Response Scheduling and Dispatching
- Fixed-Route Scheduling and Operations

Demand Response Scheduling and Dispatching Software

- Software for demand response scheduling and dispatch can
  - Improve service efficiency
  - Improve staff efficiency
  - Support real-time vehicle location and expected time of arrival (ETA) info
  - Generate real-time data
- Some scheduling and dispatch software also supports routing and operator scheduling
- Requires investment in hardware such as on-board tablets
- Can be difficult to justify expense if ridership is low
  - Software can be expensive to acquire and maintain
  - Significant training investment needed
  - Effort required to tune software and ensure input data accuracy

Fixed-Route Scheduling and Operations Software

- Software for fixed-route scheduling and operations can
  - Improve efficiency of vehicle and operator schedules
  - Facilitate quick changes to assignments
  - Develop more realistic/manageable schedules
  - Monitor service delivery and inform service adjustments
  - Provide real-time vehicle location and ETA information
  - Improve customer satisfaction
- Schedulers must be well-trained and input data must be accurate
- Operations supervisors must understand how the software works
- Can be difficult to justify expense if there are few routes and ridership base is stable
  - Software can be expensive to acquire and maintain (operations software requires on-board hardware)
  - Significant training investment needed

Scheduling and Dispatching Software Implementation Strategies

Implementation strategies for smaller agencies

- Contract out service (or a portion of it) to entity that has the software and trained staff
- Partner with other transportation agencies to license software, acquire hardware, and/or share trained staff
- Evaluate extent to which software costs could be offset by staffing efficiencies enabled by the software
- Take advantage of vendor demos and Requests for Information to learn more about vendors and platforms

Open Discussion

- Does your agency have demand response and/or fixed-route scheduling, dispatching, or operations software?
  - If so, are you happy with it? What are the biggest benefits? Biggest challenges? Lessons learned?
  - If not, why not? Have you explored procuring the software? What are the biggest hurdles?

Fare Collection

Fare Collection Technology

- Fare collection technologies generally refer to *automatic fare collection*, which is the collection and processing of fares by electronic means
  - Includes mobile app payments, swipe cards, smart cards, transponders, and credit cards
  - Automatic fare collection also referred to as cashless fares and electronic fares
- Can be on-board/off-board or open/closed systems
- Potential benefits of electronic fares include
  - Increased customer satisfaction and ridership
  - Reduced revenue handling costs and improved operational efficiency
- Might also provide ridership/vehicle location data and facilitate fare program modifications/promotions

Fare Collection Technology (*Continued*)

- Fare collection technology cost drivers
  - Equipment (e.g., fareboxes)
  - Website development and maintenance
  - Staffing of locations that sell fare products
  - Computer systems and software (including apps)
  - Systems for counting and reconciling fares
- Can also include service fees (e.g., for managing fare media)
- Ongoing expense to maintain and upgrade equipment and systems

Fare Collection Technology (*Continued*)

- Implementation considerations
  - Interoperability of systems and hardware
  - Level of effort to design and implement program of technologies
  - Testing systems and hardware
  - Maintaining backup systems
  - Ensuring security of passenger data
  - Procurement challenges for hardware and software
  - Purchasing and producing fare media
  - Maintenance and repair of systems and hardware
  - Marketing technologies
  - Processes for managing fare revenues
  - Administration of technologies
  - Training
  - Passenger response
  - Accessibility for all (including the unbanked)

Fare Collection Technology (*Continued*)

- Implementation strategies
  - Use peer data to get insights into potential reductions in fare collection costs
  - Accepting cashless fares might reduce costs of developing and issuing fare media and handling fare revenues
  - Go fare-free (has advantages and disadvantages)
  - Simpler fare structures, policies, and payment options might offer some advantages of fare-free transit while avoiding disadvantages of fare-free transit
  - Partner with other transportation agencies to acquire and implement fare collection technologies and/or share staff; regional fare system is another option

Leverage What's Available

Leveraging What's Available

- Chapter 16 of Guidebook lists resources and tools that transit agencies might be able to use to manage technology costs and which are free or heavily discounted
- Many involve the creation or use of General Transit Feed Specification (GTFS) data
- See some on next slide

Open-source tools might be useful in helping transit agencies manage technology costs, as such tools are often free to acquire and use. However, extensive training and adaptation might be needed to make the tools work for the agency.

Examples of Free or Low-Cost Software

Inclusion in this list does not constitute endorsement or recommendation.

- **1-Click:** open-source multimodal trip planning software focused on transportation-disadvantaged travelers.
- **Florida Transit Information System (FTIS):** a collection of data tools for querying urban National Transit Database (NTD) and rural NTD data.
- **Google Earth Pro:** supports map creation and provides aerial and street-view imagery.
- **National RTAP GTFS Builder:** a macro-enabled Microsoft Excel workbook to help transit agencies create a GTFS data set.
- **National RTAP ProcurementPRO:** a free web-based application that guides rural and tribal grantees and state departments of transportation through FTA procurement procedures.
- **National RTAP Two-Variable Cost Allocation Calculator:** available for Microsoft Excel or Access, supports service-based operational cost allocation.
- **National RTAP Website Builder:** allows transit agencies to create and design websites that are hosted on the National RTAP server free of charge.
- **OneBusAway:** an open-source suite of transit information tools, including tools that support providing real-time transit information and alerts to passengers.
- **OpenStreetMap:** a world map created by many individuals and free to use under an open license.
- **OpenTripPlanner:** an open-source multimodal trip planner that relies on OpenStreetMap and GTFS data.
- **QGIS:** a free, open-source geographic information system software.
- **RidePilot:** open-source demand response scheduling software for small and mid-sized transit agencies. It also supports federal reporting, operator communications, and vehicle management.
- **TheTransitClock:** This open-source tool predicts bus arrivals and supports providing real-time transit information to passengers.
- **TransAM:** This tool is open-source transit asset management software that supports capital planning.

Chapter Summary

- Key takeaways
  - Transit technology costs include ancillary costs
  - Scheduling software and fare collection technologies can have the most impact
  - Contractors and partners can reduce technology costs
  - Technology plans can provide cost-efficiency
  - Many free or low-cost resources exist
- Additional information, resources, and references provided in Chapter 16 in the Guidebook
- Questions and discussion?

Module E Evaluation

- Please fill out the <u>Module Evaluation Form</u>
- Write in the date and location
- Select <u>Module E</u>

Module Evaluation Form

Managing System Costs: <u>Module Evaluation Form</u>

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.
Select all that apply for questions with a square: ☐.

C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

MODULE F: Looking Ahead

Module Overview

- **One-sentence summary**
  Current and future trends through a cost-management lens
- **Chapter**
  - 17: Future Trends and Forward-Thinking Approaches to Cost Management

Learning Objectives

- Describe importance of planning ahead when implementing new services and technologies
- Explain the difference between microtransit and traditional demand response
- Describe advanced driver assistance systems and automated transit vehicles and their potential for cost savings

Future Trends and Forward-Thinking Approaches

- Tremendous advances in technology in past two decades have greatly affected transportation systems
  - Information access
  - Mobile technology
  - Accessibility barriers
- Potential improvements in productivity, efficiency, and reliability
- Chapter 17 focuses on microtransit, advanced driver assistance systems, and shared autonomous vehicles

Microtransit

- Microtransit: publicly operated on-demand transit service that typically use apps to book trips
  - Booking via app, web site, or phone
  - Innovative software and communications tools
  - Usually offered in small, low-density areas and/or off-peak periods
  - Provides first-mile/last-mile option
  - Multiple models for service structure, stops, and vehicle types/ownership
  - Can be operated by transit agency, private sector entity, or partnership
  - Ridesharing component reduces trip cost compared to TNCs and taxis
- Further research needed to identify factors that result in successful implementation
- Clear goals, service policies, and evaluation frameworks needed

Other Technologies

- Advanced Driver Assistance Systems (ADAS)
  - Collision warning systems
  - Collision intervention systems
  - Driving control assistance
- Vehicle automation
  - Autonomous Vehicles (AVs)
  - Shared Autonomous Vehicles (SAVs)

See Chapter 17 in the Guidebook for more information about these technologies.

Chapter Summary

- Key takeaways
  - New technologies can potentially help improve safety, service quality, cost-effectiveness, and customer satisfaction
  - Technology adoption should be guided by goals and accompanied by consistent evaluation
  - Passenger perceptions and experiences with new technology are critical
  - The characteristics of technology-driven transit services can impact adoption
- Additional information, resources, and references provided in Chapter 17 in the Guidebook
- Questions and discussion?

Module F Evaluation

- Please fill out the <u>Module Evaluation Form</u>
- Write in the date and location
- Select <u>Module F</u>

Module Evaluation Form

Managing System Costs: <u>Module Evaluation Form</u>

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.
Select all that apply for questions with a square: ☐.

C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

You don't have to completely fill in the circles and squares. Using ✗ or ✓ is fine!

Conclusion

Quick Review

Final Prize Questions

Main Points

- Cost management is an ongoing, consistent activity needing
  - Consistent planning
  - Consistent accounting and reporting of costs
  - Consistent evaluation and corrective action
- Much of transit cost management *starts with service policies*
- Specific cost management strategies will vary across transit mode, transit function (e.g., maintenance vs. operations), and operational model (e.g., outsourced vs. insourced)
- Be creative! Find where you want to improve, do your research, implement strategies, and evaluate outcomes

Stand and Deliver

Stand and share at least one thing you learned during the workshop that you hope to use or implement in your job

Companion Resources

- Toolkit available https://tx.ag/TransitCostsToolkit
- Companion Guidebook available https://tx.ag/TransitCostsGuidebook
- Online Course available https://tx.ag/TransitCostsCourse

Workshop Evaluation

- Please fill out the Workshop Evaluation Form
- Write in the date and location

Workshop Evaluation Form

Managing System Costs: <u>Workshop Evaluation Form</u>

Directions:

A) Please write and mark your selected answers clearly.

B) Only select one answer for questions with a circle: ○.
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C) You answers may require you to skip questions. Follow the directions contained in [*square brackets*]. If there are no specific instructions, simply go to the next question.

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Final Questions?