

CURRENT SHORT-RANGE TRANSIT PLANNING PRACTICE

Outline

- 1. SRTP -- Definition & Introduction**
- 2. Measures and Standards**
- 3. Current Practice in SRTP & Critique**

Public Transport Planning

A. Long Range (> 3 Years)

Major Capital Investment: Infrastructure

Major Institutional Changes

B. Medium Range (1 - 3 Years)

Bus Network Structure

Network Size

Fleet Size

Fare Policy and Technology

C. Short Range (< 1 Year)

Route Structure

Service Frequency

Vehicle and Crew Scheduling

D. Control (Real Time)

Revise Route of Specific Vehicle

Revise Schedule of Specific Vehicle

Major Planning Elements

Data Collection

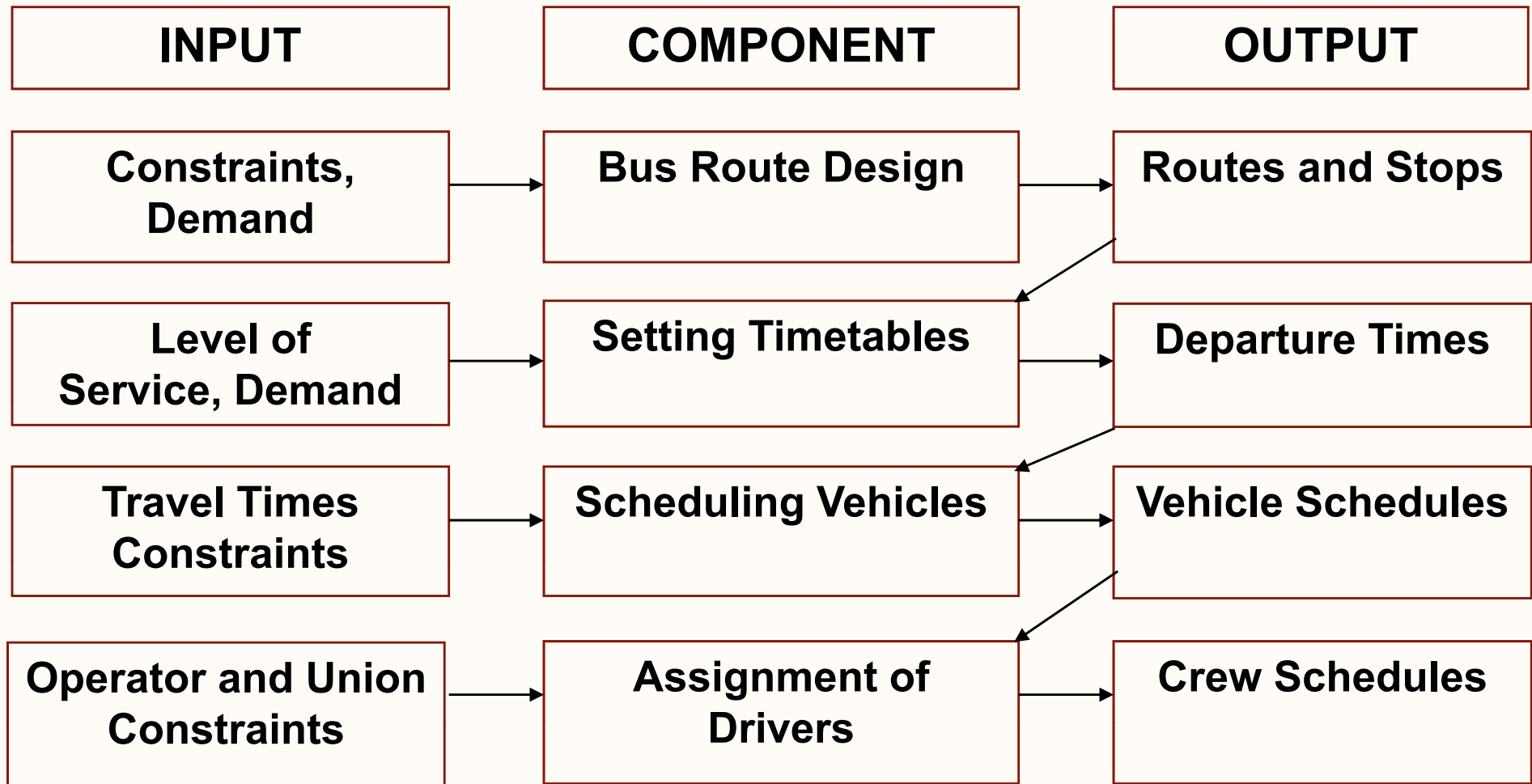
Problem/Opportunity Identification

Design Options/Strategies

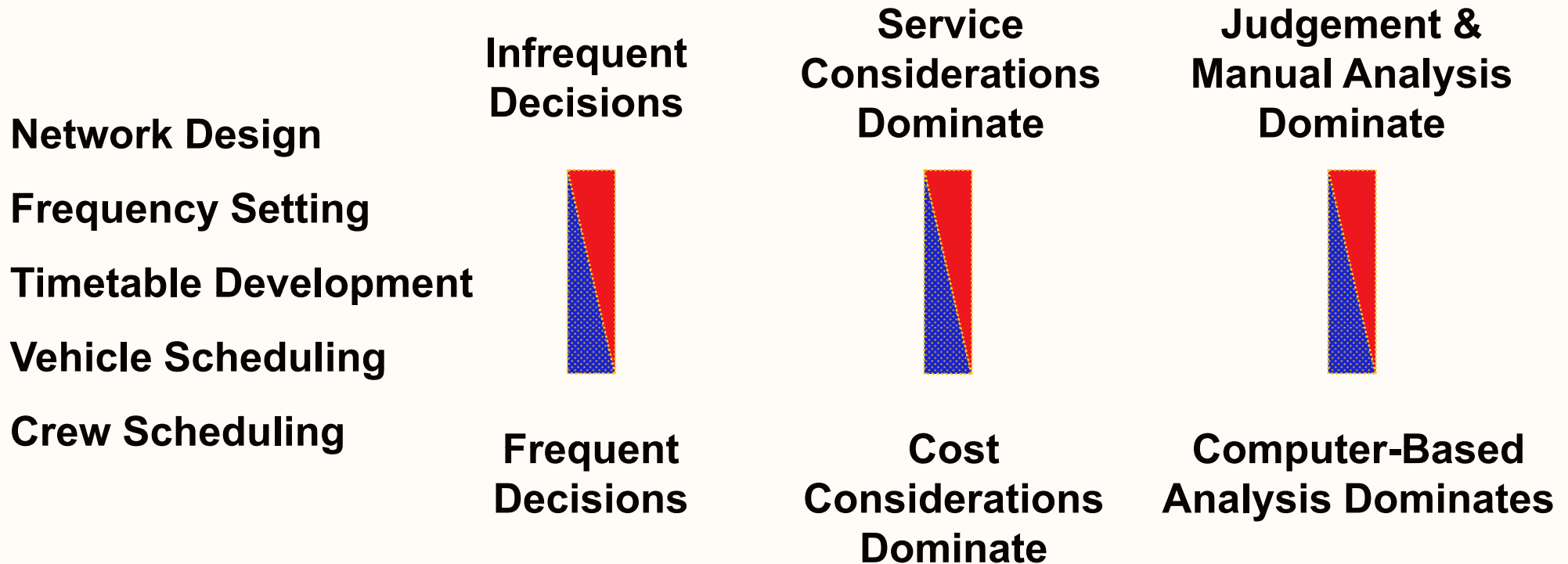
Cost Estimation

Ridership/Revenue Estimation

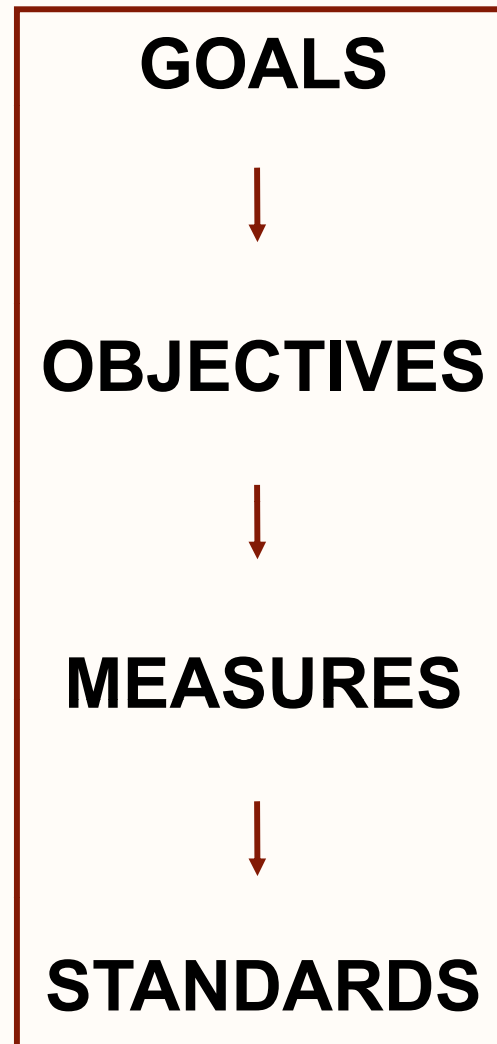
Operational Planning Process



Service Planning Hierarchy



Evaluation Structure



Use of Formal Guidelines*

- **73% of agencies use some form of formal guidelines**
- **75% of these agencies use guidelines adopted by governing board**
- **Otherwise typically adopted by Executive Director/General Manager**

**Source: Synthesis of Transit Practice 10 "Bus Route Evaluation Standards," Transportation Cooperative Research Program, Washington, DC, 1995.*

Aspects of Service Covered

Service Design

Operating Performance

- Service Quality
- Economic/Productivity

Service Design -- Route Design

Most agencies with route design guidelines include:

- Population density
- Employment density
- Spacing between routes

Other primary concerns in route design:

- Service to unserved areas
- Direct, non-circuitous routing

Coverage Example:

MBTA: The MBTA has a policy objective to provide transit service within walking distance (defined as 1/4 mile) of all residents living in areas with population densities greater than 5,000 people per square mile.

Typical Stop Spacing (by system)

<u>Stops per mile</u>	<u>% of systems</u>
<4	9
4	21
6-8	51
10-12	13
12	6

Service Design -- Schedules

Most agencies have guidelines for scheduling based on:

- **Maximum (policy) headways**
- **Maximum passenger crowding**

Policy Headway Example

MBTA: Maximum headway on all local routes should be 30 minutes in the peak and 60 minutes at other times. For express service there should be at least 3 trips in each peak period.

Maximum Passenger Crowding Example

MBTA: On the Green line (light rail) the maximum passengers per car should be no more than 220% of the seats in the peak period. In the off peak the maximum passenger per car should be no more than the seated capacity except in the central subway where it should be no more than 140% of the seated capacity.

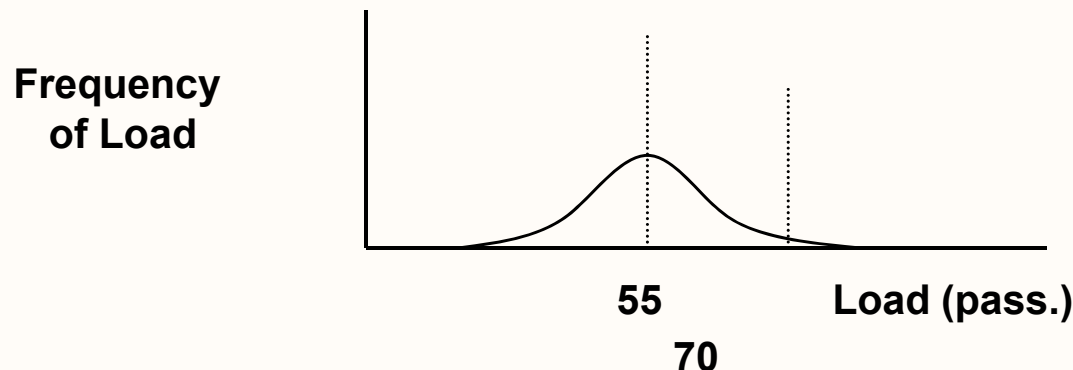
Setting Standards

A. PEAK LOAD

1. Peak Half-Hour: avoid such high loads that:

- passengers frequently cannot board the first vehicle to arrive;
- vehicles encounter high dwell times.

Maximum acceptable load ~70 passengers for a standard 40' bus.



So acceptable average observed load (at maximum load point) is 55.

2. Other times: normally expect to provide a seat for all passengers.
Acceptable average load ~40 for a standard 40' bus.

TTC Loading Standards

Acceptable Maximum-Hour Average Vehicle Loads at Peak Flow Point (Passengers Per Vehicle)

	Peak Periods	Off-Peak Periods	
Vehicle Type	All Routes	Frequency: ≥ Once Every 10 Minutes	Frequency: < Once Every 10 Minutes
40-ft Bus	50-57	35-49	28-39
50-ft Streetcar	74	58	46
75-ft Articulated Streetcar	108	76	61
6-car Subway Train	1100	400-500	--

Service Design: Span of Service

Most agencies have guidelines covering span of service.

Example: MBTA

The first trip should arrive no later than, and the last trip should depart no earlier than, the times shown below (for local bus service):

Weekdays 7 a.m. - 6 p.m.

For high density areas only:

Saturdays 8 a.m. - 6 p.m.

Sundays 10 a.m. - 6 p.m.

Service Quality

Most agencies have formal procedures for monitoring service delivery focusing on on-time performance, typically defined as 0 minutes early to 5 minutes late.

About two-thirds of agencies report rush hour on-time performance of 90% or above.

Most agencies also keep route level information on:

- **Passenger complaints**
- **Missed trips**
- **Accidents**

Example: MBTA

Local low frequency bus service (headways > 10 minutes):

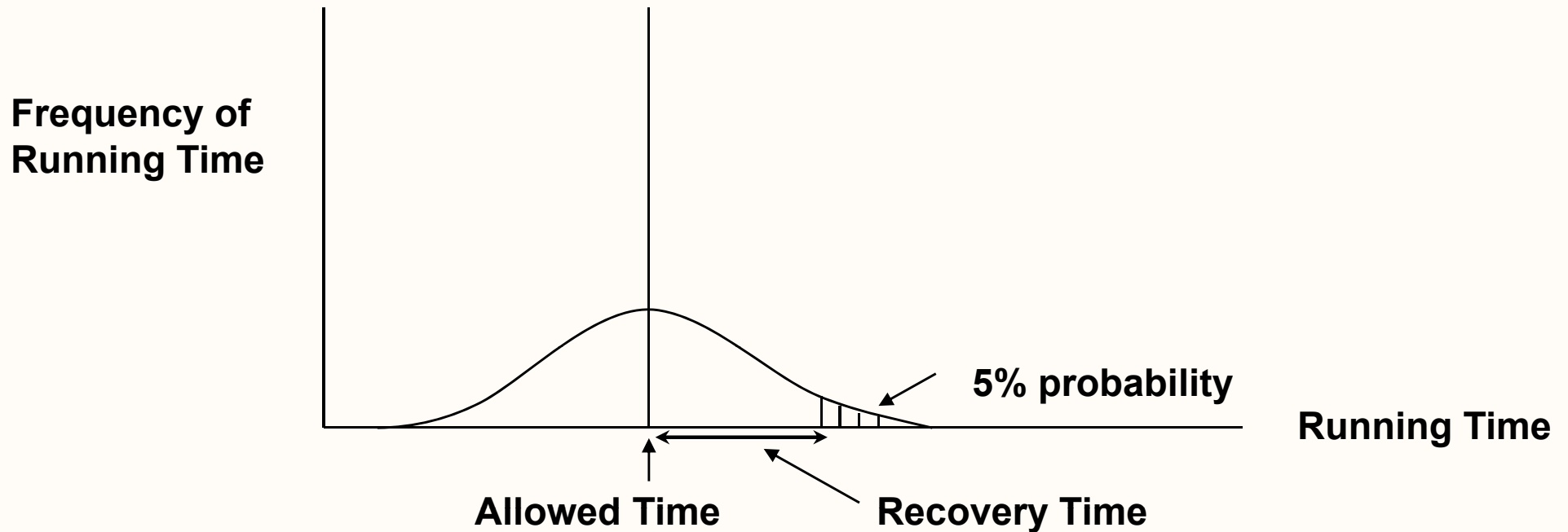
- **75% of trips should depart 0-5 minutes after scheduled terminal departure times and arrive 0-5 minutes after scheduled terminal arrival times.**

Local high frequency bus service (headways \leq 10 minutes):

- **85% of trips should have headways no greater than 150% of scheduled headway.**
- **95% of trips should have travel times no more than 5 minutes above scheduled times.**

Reliability

Example: want 95% of departures to be on-time



Implies a recovery time of (2x standard deviation of running time)

Economic/Productivity Measures

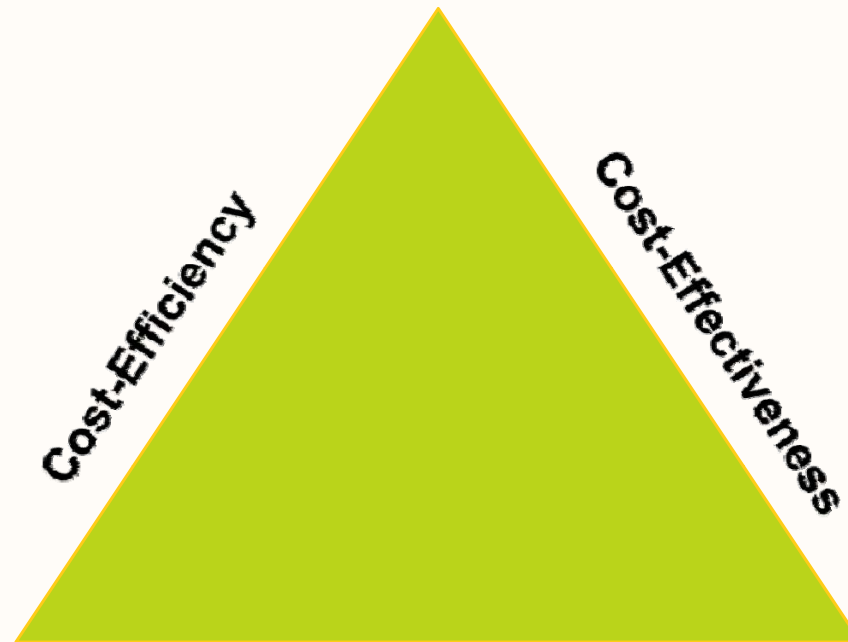
Measure	% of Agencies Using Measure	Minimum Standard (Median)
Passengers/veh hr	78%	11-35 pass/veh hr
Cost/Passenger	63%	3 x system average
Passengers/veh mile	58%	1-3 pass/veh mile
Passengers/trip	53%	---

Two most critical measures in assessing route performance:

- **passengers/veh hour**
- **subsidy/passenger**

SERVICE INPUTS

Labor
Capital
Fuel



SERVICE OUTPUTS

Vehicle Hours
Vehicle Miles
Capacity Miles
Service Reliability

Service-Effectiveness

SERVICE CONSUMPTION

Passengers
Passenger Miles
Operating Revenue
Operating Safety

Alternative Benefit Measures

REVENUE

- PROS:**
- relevance to financial concern
 - related to willingness to pay
- CONS:**
- discounts value of reduced fare trips
 - favors higher income users

PASSENGERS

- PROS:**
- reflects number of people who benefit
 - values each passenger equally
- CONS:**
- doesn't reflect trip length

PASSENGER MILES

- PROS:**
- weights longer trips more
 - most reflective of some benefits
- CONS:**
- hardest to measure
 - favors higher income passengers

Alternative Cost Measures

NET COST (Subsidy)

PROS: - usually most directly constrained

CONS: - hardest to estimate

COST

PROS: - may also be directly constrained

CONS: - hard to estimate

VEHICLE MILES

PROS: - easy to measure

CONS: - directly reflects only 30% of bus costs
- penalizes fast services

VEHICLE HOURS

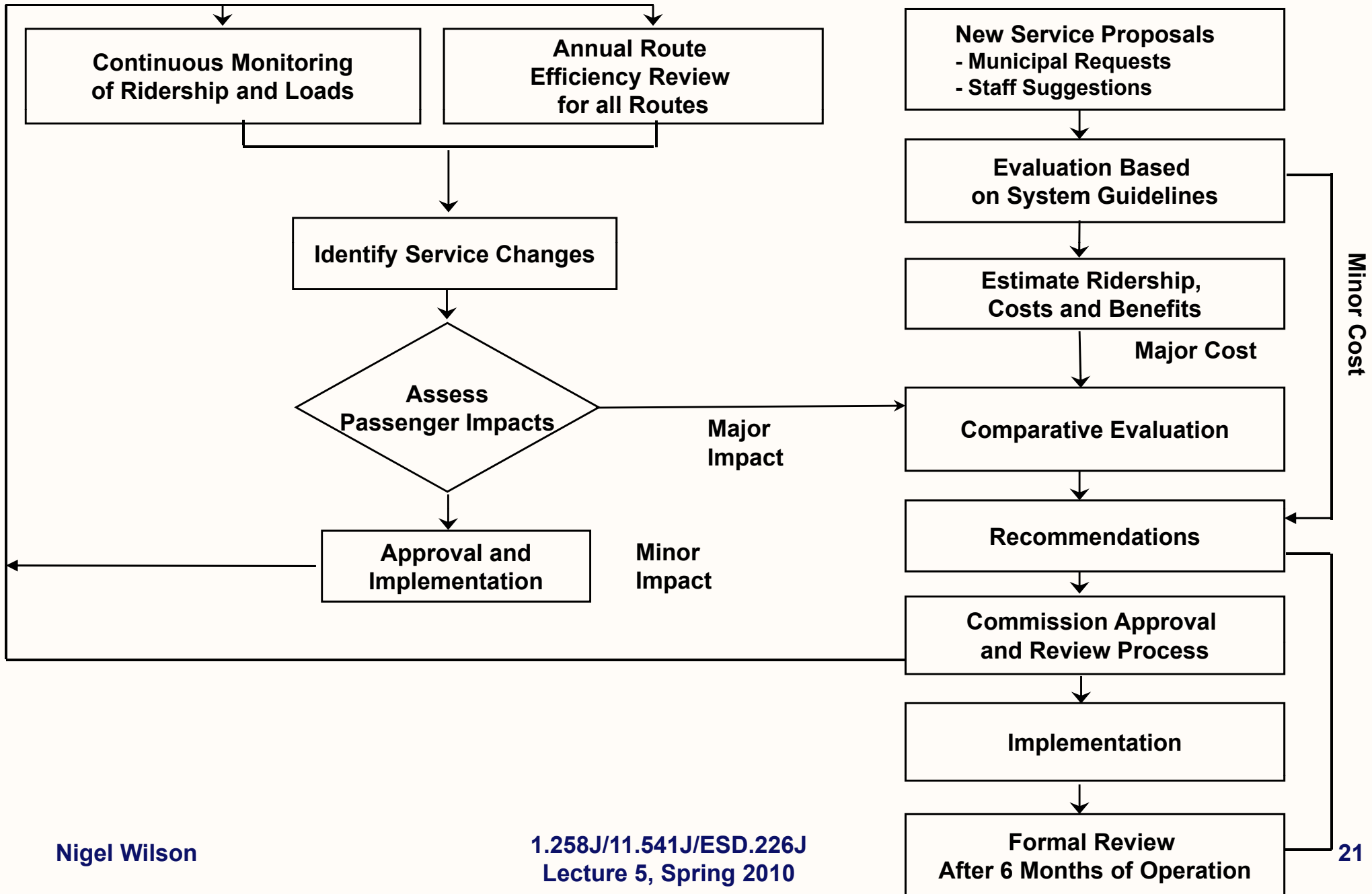
PROS: - easy to measure
- related to >50% of bus costs

CONS: - doesn't reflect cost differences between peak and off-peak services

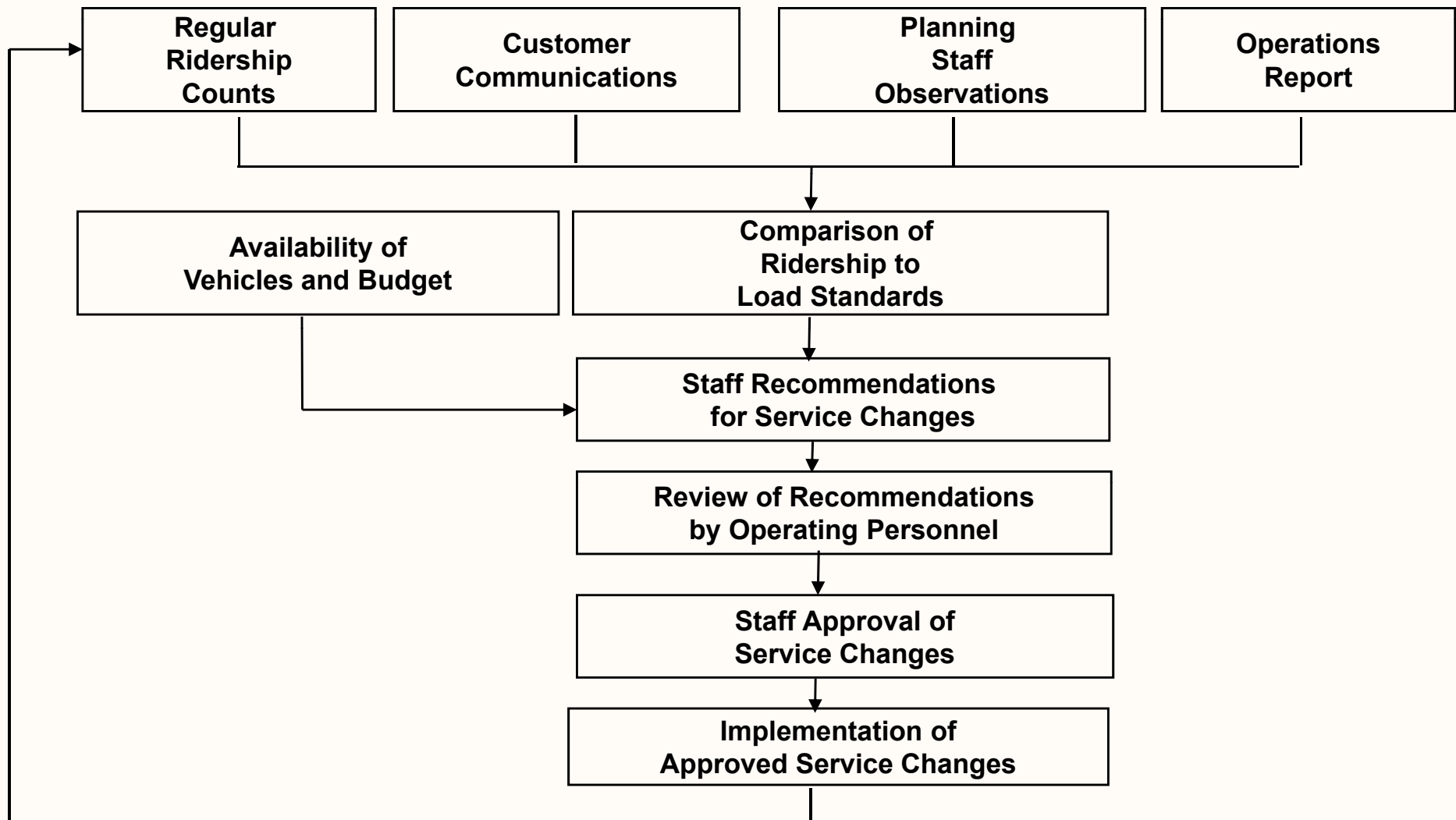
Issues in Setting Up a Short-Range Transit Planning Process

- **Role of budget constraints in the process**
 - => before budget is set
 - => after budget is set
- **Role of standards and constraints vs investing resources to obtain best ridership results**
- **Consideration of new service options vs protection of existing services**
- **Allocation of analysis/planning effort to “problem” routes vs other routes**
- **What form of standards/guidelines to use**
- **Focus on individual routes or route as component of system**

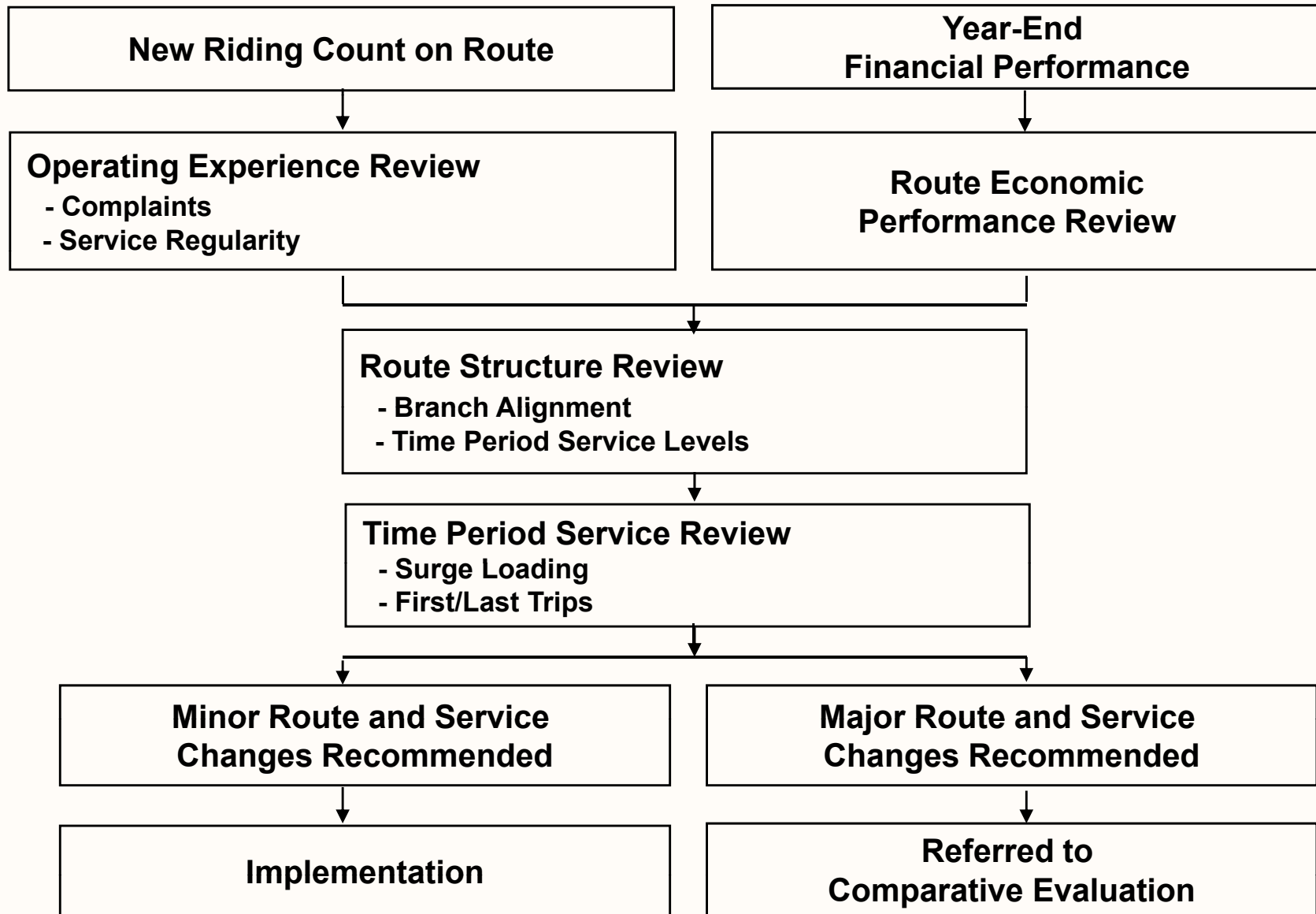
TTC Service Standards Process: Overview



TTC Service Standards Process: Ridership Monitoring and Service Adjustment



TTC Service Standards Process: Route Efficiency Review Program



TTC New Services Criteria

1. **Must serve people beyond 300 meters from current TTC service**
2. **Must maximize interconnections with rapid transit**
3. **Must result in a net benefit for customers**
 - **net benefit is measured by change in weighted travel time with weighted travel time =**

A*in-vehicle time + B*waiting time + C*walking time + D*transfers

and $A = 1.0, B = 1.5, C = 2.0, D = 10.0$

TTC Financial Standards and Comparisons

Single measure used to evaluate service change proposals is:

customers gained (lost) per dollar spent (saved)

Used for evaluating:

- new service proposals
- possible service reductions
- fare changes

The financial unit is the net cost (cost-revenue) associated with the change.

Currently, the threshold for new service is 0.23 new customers per dollar spent.

Services with performance of less than 0.23 customers per dollar spent are examined for possible cost reduction annually.

Service Change Process

- **Major service changes evaluated twice per year resulting in a ranking against other proposals and productivity for existing services**
- **Board provided with recommended service changes and ranked list of all other proposals evaluated and system average performance**
- **Experimental services are designated and evaluated after six months operation**

A Critique Of Current Practice

- **Focus is on poorly-performing routes.**
- **Data limitations -- both type and quality.**
- **Measures not always closely tied to objectives.**
- **Focus on individual route performance rather than network contribution.**

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