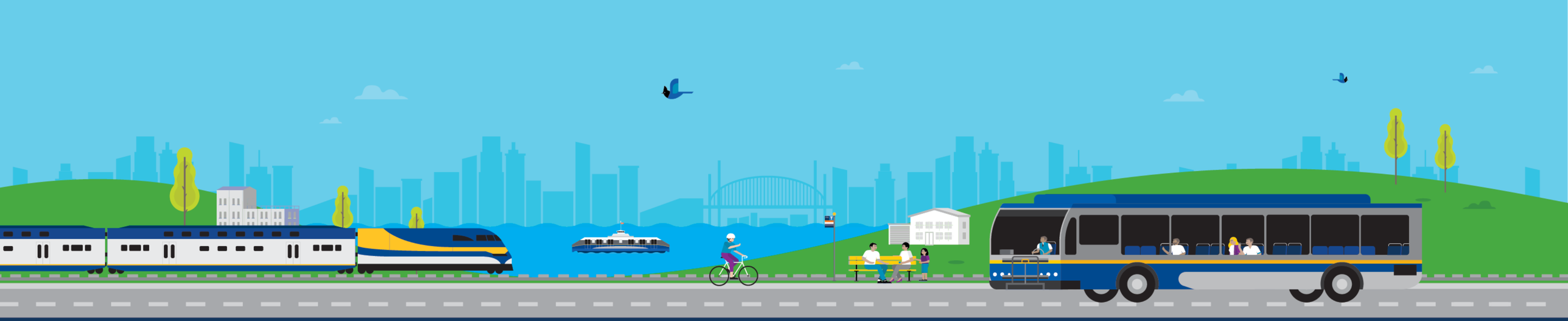

How to model non-existing modes in the RTM

Forecasting

Together all the way

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Why we need to worry about this

- The RTM is estimated for existing transit modes
  - Bus
  - Rail (SkyTrain and SeaBus)
  - West Coast Express
- There are a number of projects that consider new modes
  - LRT
  - BRT
  - Gondola
- Applying the RTM as is for these projects could result in substantial over/under estimation of ridership and benefits

Why is that so

- The probability of choosing a mode is a function of the utility of that mode and of all other modes
- The utility of each mode for a trip is a function of
  - Household attributes (income, number of vehicles etc.)
  - The trip purpose (work, school etc.)
  - Mode measured attributes (wait time, access time, in-vehicle travel time etc.)
  - Mode unmeasured attributes – Alternative Specific Constant (ASC) (perceived reliability, comfort etc.)

$$P_n = \frac{e^{V_n}}{\sum_j^c e^{V_j}}$$

Variable	Mode	Coefficient
Alternative Specific Constant	HOV2	0.9578
Alternative Specific Constant	HOV3+	-0.8391
Alternative Specific Constant	Bus	-0.1646
Alternative Specific Constant	Rail	1.6577
Alternative Specific Constant	WCE	3.2035
Alternative Specific Constant	Walk	6.7431
Alternative Specific Constant	Bike	1.3421
Wait Time	All transit modes	-0.1472
Access Time	All transit modes	-0.1016
Number of Boardings	All transit modes	-0.6562
In-vehicle Travel Time	SOV, HOV2, and HOV3+	-0.0482
In-vehicle Travel Time	Bus	-0.0598
In-vehicle Travel Time	Rail and WCE	-0.0476

An example – B-Line & SkyTrain

year	B-Line	SkyTrain
2035 Base	6,500	31,700
2050 Base	7,200	37,900

An example – B-Line & SkyTrain

Similar measured attributes

year	B-Line	BRT	LRT	SkyTrain
2035 Base	6,500	8,600	19,000	31,700
2050 Base	7,200	10,600	23,400	37,900

Coded as Bus

Coded as Rail

An example – B-Line & SkyTrain

Whether the mode is coded as Bus or Rail has a large impact on ridership

year	B-Line	BRT-1	BRT-2	LRT-2	LRT-1	SkyTrain
2035 Base	6,500	8,600	17,900	10,000	19,000	31,700
2050 Base	7,200	10,600	21,900	12,400	23,400	37,900

Coded as Bus

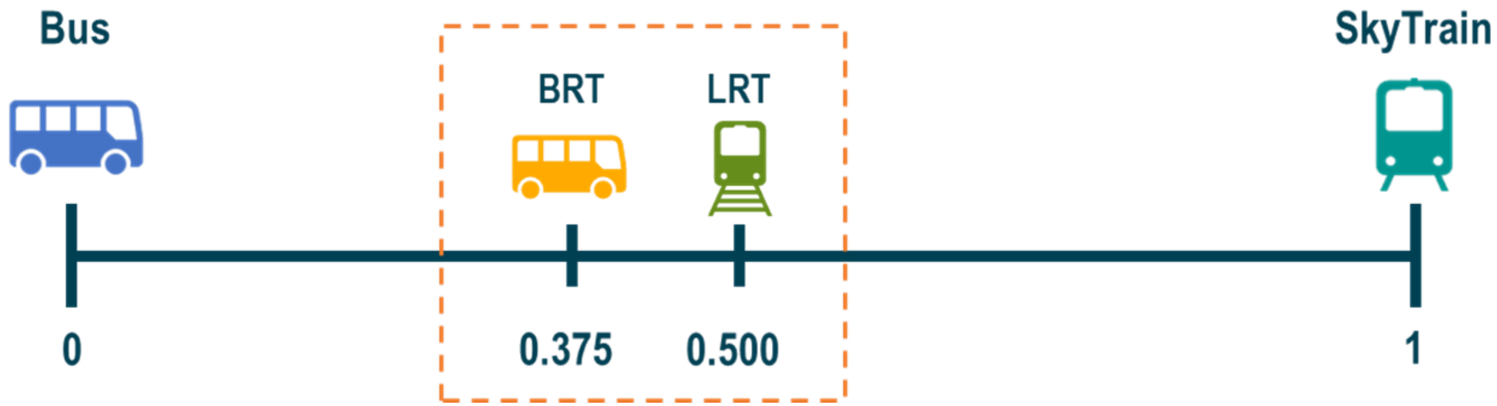
Coded as Rail

Coded as Bus

Coded as Rail

How to model the perceptions of new modes

- Perceptions of BRT and LRT, will likely fall between Bus and SkyTrain
  - Service attributes (separation-reliability, etc.)
  - Findings from other places
- Scale perception (in particular ASC) of BRT and LRT relative to bus and SkyTrain



Adjustment example

Variable	Mode	Coefficient
Alternative Specific Constant	HOV2	0.9578
Alternative Specific Constant	HOV3+	-0.8391
Alternative Specific Constant	Bus	-0.1646
Alternative Specific Constant	Rail	1.6577
Alternative Specific Constant	WCE	3.2035
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Wait Time	All transit modes	-0.1472
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Number of Boardings	All transit modes	-0.6562
In-vehicle Travel Time	SOV, HOV2, and HOV3+	-0.0482
In-vehicle Travel Time	Bus	-0.0598
In-vehicle Travel Time	Rail and WCE	-0.0476

ASC BRT(0.375)= 0.519 LRT(0.5)=0.747

IVTT BRT(0.375)=-0.0552 LRT(0.5)=-0.0537

The exact same project evaluated under different assumptions

	LRT as BRT	LRT as LRT	LRT as SkyTrain
Benefits	900	1,498	4,112
Costs	1,500	1,500	1,500
NPV	-600	-2	2,612
BCR	0.60	1.00	2.74

How this effects different project benefits

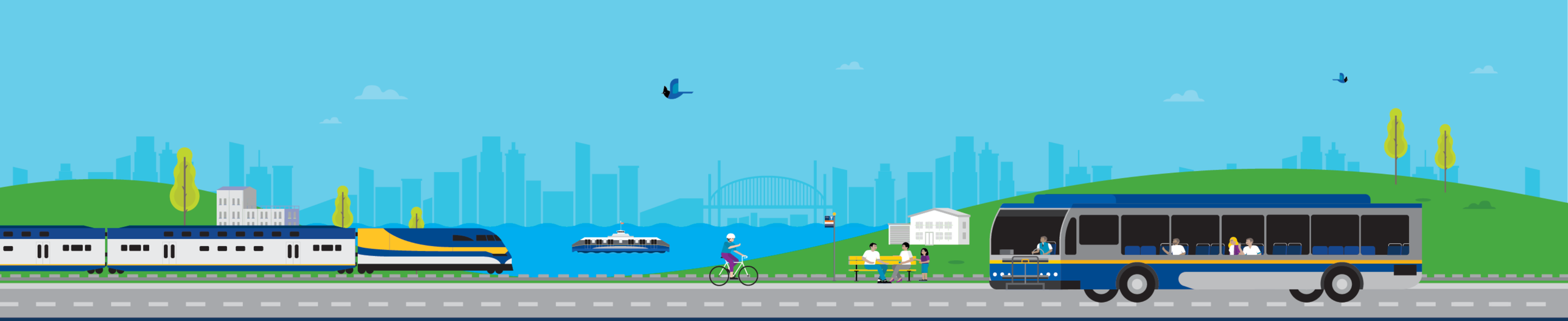
	Project Benefits	Impact
Conventional Benefits	Transit Travel Savings (TTS)	+++
	Auto Travel Savings	++
	Incremental Fare Revenue	++
	Truck Travel Savings	+
Wider User Benefits	Agglomeration	++
	Reliability (travel on roads)	+
	Safety	++
	GHG (VKT Decrease, Cement production not icluded)	+

How is it done in application

- Two new modes have been added to the assignment
  - LRT – ‘f’
  - BRT – ‘g’
- Perception scaling is in a scalar matrix in the model
- To add a new BRT/LRT line:
  - Create a new transit vehicle with mode ‘g’/‘f’ and related capacity
  - Assign mode ‘g’/‘f’ and the newly created transit vehicle to the transit line

Additional thoughts

- This method can be used to model other modes (e.g. Gondola)
- Need to be careful when analyzing results – these modes are not available and so how people will use them is uncertain – use ranges
- In future RTM upgrades we would like to reduce the importance of the ASC (e.g. differential coefficients for wait, transfer etc.)



Thank You

Together all the way

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