momo2025 BY ZEPHYR

CAMBRIDGE SYSTEMATICS

Think Forward

Colorado Mountain Rail Ridership Forecasts

presented to

Podium Session

Innovations in Transit Modeling: Methods, Tools, and Applications

9/16/2025

presented by

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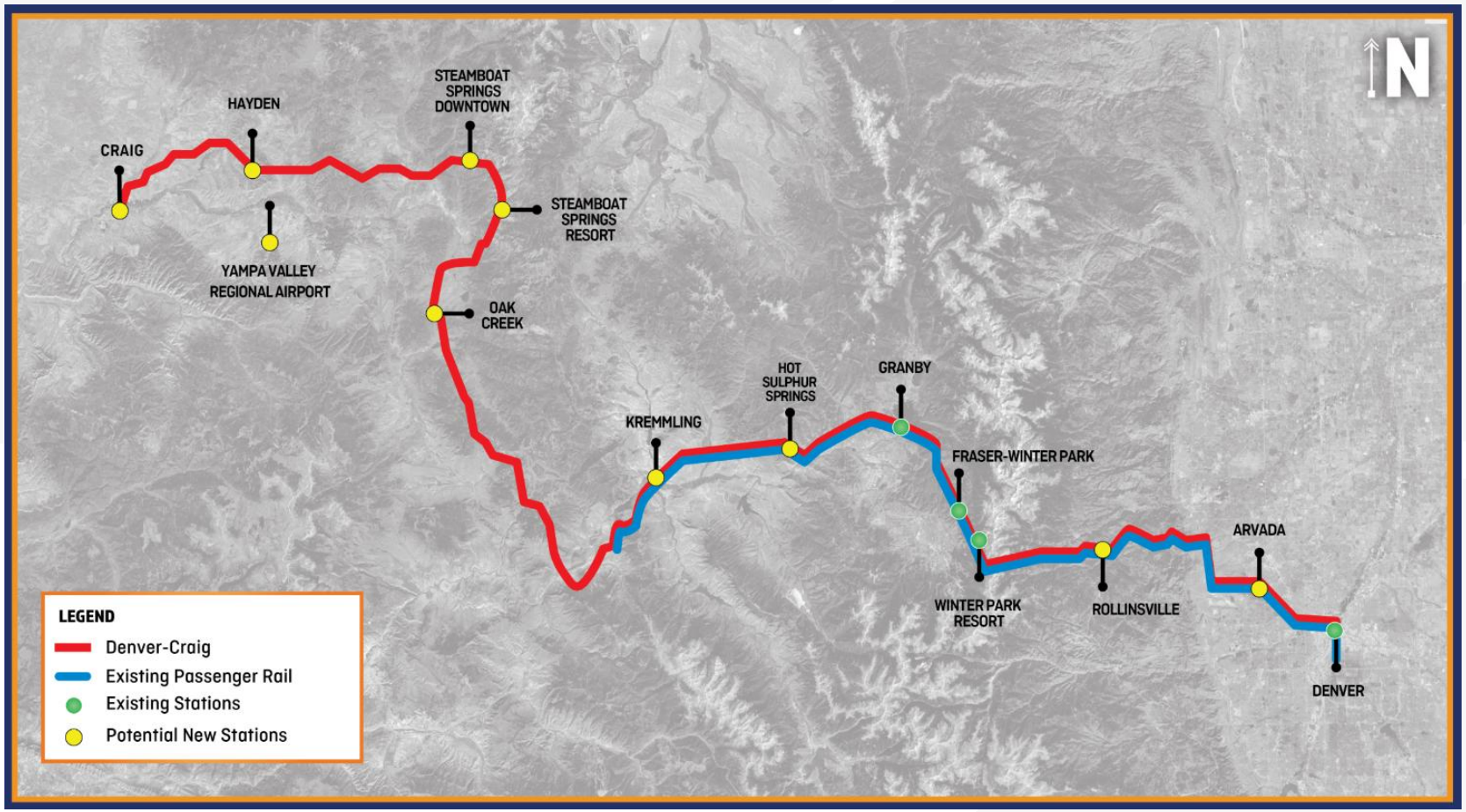
Presentation Outline

- Project Overview
- Market Analysis
- Model Framework and Implementation
- Results
- Key Takeaways

Project Overview



- 200-mile corridor
- Major Attractions
- Rail markets
  - Purpose: Recreation and Commute
  - Seasonality
- Limited Bus Service
  - Outrider (Craig)
  - Snowstang (Stmbt)
  - Airport Shuttles (Stmbt)

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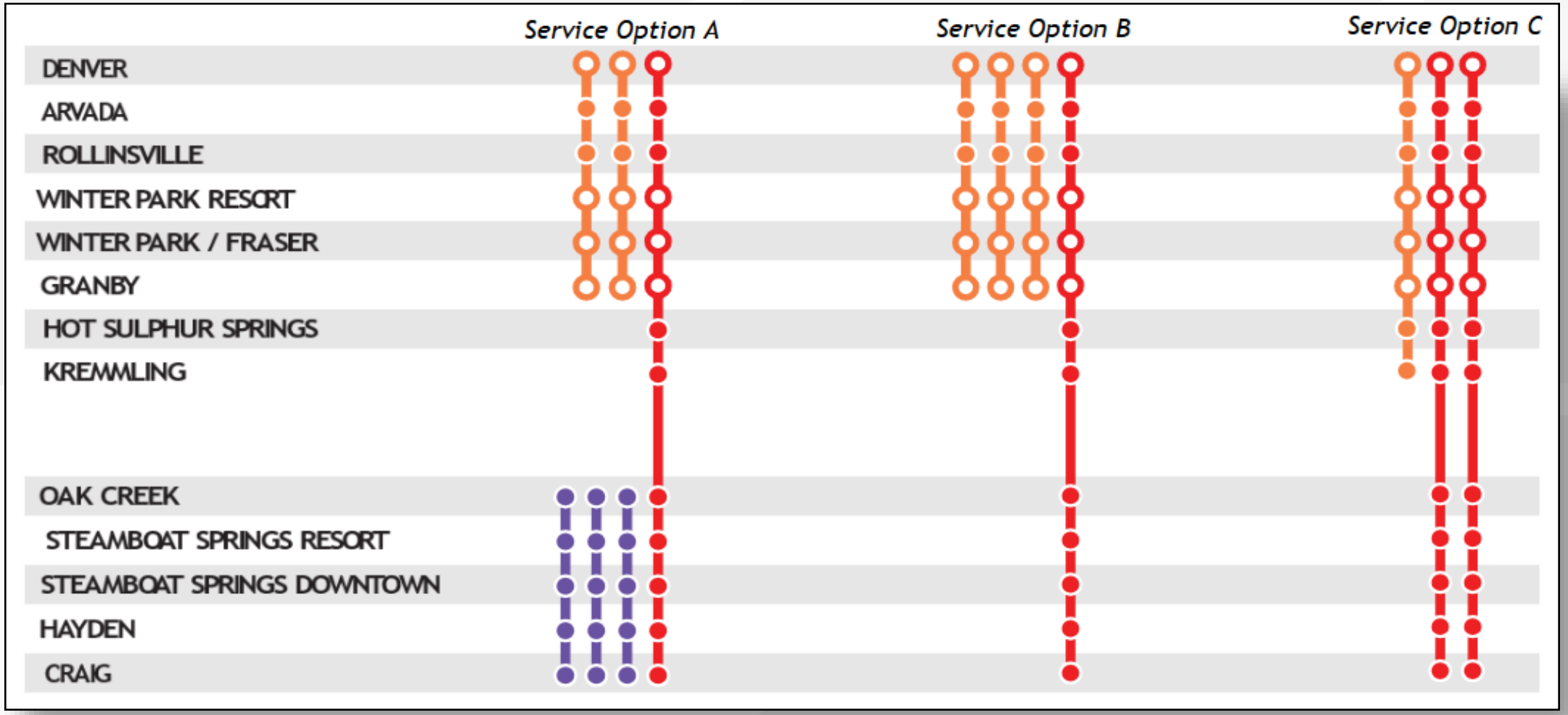
Service Options Overview



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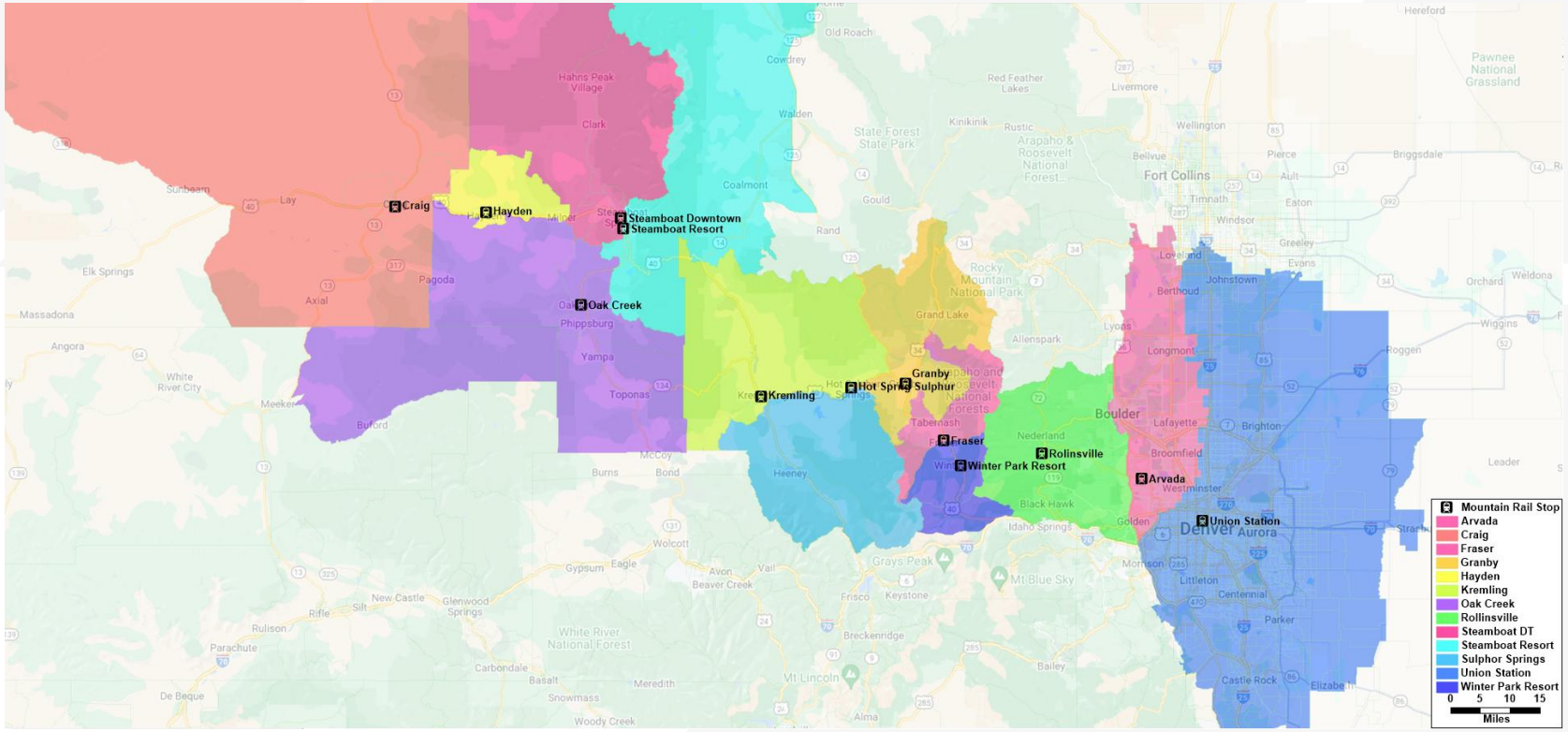
Market Analysis: Catchments

- Station Catchments:
  Distance-based using StateFocus skims



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Market Analysis: Universe of Trips

- LBS Data: LOCUS
  - Big sample
  - Multi-modal
  - Recent
  - Fine resolution

- Assumed longer trips are more likely to use rail
  - Used a 40-mile filter after considering different thresholds
  - A 10-mile threshold for commuter markets

Potential Demand Within the Rail Corridor –
40-mile filter

	Union St	Arvada	Rollinsv	WinterP	Fraser	Granby	Sulphor	Kremlin	Oak Cre	Steamb	Steamb	Hayden	Craig	Total
Union Station	-	-	2,479	1,808	826	1,462	88	153	8	393	93	15	78	**7,402**
Arvada	-	-	234	353	296	242	5	64	-	191	287	2	38	**1,713**
Rollinsville	2,432	125	-	76	65	27	-	8	-	31	-	-	-	**2,764**
WinterParkRes	1,046	245	85	-	143	41	-	64	10	8	16	-	-	**1,657**
Fraser	458	109	12	145	-	8	-	26	-	10	20	-	2	**791**
Granby	591	125	5	76	-	-	-	18	1	29	19	-	-	**864**
Sulphor Springs	63	-	-	-	-	2	-	2	2	1	6	-	-	**77**
Kremling	107	35	4	52	36	2	2	-	3	61	49	-	40	**392**
Oak Creek	16	5	-	-	8	14	-	6	-	8	90	-	94	**241**
Steamboat Resort	214	126	-	9	8	8	9	49	15	-	15	-	335	**789**
Steamboat DT	311	16	-	19	24	2	1	49	101	8	-	8	370	**910**
Hayden	29	-	-	-	-	-	-	9	2	-	16	-	1	**56**
Craig	60	12	-	-	2	16	-	65	55	359	335	6	-	**910**
Total	**5,326**	**798**	**2,820**	**2,537**	**1,408**	**1,825**	**106**	**513**	**196**	**1,099**	**947**	**31**	**959**	**18,566**

- Q1 Friday
- Removed trips within the Denver catchment area

Model Framework and Implementation

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Market Segmentation

- Trip Purpose (2)
  - Long Distance Recreational (to/from Denver area)
  - Local Commuter (workers, local recreational)
- Time of Day (1): Daily
- Day of Week (1): Friday
- Season (1): Calendar Quarter 1

Mode Options

- Auto
- Rail
  - Access Type at Origin Station: Walk, Drive, Walk to Local Transit
  - Egress Type at Destination Station: Walk, Vehicle*
- Bus
  - Access Type at Origin Stop: Walk, Drive, Walk to Local Transit
  - Egress Type at Destination Stop: Walk, Vehicle*

* Vehicle egress assumes general availability of TNCs where too far to walk.

General Approach

- Pivot Point Logit to predict mode shifts
  - Starting from a base matrix of mode shares is likely to be more accurate than generating demand from the ground up
  - Parameters
    - Assert parameters borrowed from SWM home-based non-work

Input Data – Mode Choice Variables

- Time Variables: IVTT, walk access, vehicle access/egress
- Monetary Cost
  - Fare
  - Auto parking, toll, operation costs
- Service frequency (trips per day)
- Constants
  - Region-Specific: CBD, Boulder, Denver International Airport
  - Mode-Specific: Auto, Mountain Rail, Mountain Bus, DIA Shuttles

Assumptions Used in Model Development

Criteria	Threshold
Walk to Mountain Rail station	<=10 min
Drive to Mountain Rail station	<=50 mile
Walk to access local transit	<=10 min
number of transfers	<=1
Time in local transit	<=30 min

- Other Assumptions
  - Average party size of 2
  - Average length of stay: 2.5 nights

Mode Choice Model Parameters

Parameter	Value	Source
ln(in-vehicle time)	–0.27	
ln(vehicle access/egress time)	–0.81	
ln(walk access/egress time)	–0.81	
Toll	–0.02	
Fare	–0.02	
Mountain Rail frequency = 1	0.400	Maine State Rail Plan
Mountain Rail frequency = 2	0.677	Parameter for freq=1 * (1+ln(2))
Mountain Rail frequency = 3	0.839	Parameter for freq=1 * (1+ln(3))
Mountain Rail frequency = 4	0.935	Parameter for freq=1 * (1+ln(4))

All time variables in minutes, all cost variables in dollars

Sensitivity Test Results

Mode	Base Scenario	5% Rail Time Decrease	Rail Frequency Increase from 1 to 2	5% Rail Fare Increase
Rail Trips	253	256	351	249
Bus Trips	60	60	59	60
Auto Trips	8802	8799	8705	8806
Change in Ridership		1.1%	38.7%	-1.8%
Implied Elasticity		-0.229	0.387	-0.355

Annualization Factors

	Recreational Travel	Commuter Travel
Winter Friday to Winter Week	4.38	7.42
Winter Week to Winter Season	13	13
Winter to Annual	1.195	2.954
Annualization Factor	68	285

Results

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Annual Ridership Summary by Segment

Estimate (K Passengers)

Segment	Service Option A	Service Option B	Service Option C
Denver - Oak Creek	155	175	157
Steamboat Resort - Craig	25	6	12
Other Trips *	25	16	24
Total	205	197	193

Range (K Passengers)

Segment	Scenario A	Scenario B	Scenario C
Denver - Oak Creek	127 - 183	141 - 209	130 - 185
Steamboat Resort - Craig	17 - 32	4 - 8	9 - 16
Other Trips *	13 - 38	11 - 21	15 - 30
Total	157 - 253	156 - 238	154 - 231

* Other Trips include inter-segment trips that start in one segment and end in the other.

Key Challenges and Takeaways

Lessons Learned

- Key Challenges
  - Universe of Trips
  - Absence of a similar rail service to estimate a model based upon
  - When existed, Amtrak OD data are hard to obtain

- Key Takeaway
  - Explore non-linear IVTT options to explain long distance rail travel