Domestic Inbound Freight Optimization

FINAL PRESENTATION

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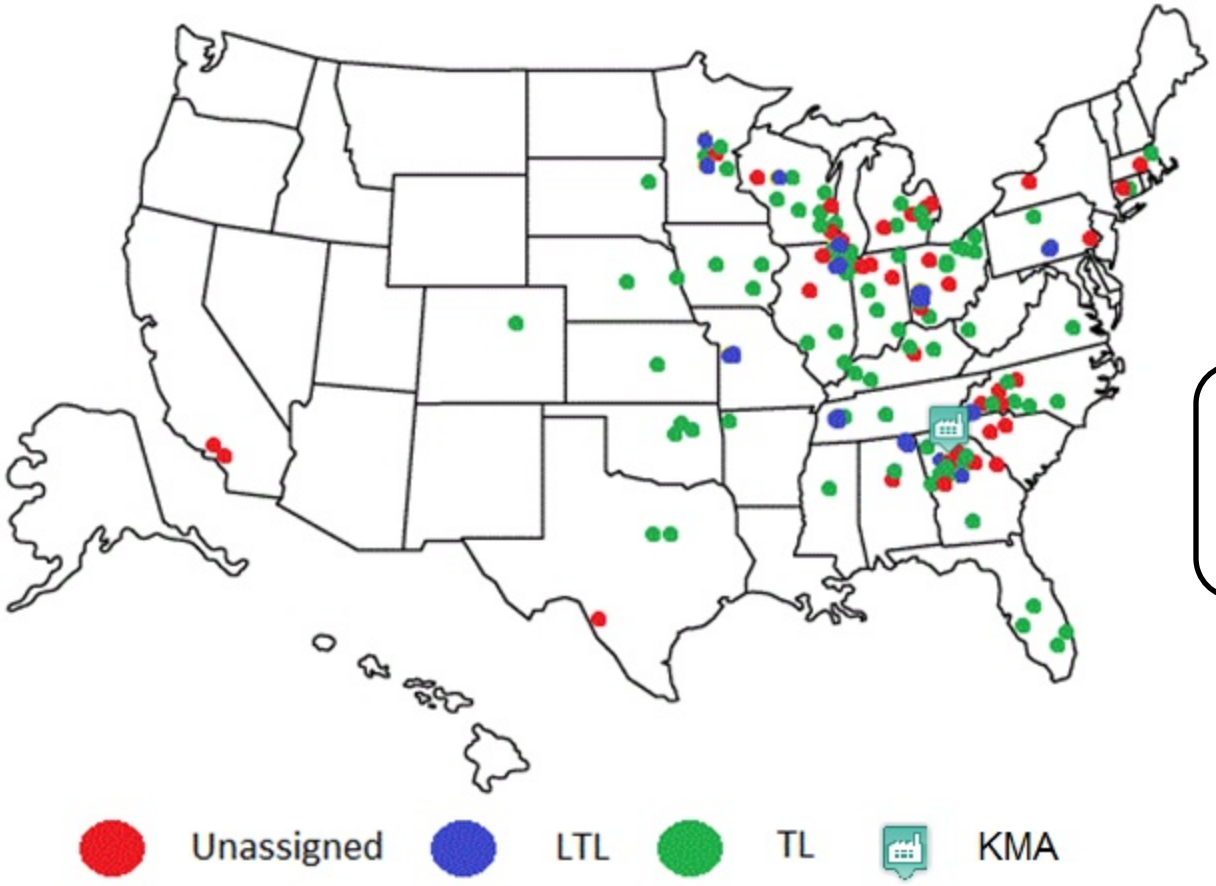
Project Description



- ~200 suppliers
- ~30 shipments/day

Direct vs. Consolidated

Direct Route

Consolidated Route

Overview

Problem

Domestic inbound freight costs:

- Infrequent change of transportation mode
- Routes manually consolidated

Deliverables

Open source tool:

- Assign transportation modes
- Consolidate shipment routes

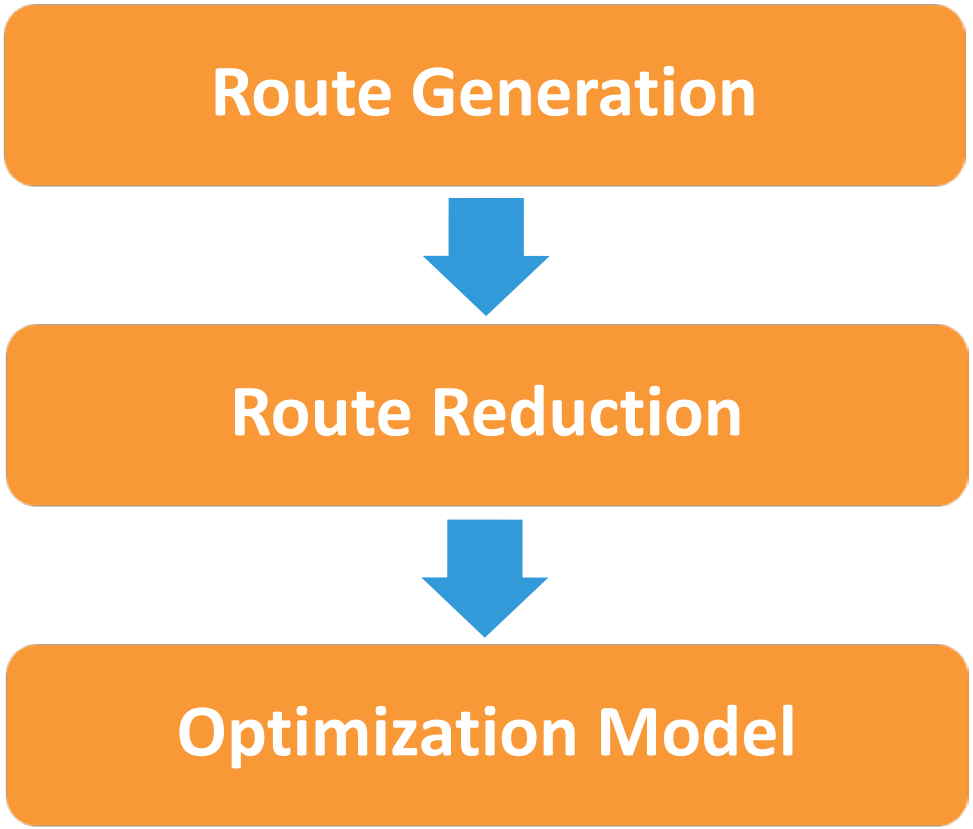
Value Added

- Average transportation cost savings of 11.3% per week

Order Information

Supplier ID	Zip Code	Weight (lbs)	Floor Spots	Cube (m^3)	Delivery Date
A	55358	29000	16	85	12/3/2012
B	53038	15000	14	35	12/3/2012
C	54842	2500	4	15	12/4/2012
D	47130	12000	20	70	12/4/2012
E	54150	30000	13	75	12/6/2012

Methodology



Route Consolidation

Floor spots usage in week

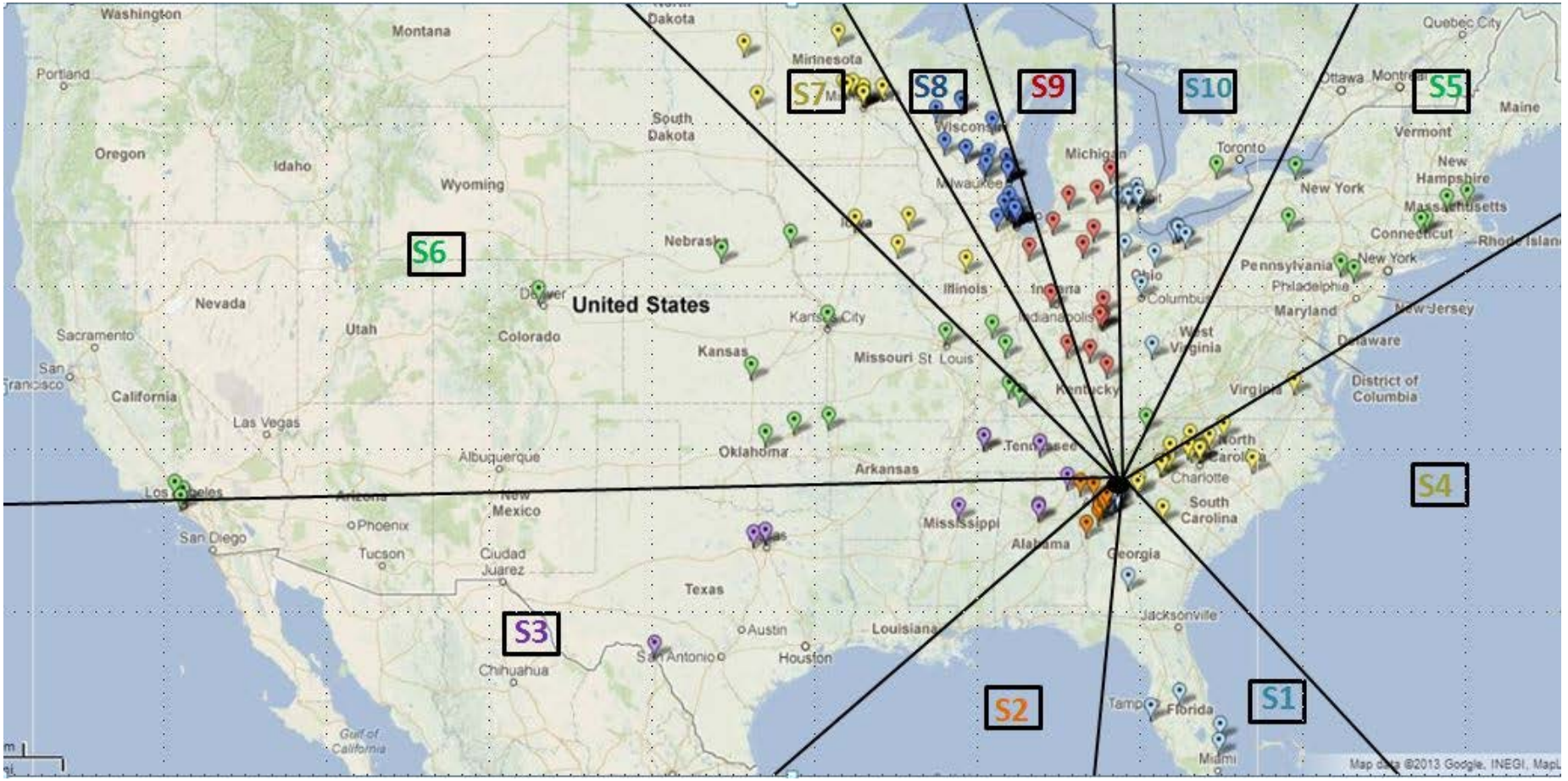
Supplier ID	Monday	Tuesday	Wednesday	Thursday	Friday
A	10	15	5	12	17
B	3	1	4	5	7
C	9	9	10	9	3
D	20	0	0	0	0
E	10	10	5	5	5
F	1	0	0	0	15

Consolidation across days

Consolidation across suppliers

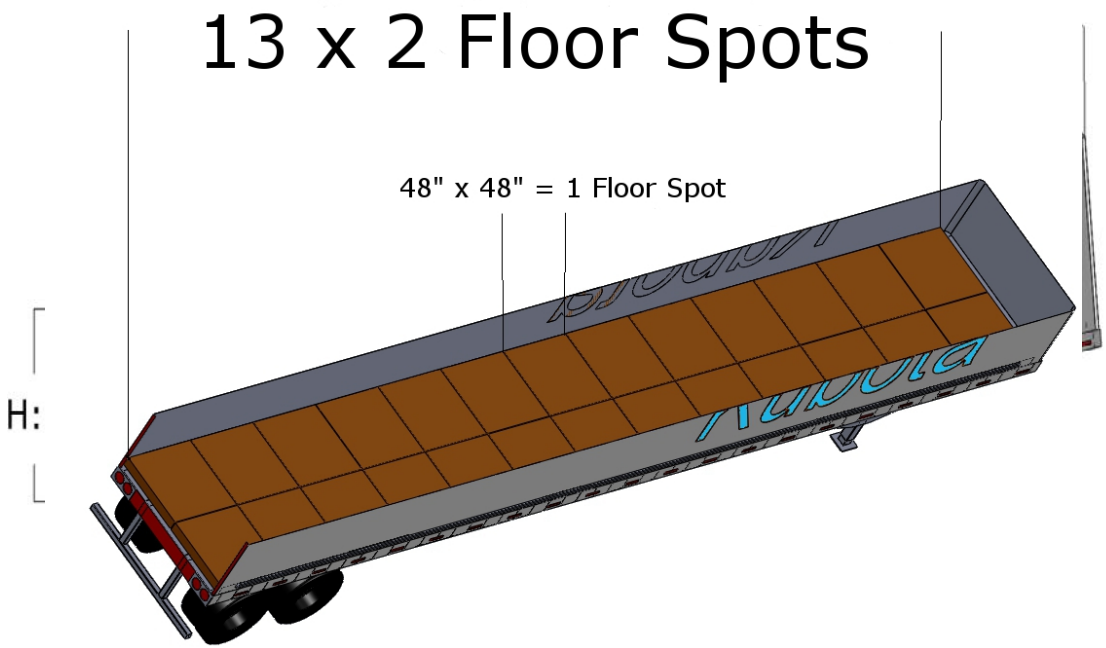
Consolidation across days and suppliers

Group Selection



Capacity Constraints

Weight



Volume

Cost Calculation

Less-than Truckload

- Estimates from 3PL
- Inputs:
  - Origin zip code
  - Destination zip code
  - Weight
  - Date of shipment

Truckload

- Road distance based on zip codes
- Mileage rates for regions
- $75 stoppage fee
- Average national fuel cost

Optimization Model

Input → **Optimization** → **Output**

- Set of routes
- Cost of each route

$$min \sum_{i=1}^{n} C_i * X_i$$

$$s.t. \sum_{i \in I_s} X_i = 1 \quad \forall S$$

$$X_i \text{ is binary}$$

$S = Subset\ of\ all\ suppliers$

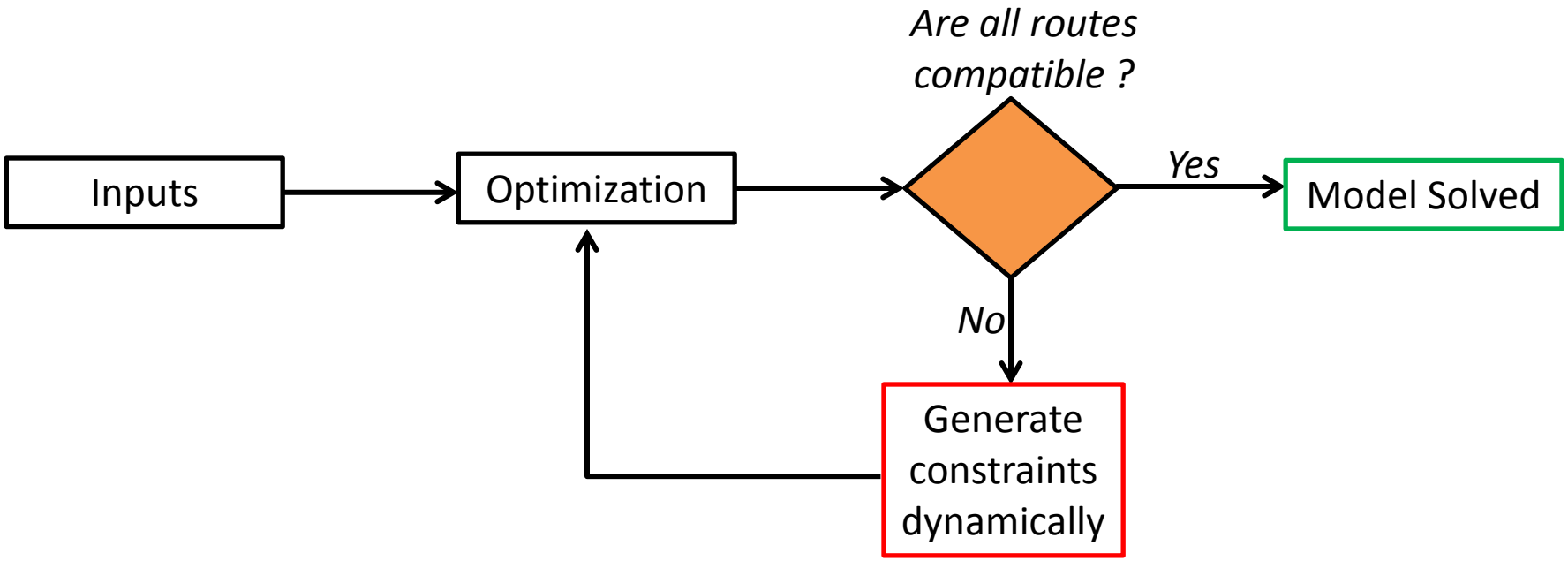
$I_s = Subset\ of\ all\ routes\ that\ pass\ through\ supplier\ S$

- Optimized total transportation cost
- Optimal routes

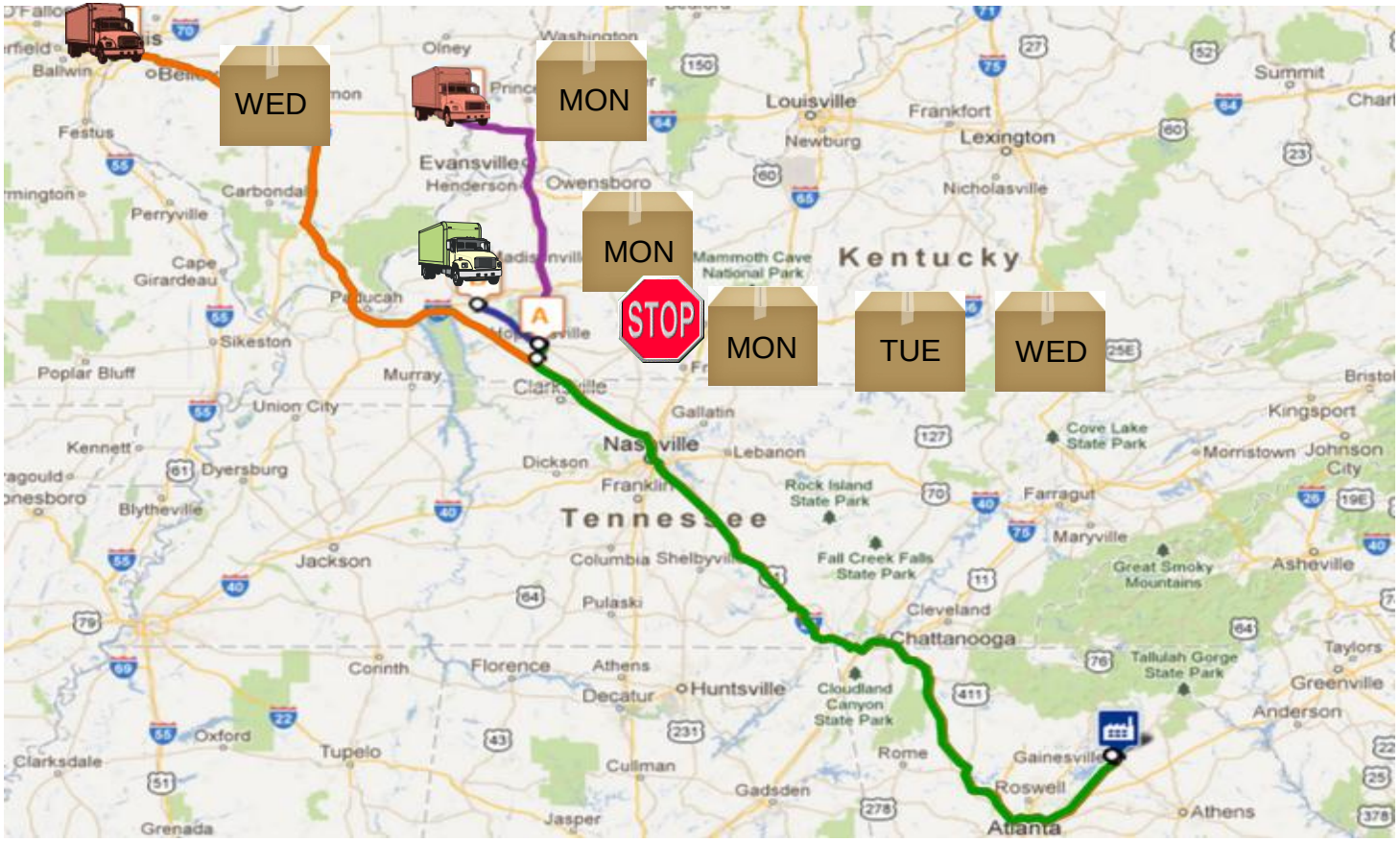
Incompatible Routes

Supplier ID	Monday	Tuesday	Wednesday
A	1	2	3
B	4		

Optimization Process

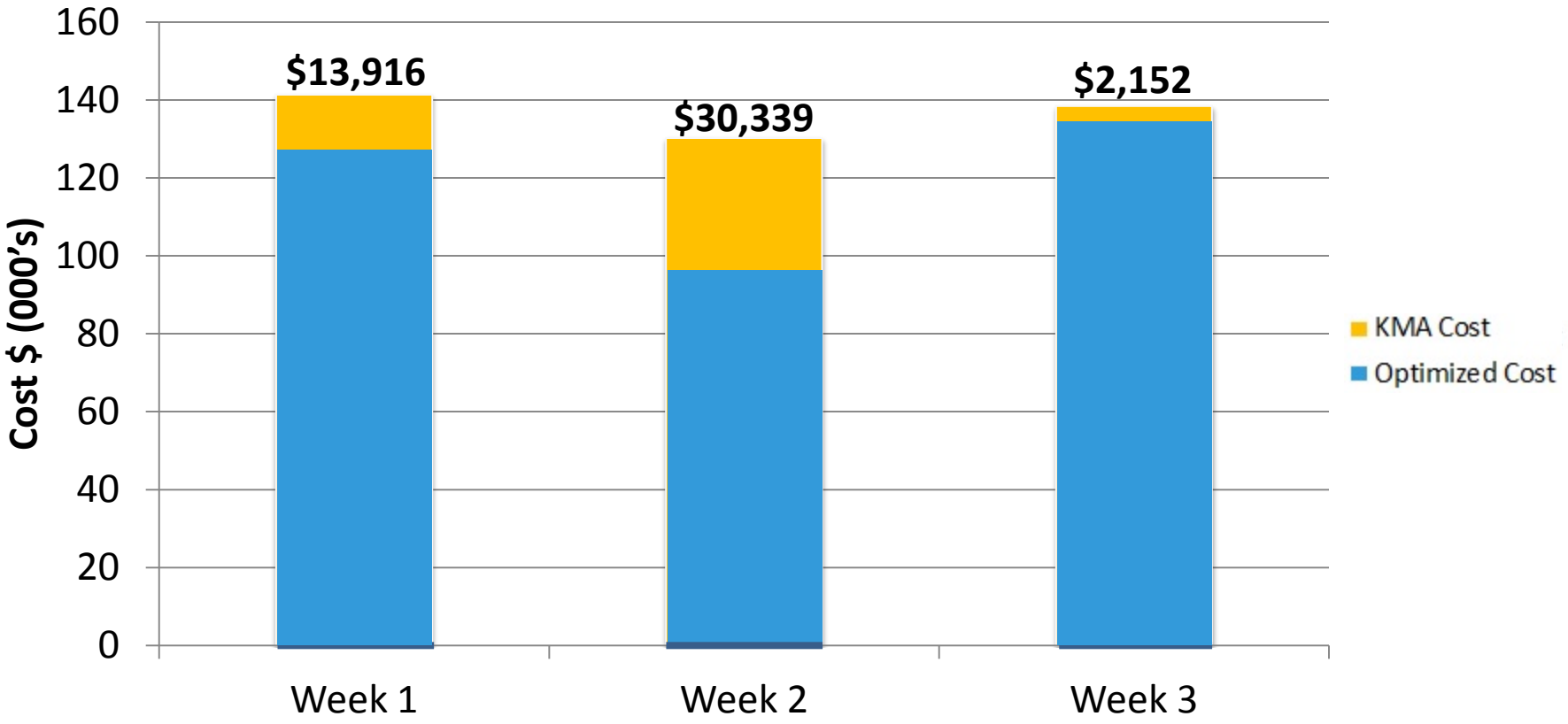


Example

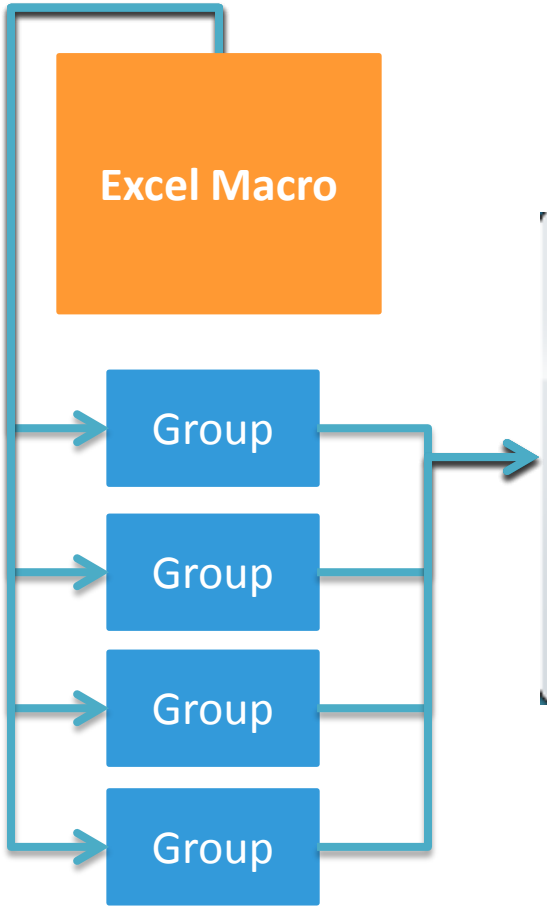


: TL : LTL

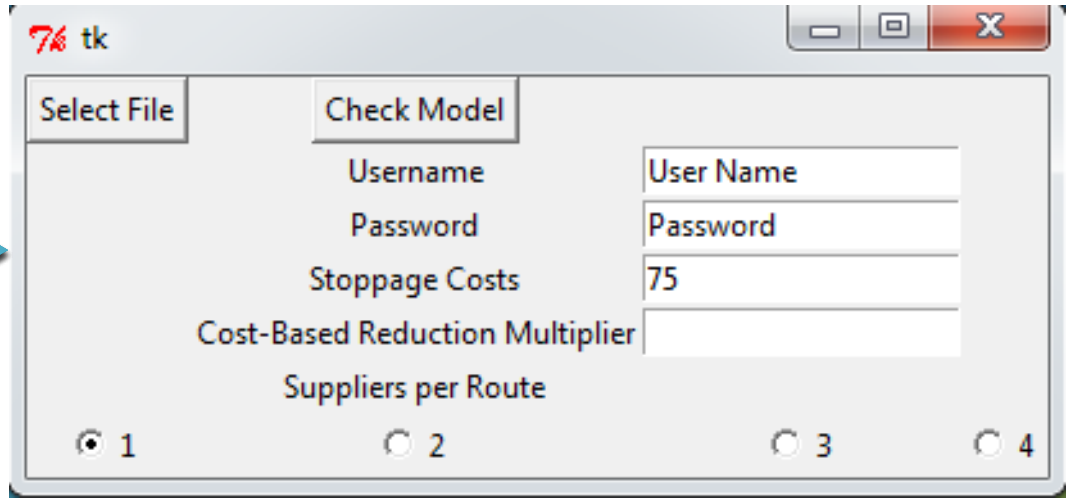
Value Added


160
140
120
100
80
60
40
20
0
Cost $ (000's)
$13,916
$30,339
$2,152
Week 1
Week 2
Week 3
KMA Cost
Optimized Cost

Deliverables



Route Generation Program



Summary

Objective	• Reducing domestic inbound freight cost
Methodology	• Route Generation • Route Reduction • Optimization model
Deliverables	• Assign transportation modes • Consolidate shipments
Value Added	• Average savings of 11.3% per week

Thank You

Questions?