

MIT-CTL Study on the EPA SmartWay Program

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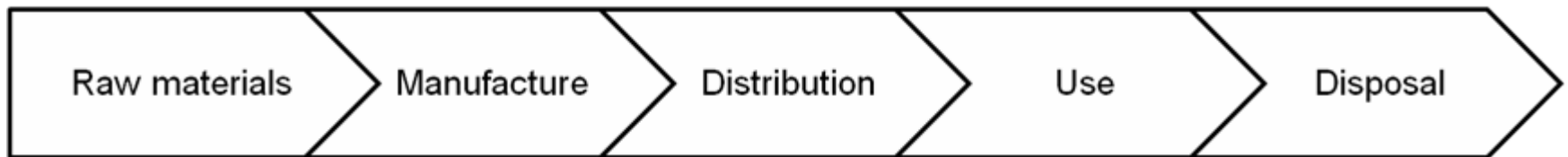
November 18, 2008



<http://ctl.mit.edu>

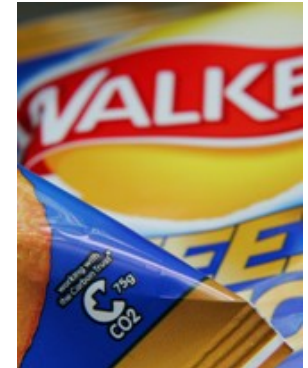
Carbon-Efficient Supply Chains

- Challenges facing our society
 - Rising energy demand and decreasing supply
 - Impacts of climate change
- Strategies to reduce greenhouse gas emissions
- Addressing issue from supply chain perspective



Carbon-Efficient Supply Chains

- Research has focused on:
 - Methodology and strategies
 - Reporting and labeling



CO2 Labels Proposed for Beer Cans by '09



Carbon Facts

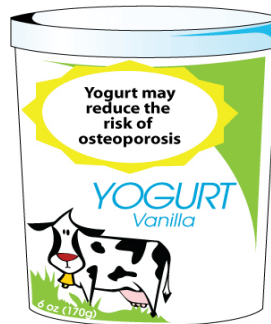
Product Size 1 Cheeseburger (130g)

Amount Per Serving	
Kilograms CO ₂ Equivalent	3.08
Kilograms CO ₂	2.43
Kilograms CH ₄	1.23
Total C: Energy Sources	243g
<i>Transportation</i>	
Fossil Fuel (Diesel)	120g
Fossil Fuel (Gasoline)	49g
<i>Electricity Production</i>	
Fossil Fuel (Natural Gas)	75g
Fossil Fuel (Coal)	0g
Other	
Total C: Non-Energy Sources	2840gCO₂e
Enteric Fermentation	81.0g (1864gCO ₂ e)
Manure	25.8g (606gCO ₂ e)
Other	5.2g (126gCO ₂ e)
Carbon/Product Ratio	23.7
Localism Rating	Yellow
Sustainable Production Rating	D+
overall carbon code: orange	



Carbon-Efficient Supply Chains

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 - Methodology and strategies
 - Reporting and labeling



Sample label for Macaroni & Cheese

Nutrition Facts	
Serving Size 1 cup (228g) Servings Per Container 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value*	
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories: 2,000	2,500
Total Fat	Less than 65g	80g
Sat Fat	Less than 20g	25g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2,400mg	2,400mg
Total Carbohydrate	300g	375g
Dietary Fiber	25g	30g

① Start Here →

② Check Calories

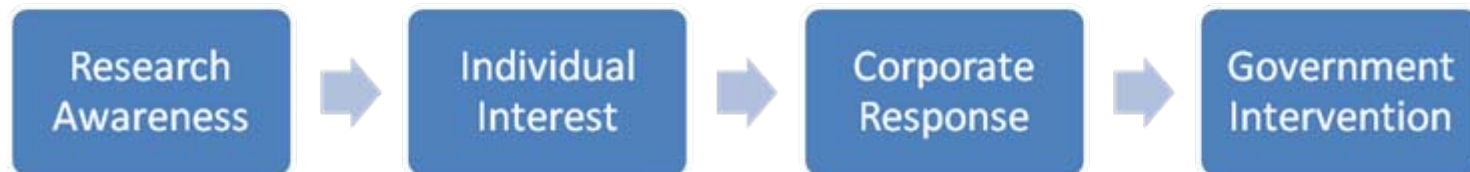
③ Limit these Nutrients

④ Get Enough of these Nutrients

⑤ Footnote

⑥ Quick Guide to % DV

- 5% or less is Low
- 20% or more is High



Model of events leading up to mandatory nutritional labeling

Objectives of Study

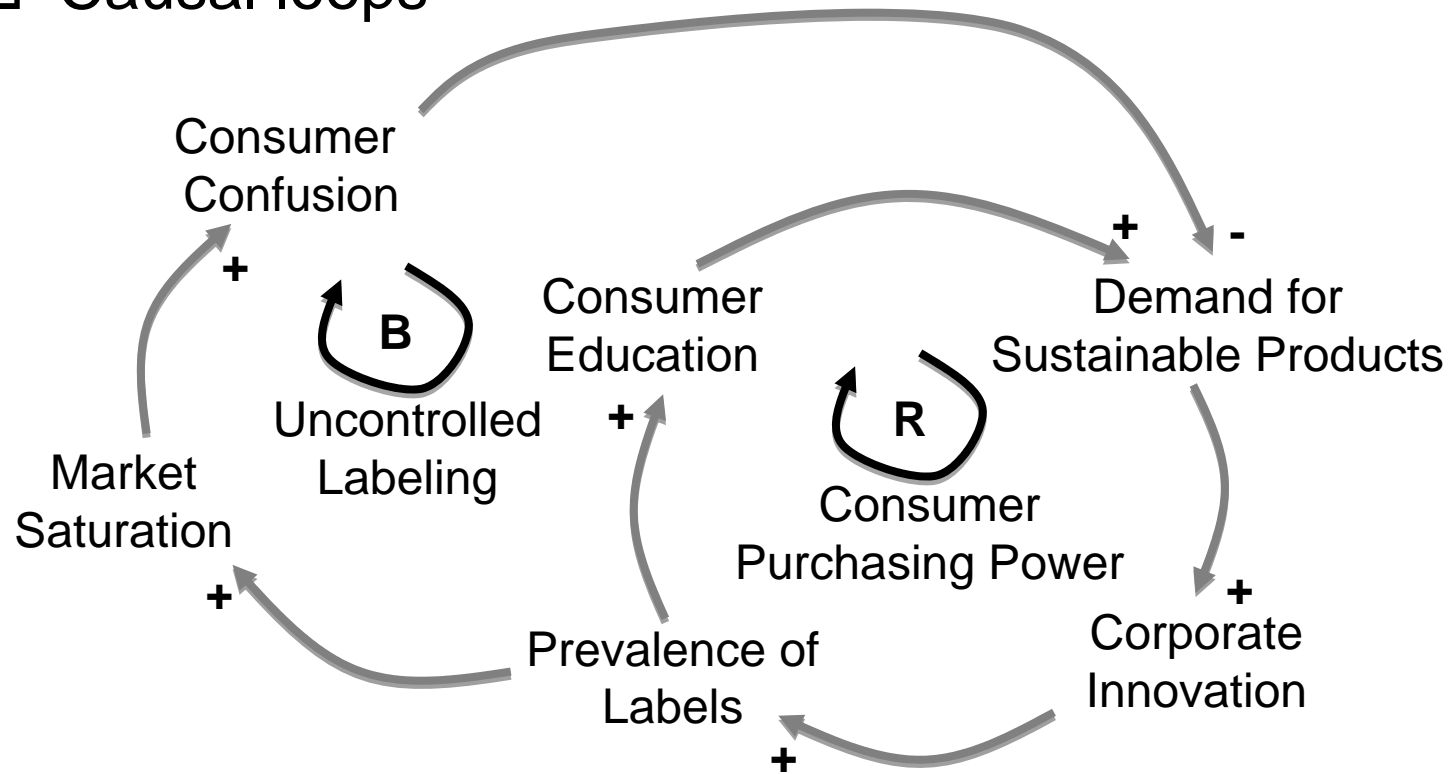
- Understanding factors contributing to success of the SmartWay program
- Possible implementations in other countries or in broader scopes
- Policies to ensure that success is sustained over the long run

System Dynamics

- Approach to studying complex systems
 - Non-linear responses
 - Internal feedback loops
 - Time delays
- Developing model structure
- Performing simulations to test policies and understanding change over time

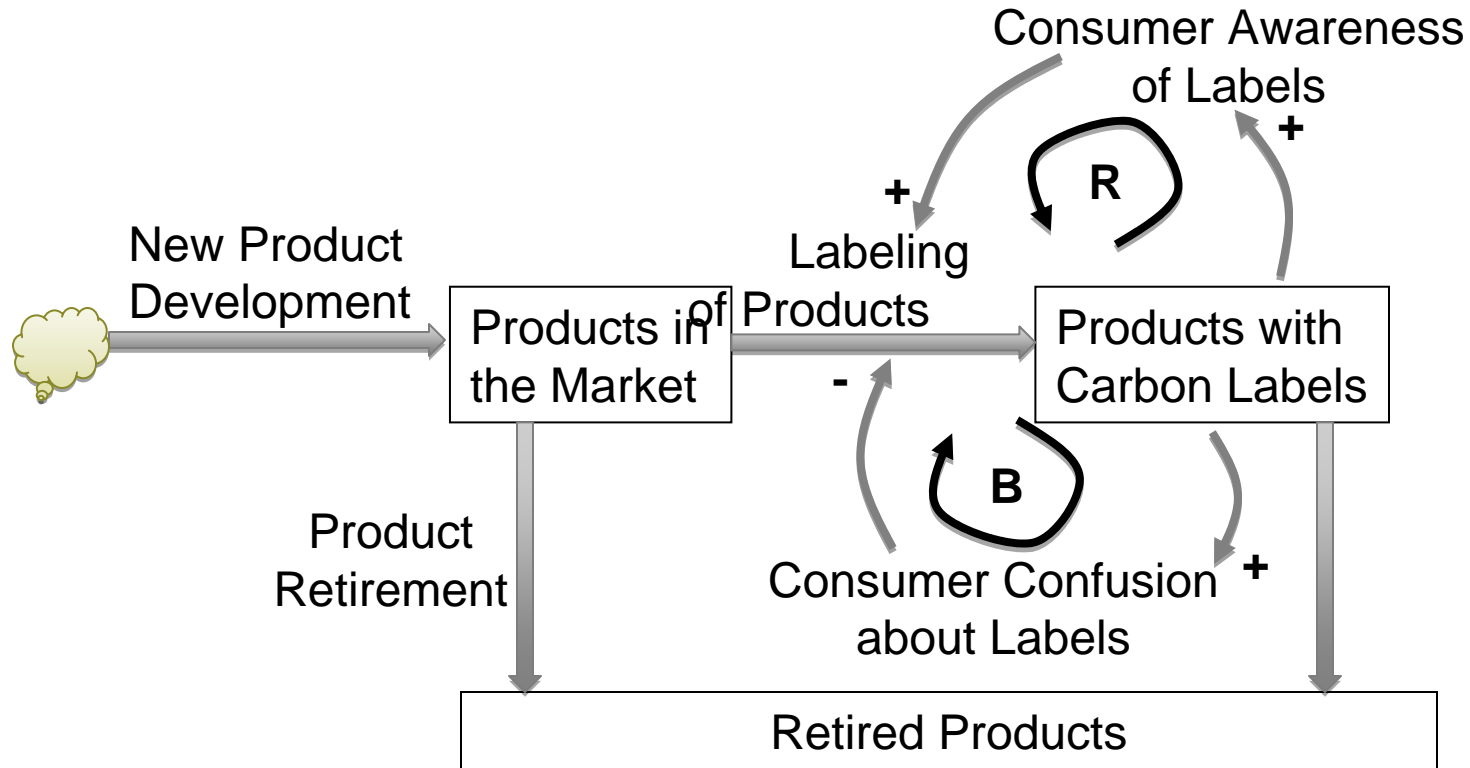
System Dynamics

- Approach to studying complex systems
 - Causal loops



System Dynamics

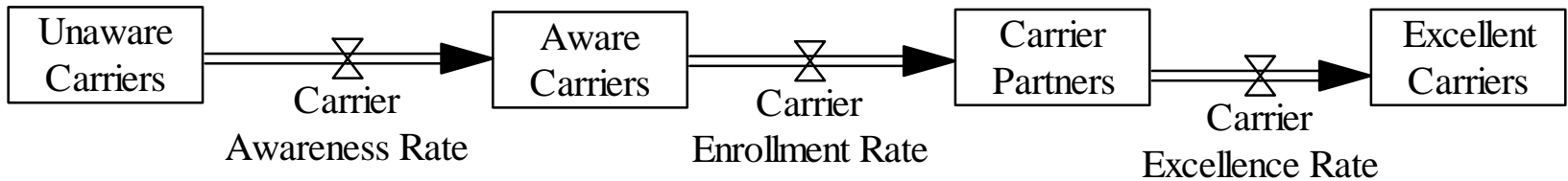
- Approach to studying complex systems
 - Stock and flow diagrams



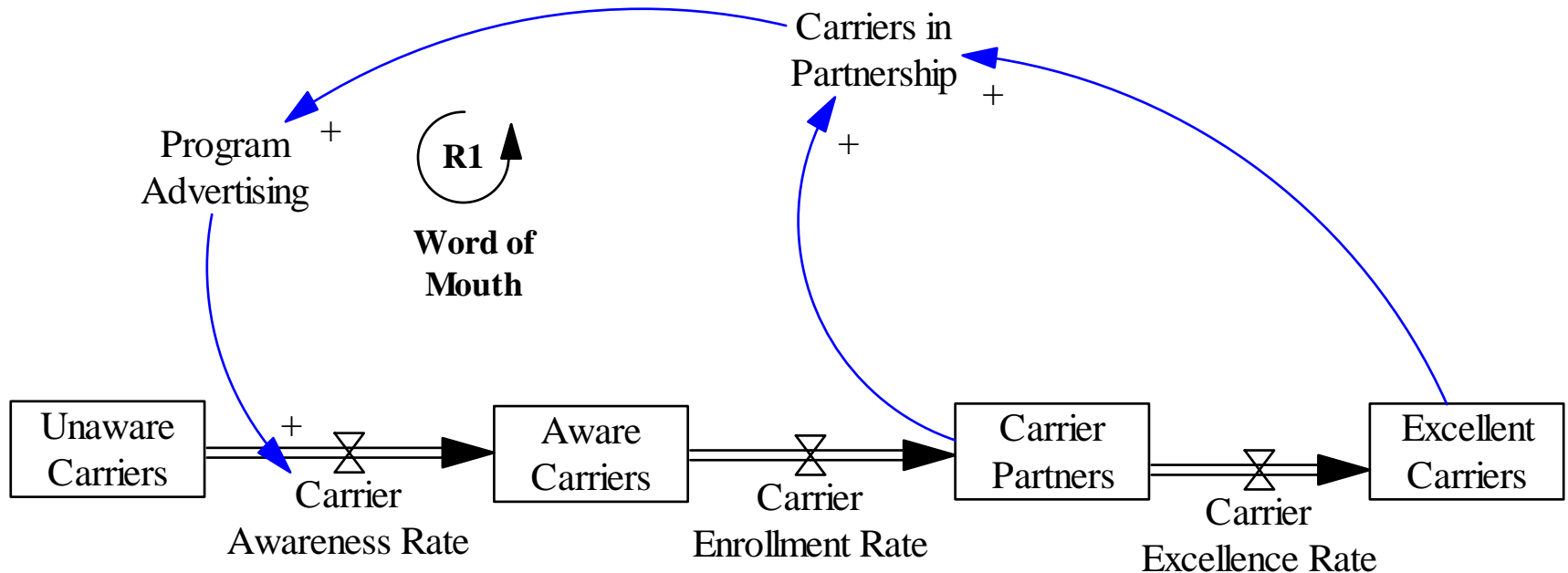
SmartWay Model

- Work in progress
- Reiterative process
 - Initial framework developed in May
 - Visit to SmartWay team in June
 - Interviews with partners in Sep/Oct

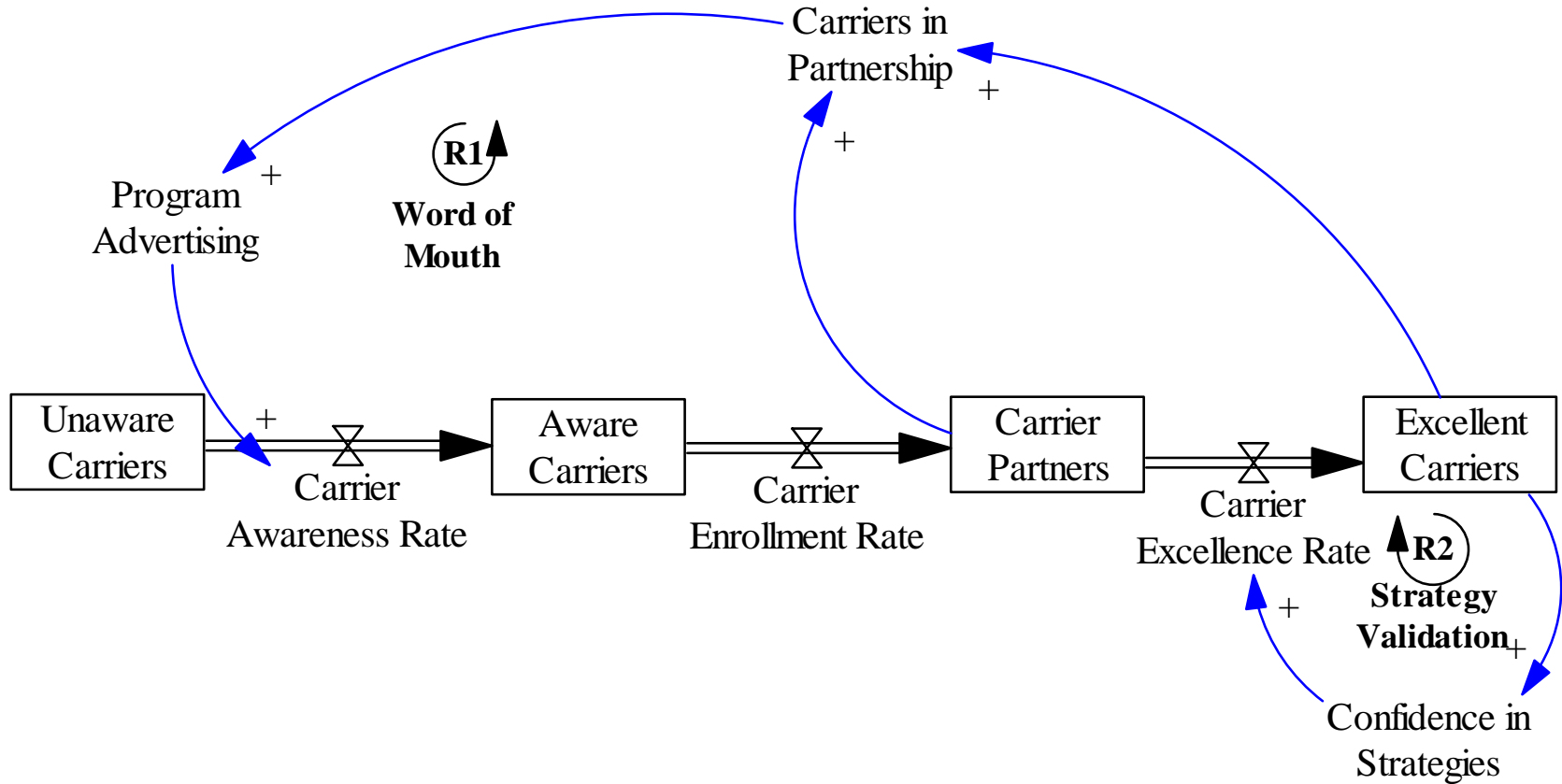
Carrier Stocks and Flows



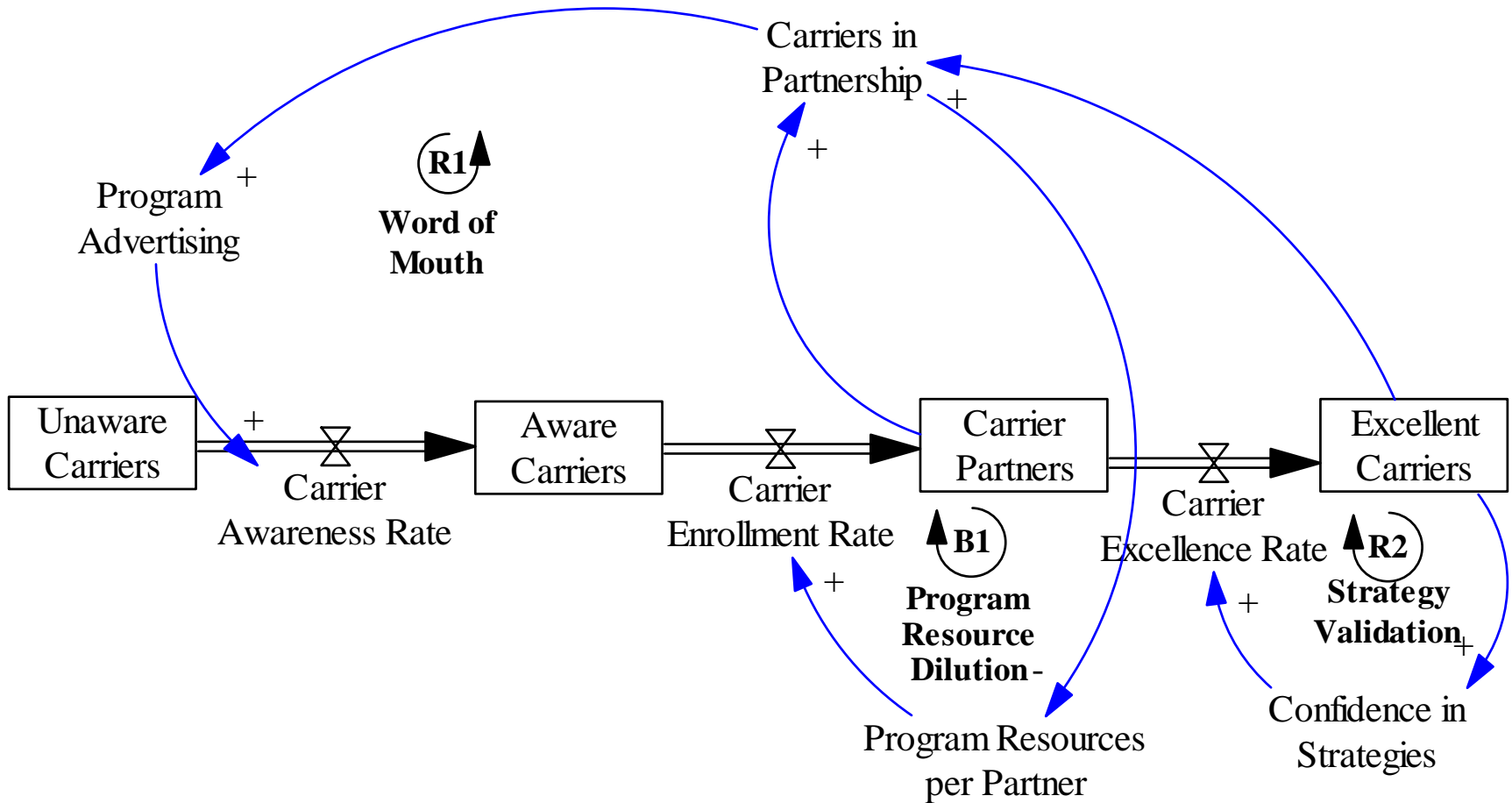
Reinforcing Loop 1: Word of Mouth



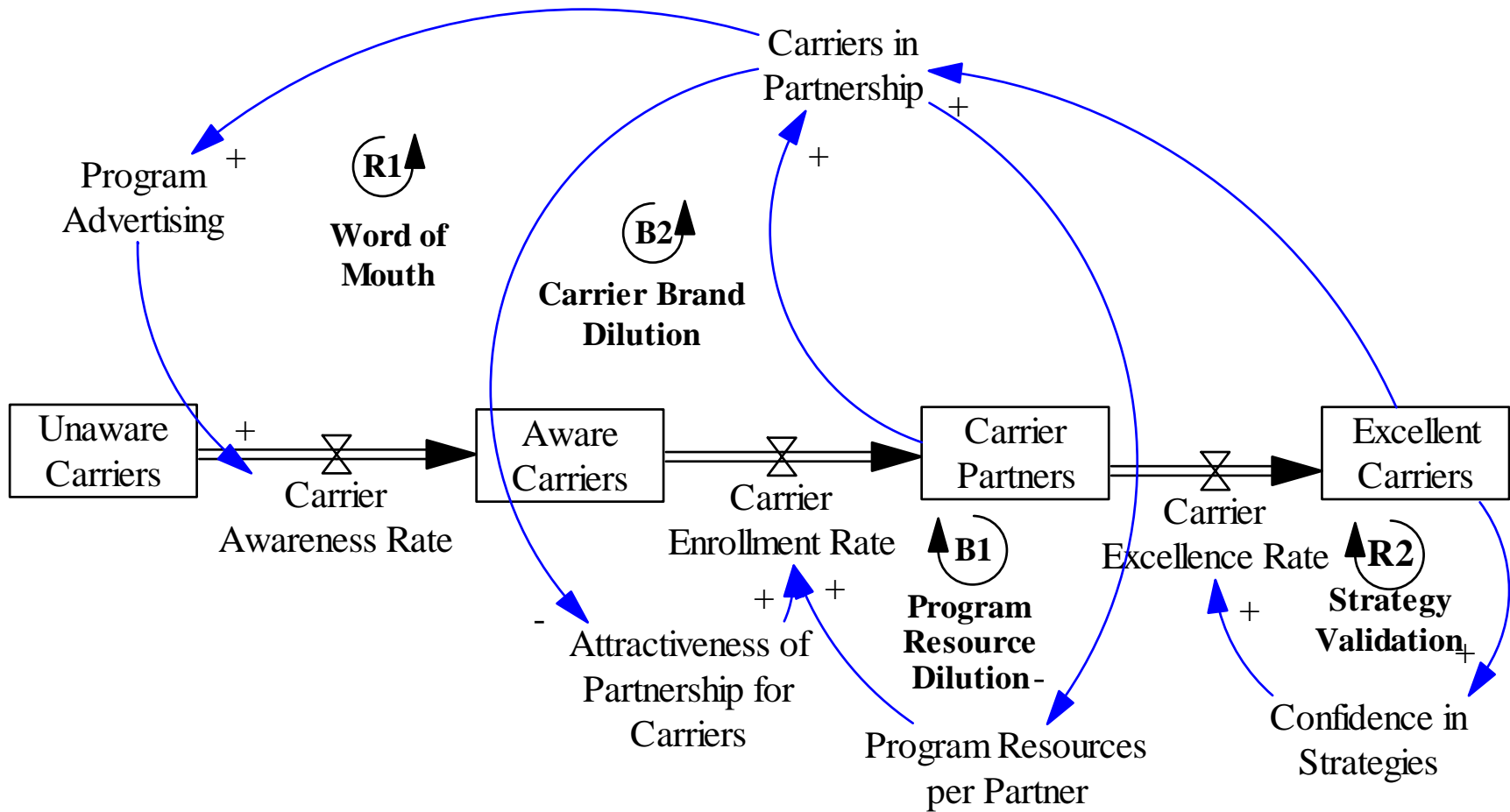
Reinforcing Loop 2: Strategy Validation



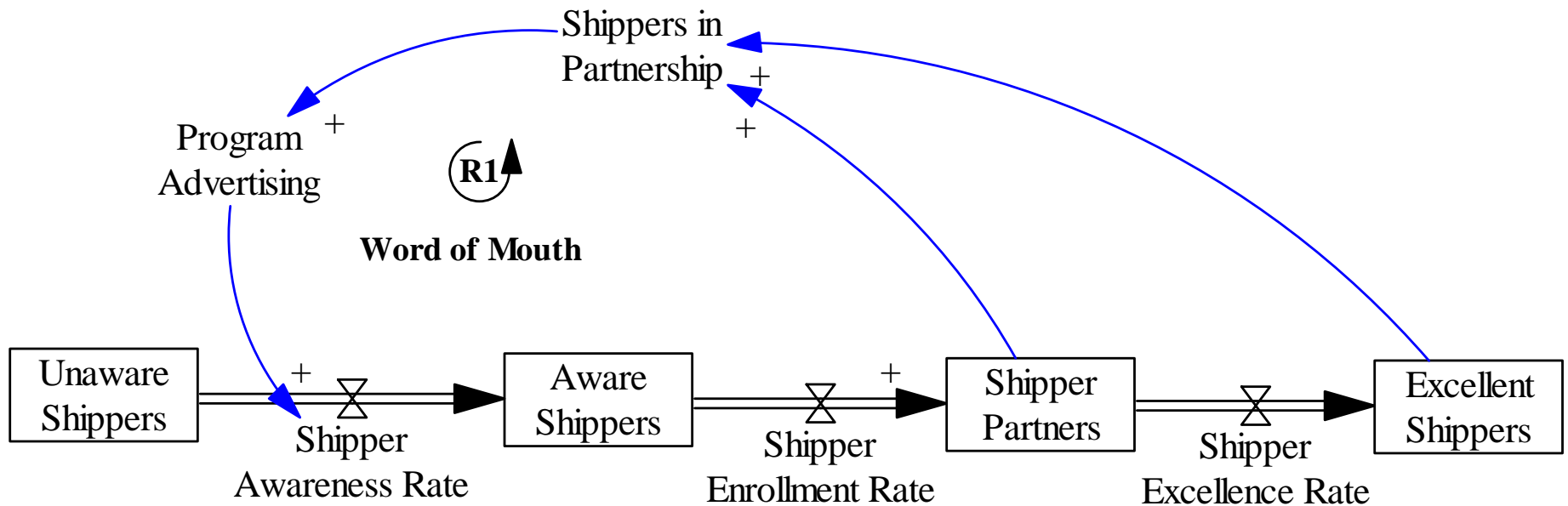
Balancing Loop 1: Resource Dilution



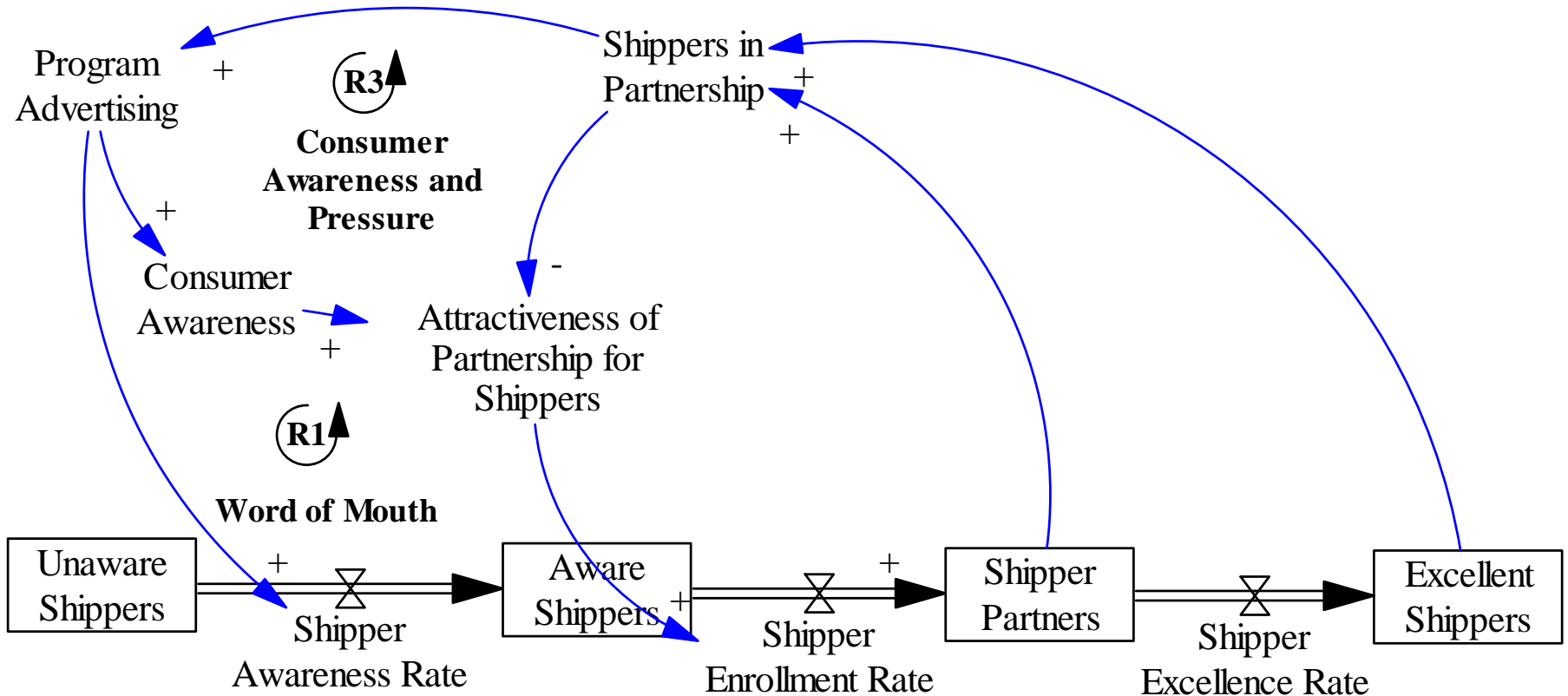
Balancing Loop 2: Brand Dilution



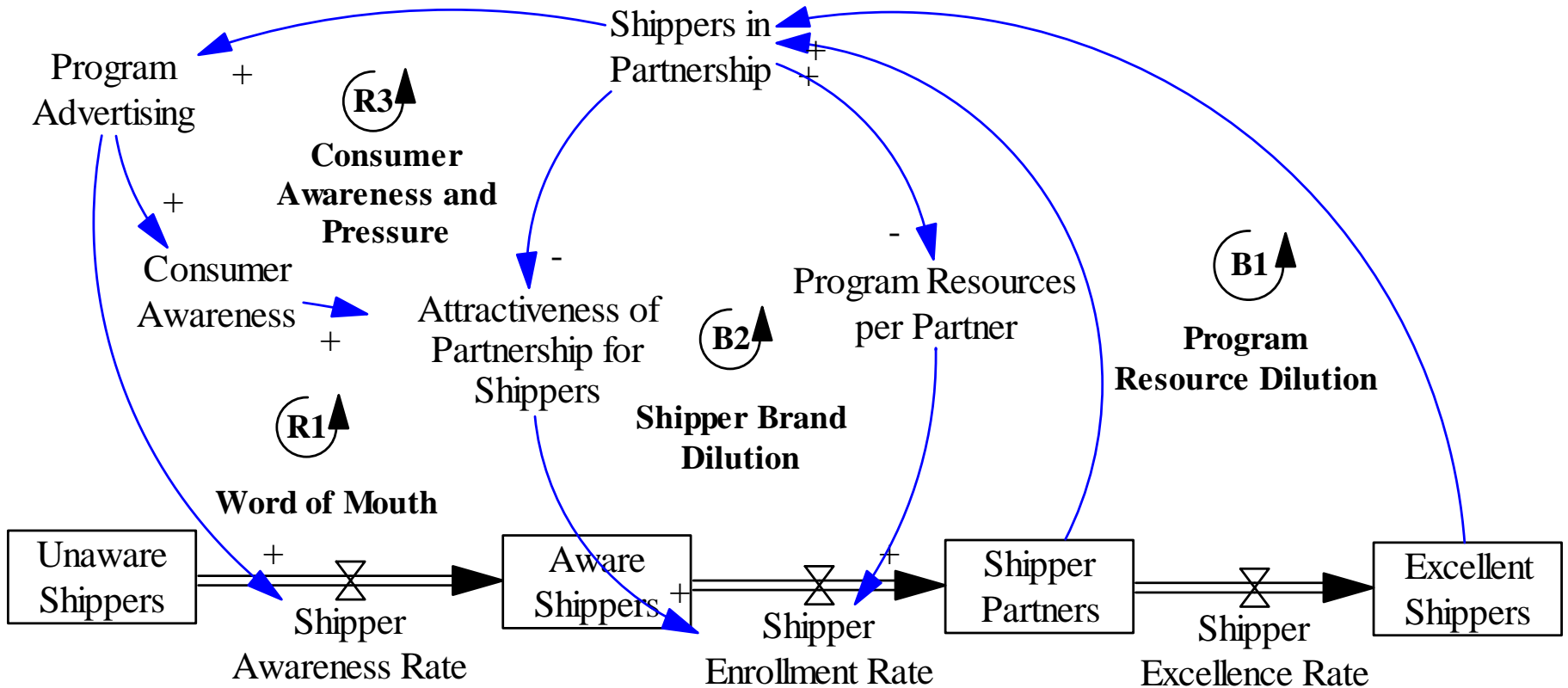
Shipper Stocks and Flows



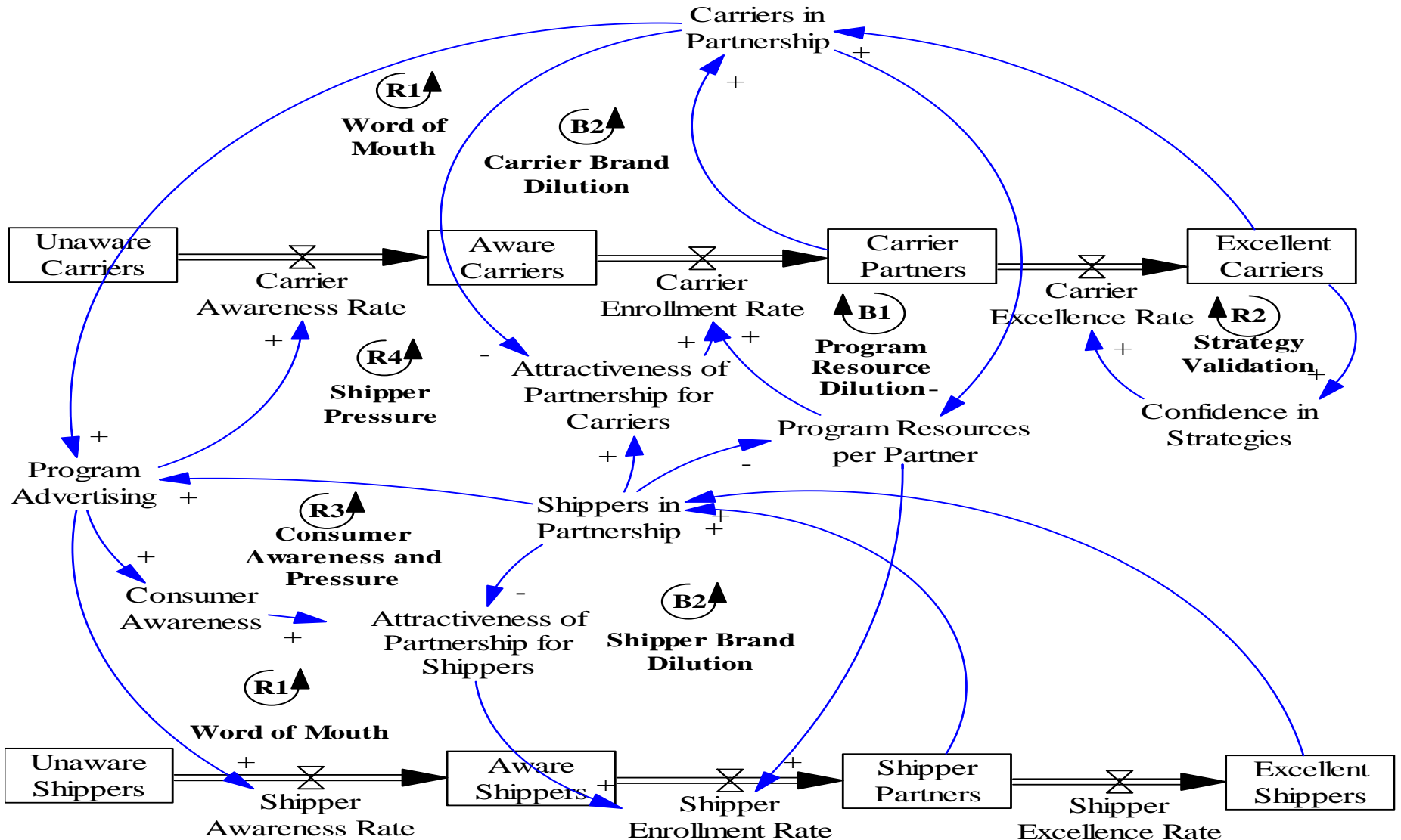
Reinforcing Loop 3: Consumers



Shipper Balancing Loops

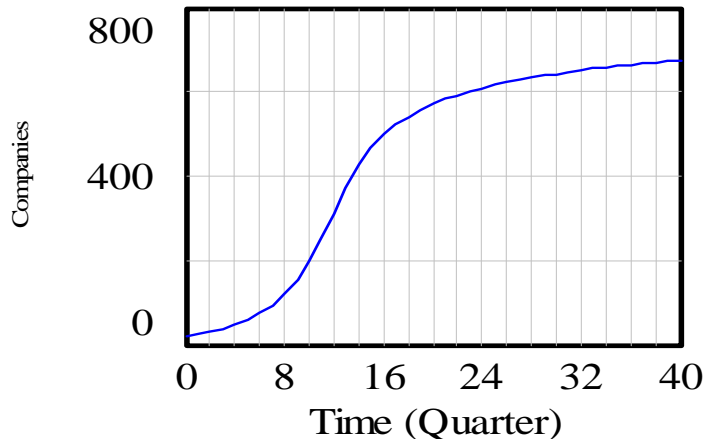


Stock and Flow Diagram



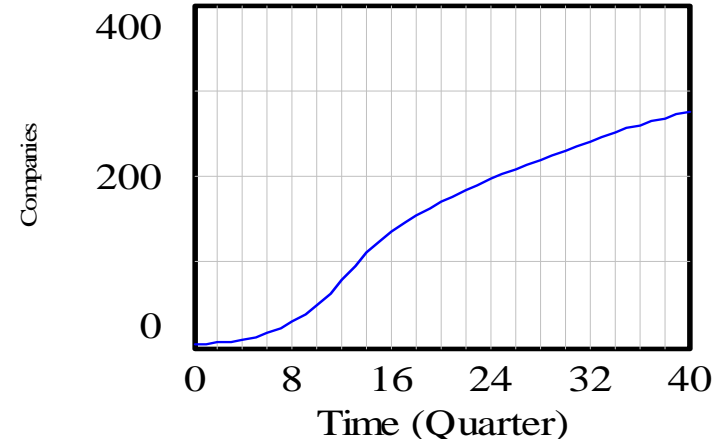
Baseline Simulation

Total Carrier Partners



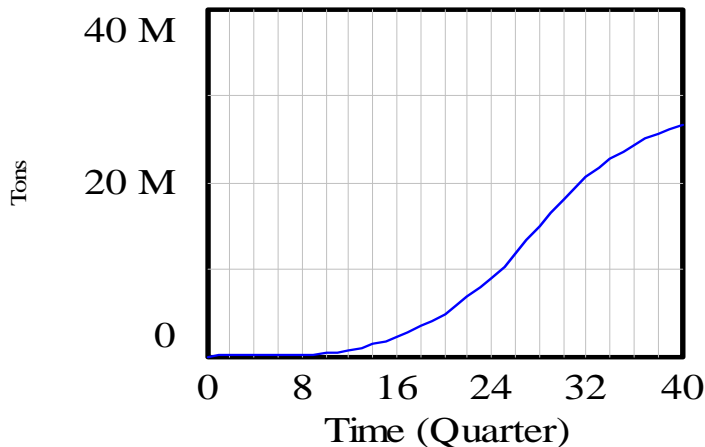
Total Carrier Partners : Baseline

Total Shipper Partners



Total Shipper Partners : Baseline

CO2 Emissions Reductions

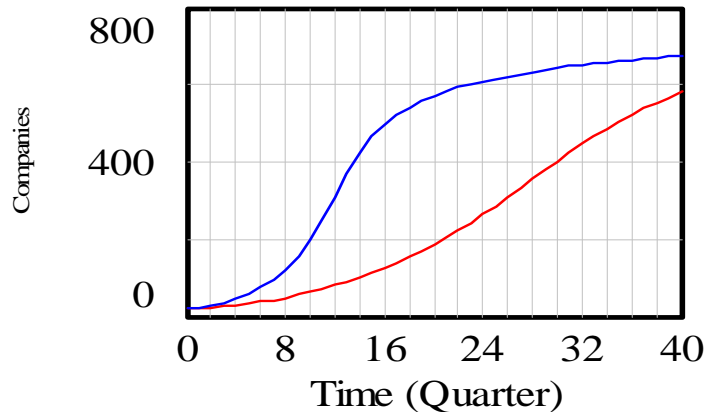


CO2 Emissions Reductions : Baseline

- Rapid initial growth
 - Word of mouth
 - Advertising
 - Recruitment
 - Shipper pressure
- Saturation
 - Limited program resources

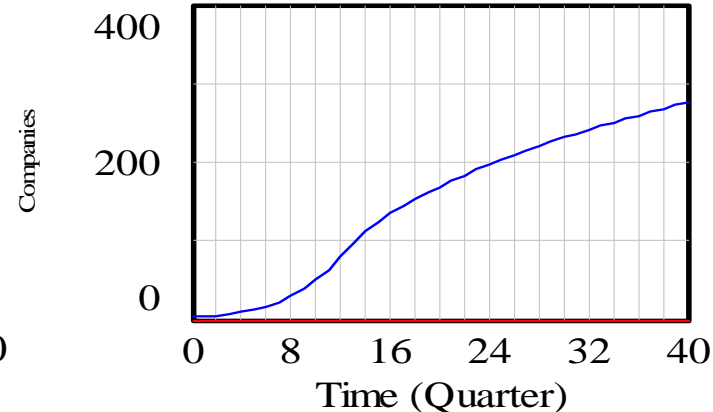
No Shipper Scenario

Total Carrier Partners



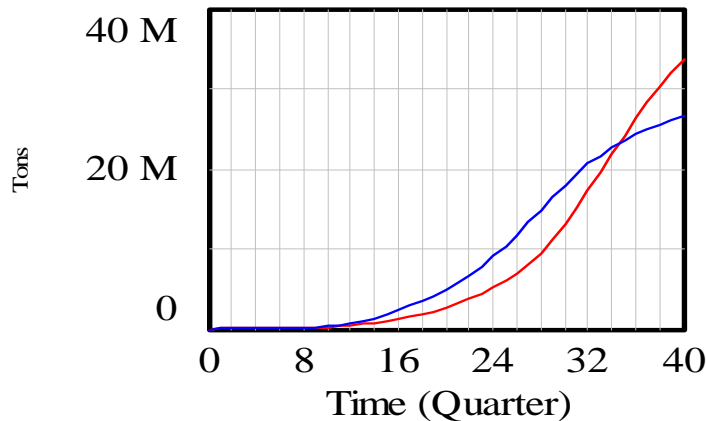
Total Carrier Partners : Baseline — (blue line)
 Total Carrier Partners : No Shippers — (red line)

Total Shipper Partners



Total Shipper Partners : Baseline — (blue line)
 Total Shipper Partners : No Shippers — (red line)

CO2 Emissions Reductions

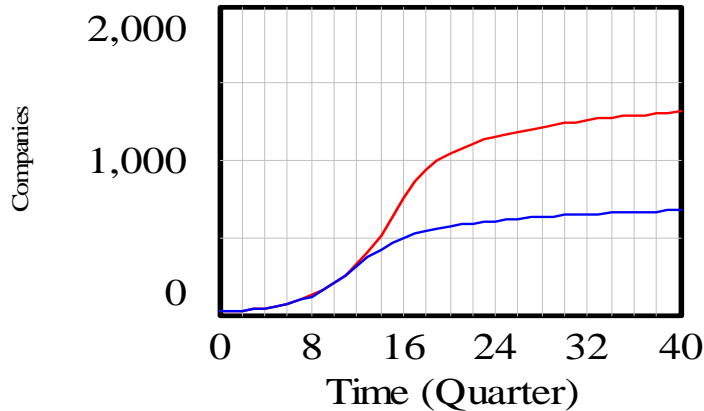


CO2 Emissions Reductions : Baseline — (blue line)
 CO2 Emissions Reductions : No Shippers — (red line)

- Slow initial growth
 - Importance of shipper influence
- Larger long term CO₂ reductions
 - Focus on carrier emission potential
 - But assuming resource constraint

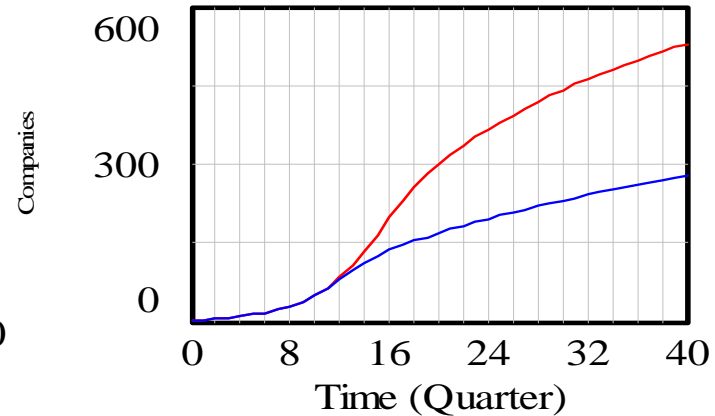
Double Partner Budget

Total Carrier Partners



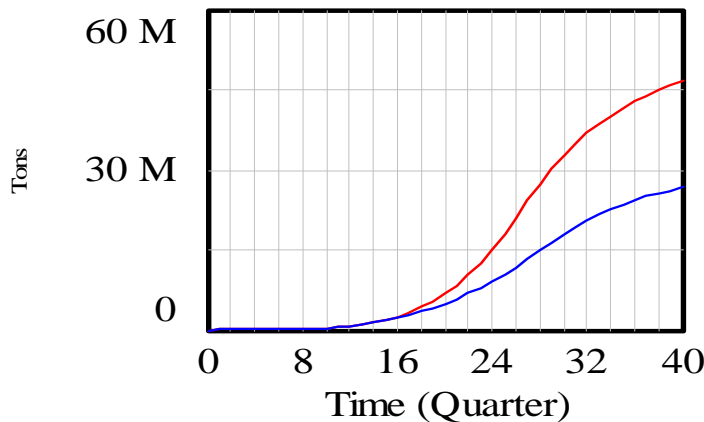
Total Carrier Partners : Baseline — (blue line)
 Total Carrier Partners : Double Partner Budget — (red line)

Total Shipper Partners



Total Shipper Partners : Baseline — (blue line)
 Total Shipper Partners : Double Partner Budget — (red line)

CO2 Emissions Reductions

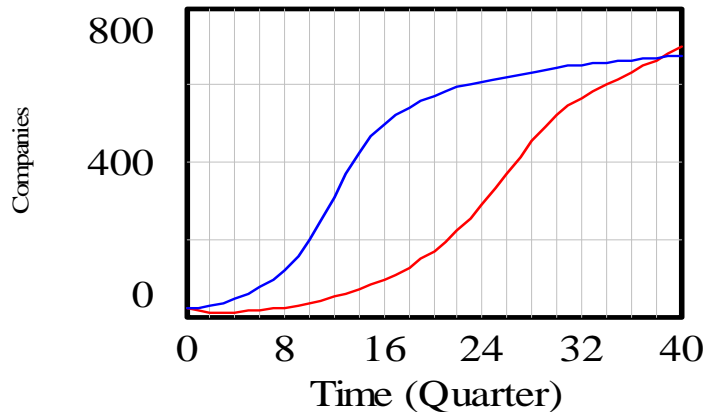


CO2 Emissions Reductions : Baseline — (blue line)
 CO2 Emissions Reductions : Double Partner Budget — (red line)

- Ability to handle more partners
 - But for a limited time
- Funding opportunities are limited

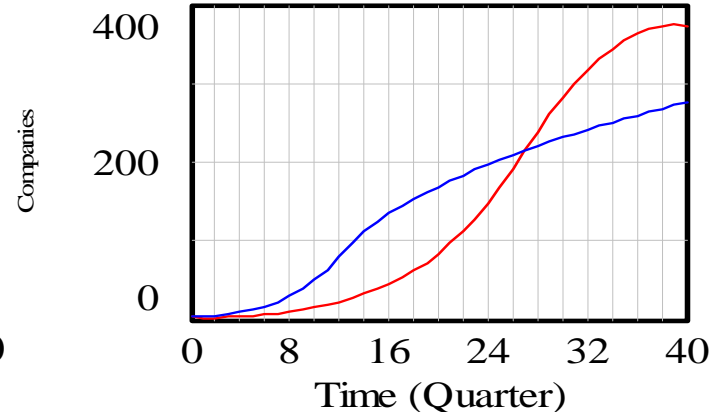
Reduction in Service Level

Total Carrier Partners



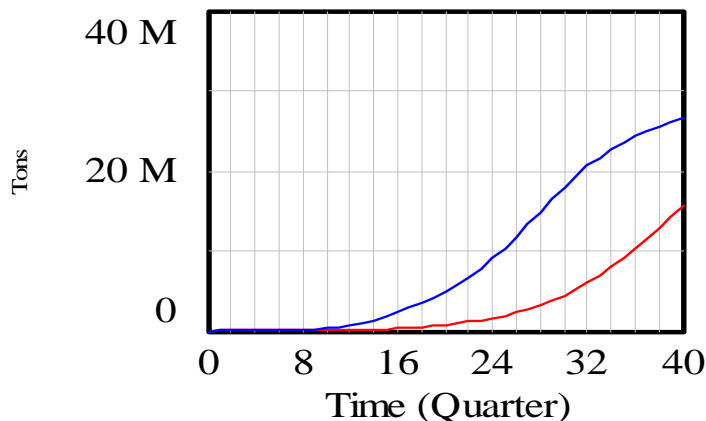
Total Carrier Partners : Baseline — (blue line)
 Total Carrier Partners : Service Level Reduction — (red line)

Total Shipper Partners



Total Shipper Partners : Baseline — (blue line)
 Total Shipper Partners : Service Level Reduction — (red line)

CO2 Emissions Reductions

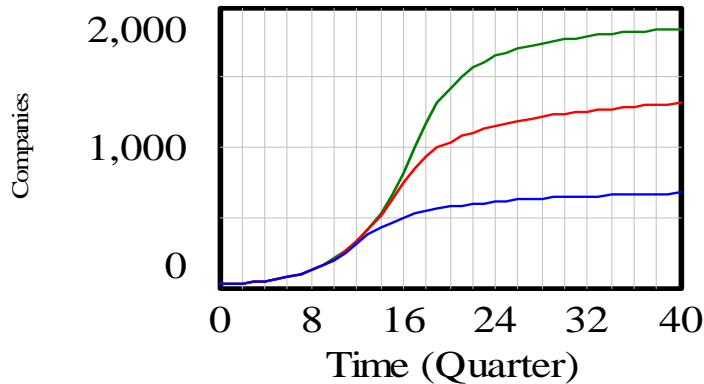


CO2 Emissions Reductions : Baseline — (blue line)
 CO2 Emissions Reductions : Service Level Reduction — (red line)

- Generic partner management
 - Less staff/resource intensive
- Reduced initial attractiveness

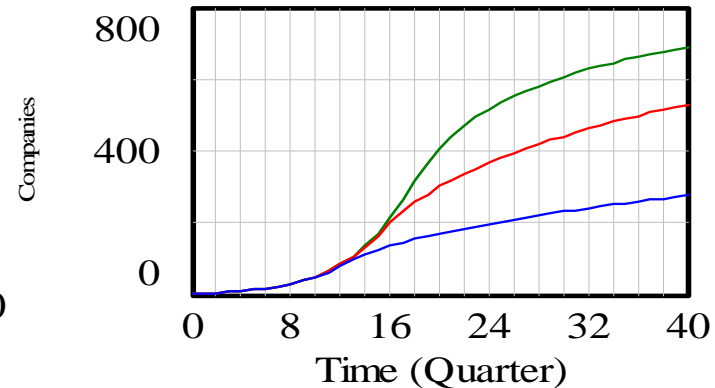
Large Carrier Focus

Total Carrier Partners



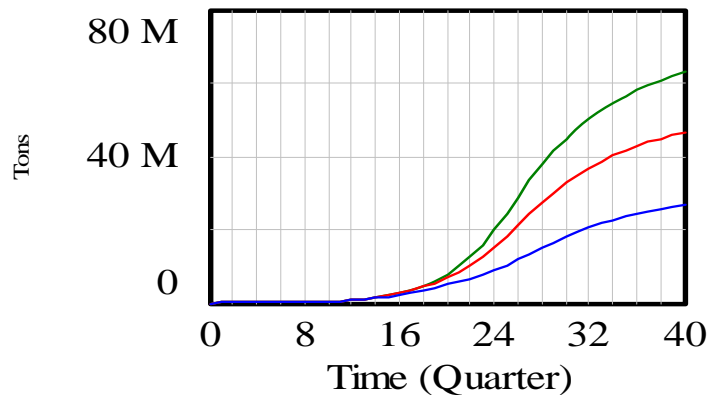
Total Carrier Partners : Baseline ———
 Total Carrier Partners : Double Partner Budget ———
 Total Carrier Partners : Large Carrier Focus ———

Total Shipper Partners



Total Shipper Partners : Baseline ———
 Total Shipper Partners : Double Partner Budget ———
 Total Shipper Partners : Large Carrier Focus ———

CO2 Emissions Reductions



CO2 Emissions Reductions : Baseline ———
 CO2 Emissions Reductions : Double Partner Budget ———
 CO2 Emissions Reductions : Large Carrier Focus ———

- Focus on larger carrier partners
 - Fleet size > 1000
 - Greater reduction potential
- Less direct involvement with smaller partners

Observations

- Importance of shipper participation in program
- Value of knowledge sharing in partnership for technology diffusion
- Provision of quality tools and services
- Dilution of brand not as significant
- Advantages of voluntary private public partnerships

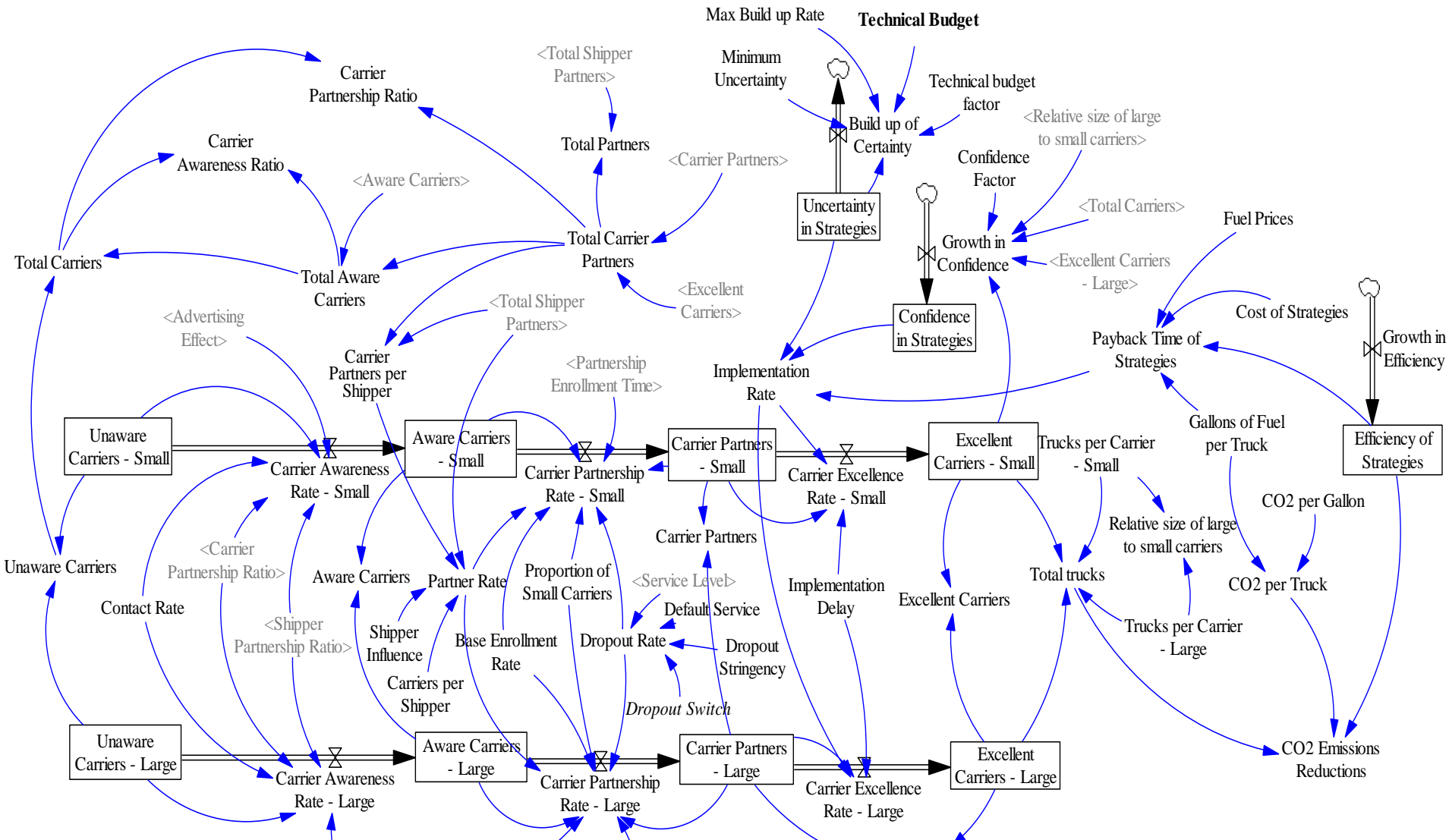
Special Thanks

- SmartWay team for their generous help and assistance in the study
- Partners who participated in the interviews and contributed their valuable feedback

Questions?

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SmartWay System Model 1/2



SmartWay System Model 2/2

