Inventory Optimization with Experian VIO, Mosaic and Simmons

Prepared for AASA Technology Council
by Justin Holman
03-30-12

TerraSeer

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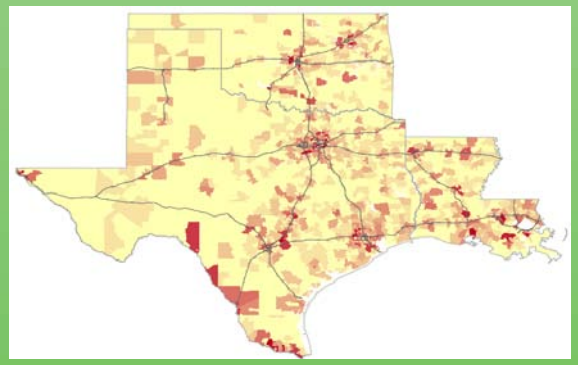
Overview

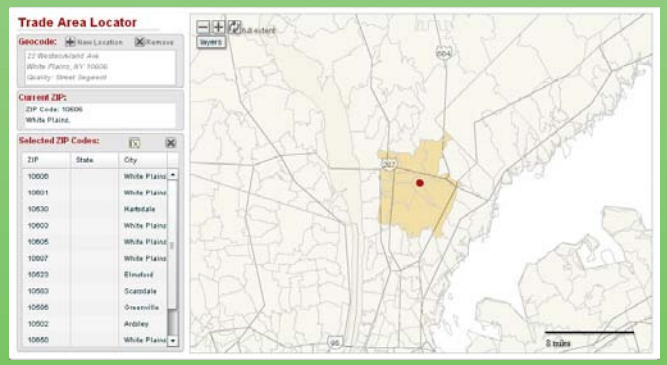
1. Replacement Rate Models
2. Demand Forecasting
3. Inventory Optimization
4. Enhanced Forecasting with Mosaic/Simmons

Inventory Optimization Process

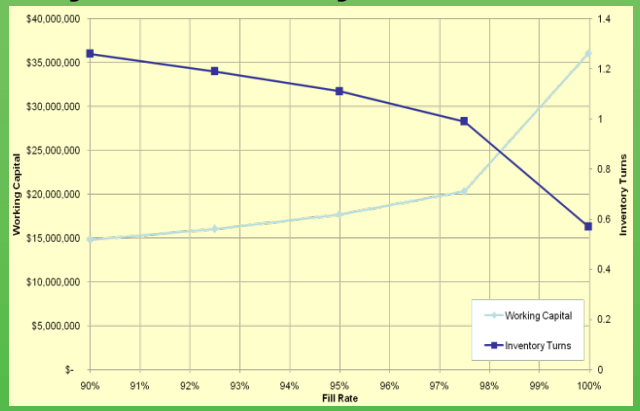
1. **Develop Total Demand Model**
   - Vehicle Registrations
   - Repair Rates By Part



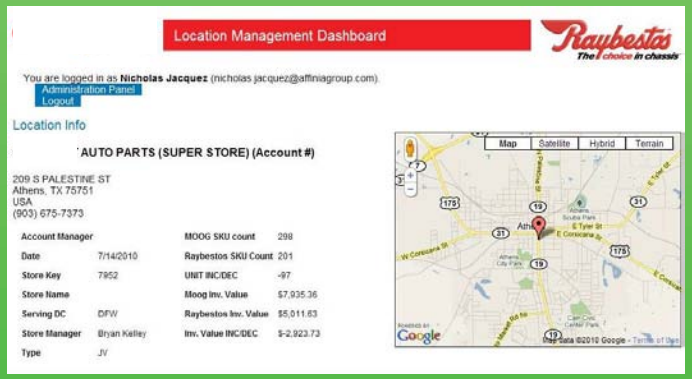
2. **Forecast Demand By Location**
   - Industry/Trade Area Dynamics
   - Market Share



3. **Optimize Store & DC Inventories**
   - By Location, By SKU



4. **Communicate & Manage Network**
   - Web Tools Enable Collaboration



Building a VIO/Repair Rate-Driven Demand Model

Data

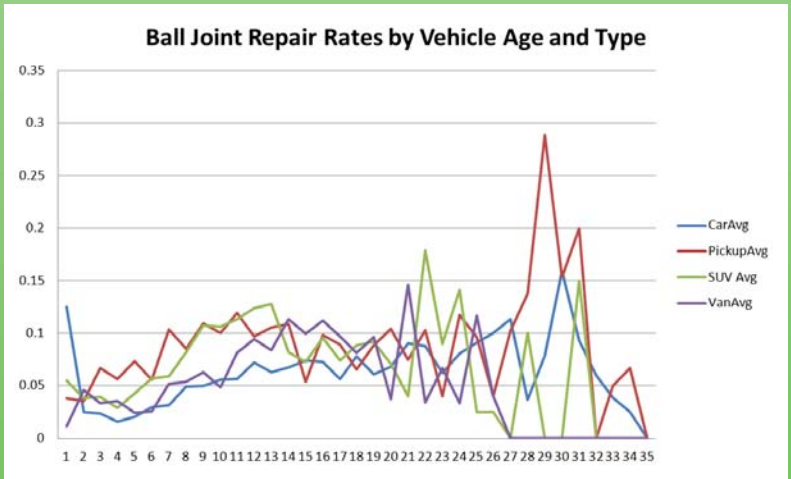
- Vehicles - VIO data at zip code level
- Repair Rates - create models using Consumer Panel Data
  - Annual survey conducted since 1975
  - 100,000 U.S. households, 175K – 200K vehicles annually
  - Sample balanced to Vehicle Registrations and representative by region and Key Demographic Factors

Repair Rate Statistical Modeling Process

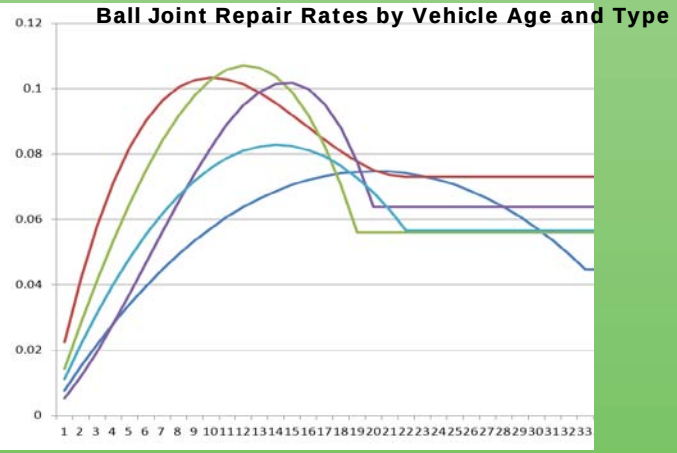
1. Calculate Survey Repair Rates from survey data
2. Create Model by vehicle age and type
3. Generate Adjustment Factors (e.g., Make, Model and Region)
4. Validate Predicted Values (prediction vs actual by market)

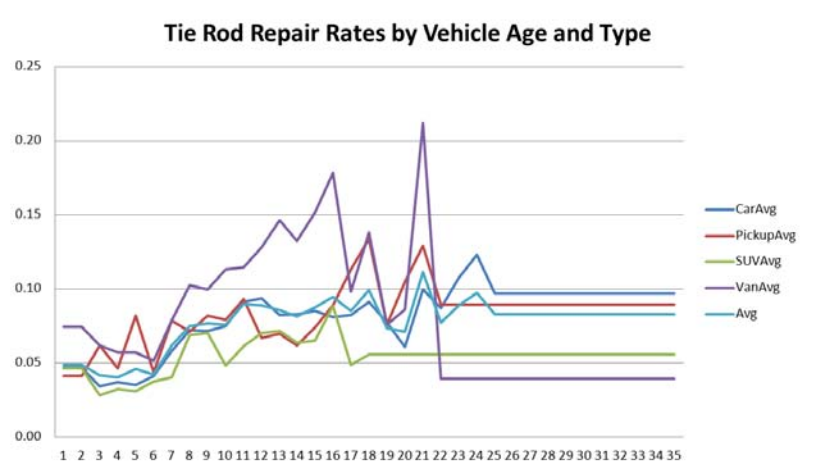
Repair Rate Statistical Modeling Process

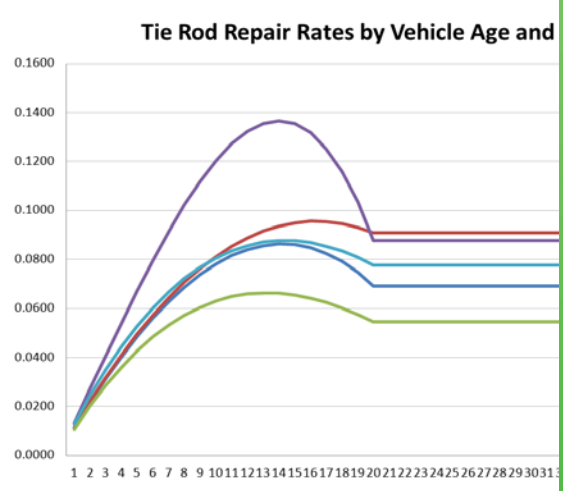
1. Calculate Repair Rates



2. Build Statistical Models







3. Create Adjustment Factors

Makes, Models, Regions

Example:

Methodology to Account for Regional Variations

- Analyze residuals using baseline model with Vehicle Make adjustment and Make/Model adjustment
- Determine a state-specific adjustment factor to account for states with higher and lower repair rates

Lower Than Forecast Repair Rates

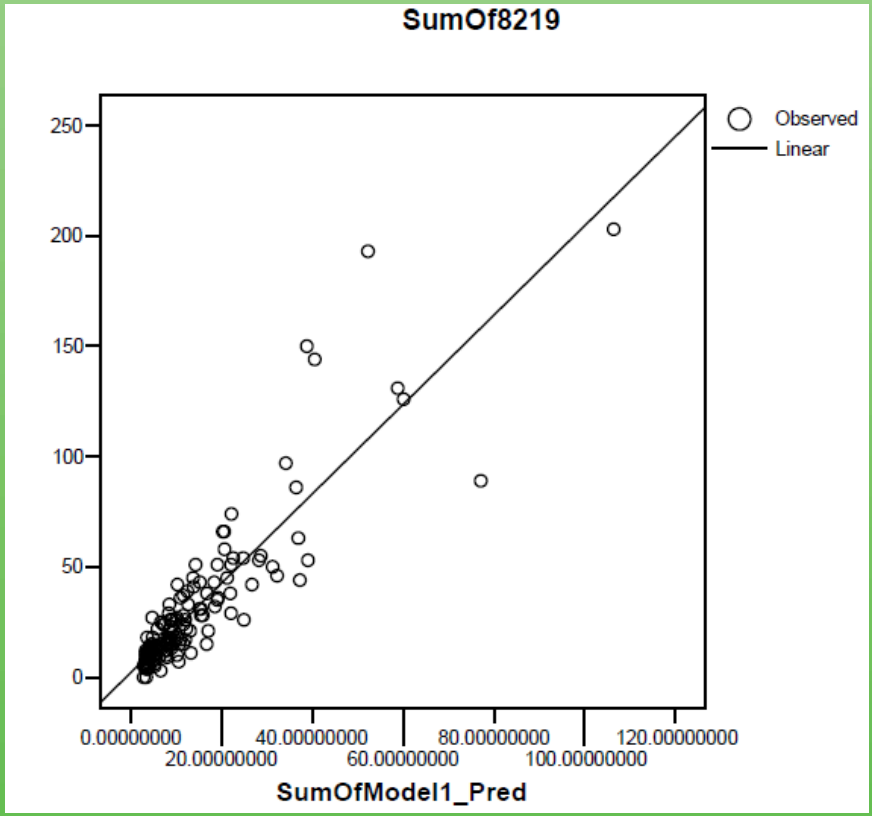
Ball Joints	Tie Rods
1. Alabama	1. Alabama
2. California	2. California
3. Georgia	3. Kentucky
4. Washington	4. Oregon
5. Oregon	5. Mississippi

Higher Than Forecast Repair Rates

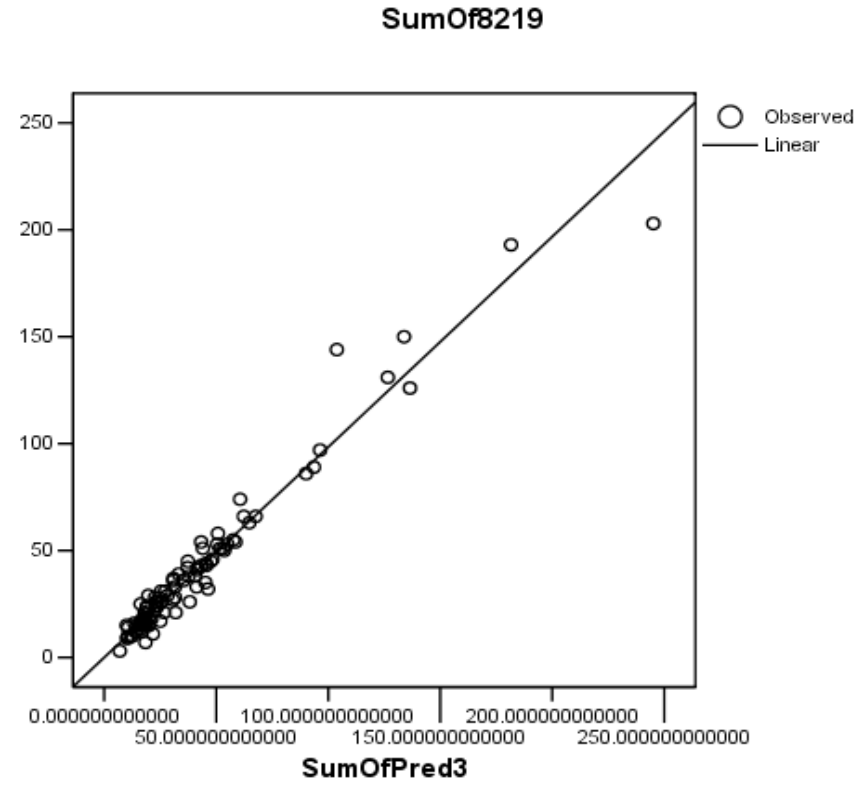
Ball Joints	Tie Rods
1. New Hamp.	1. Maine
2. Vermont	2. Mass.
3. Maine	3. Vermont
4. Mass.	4. Rhode Is.
5. Rhode Is.	5. New Hamp.

4. Validate Predicted Values

Initial model: $R^2 = 0.787$

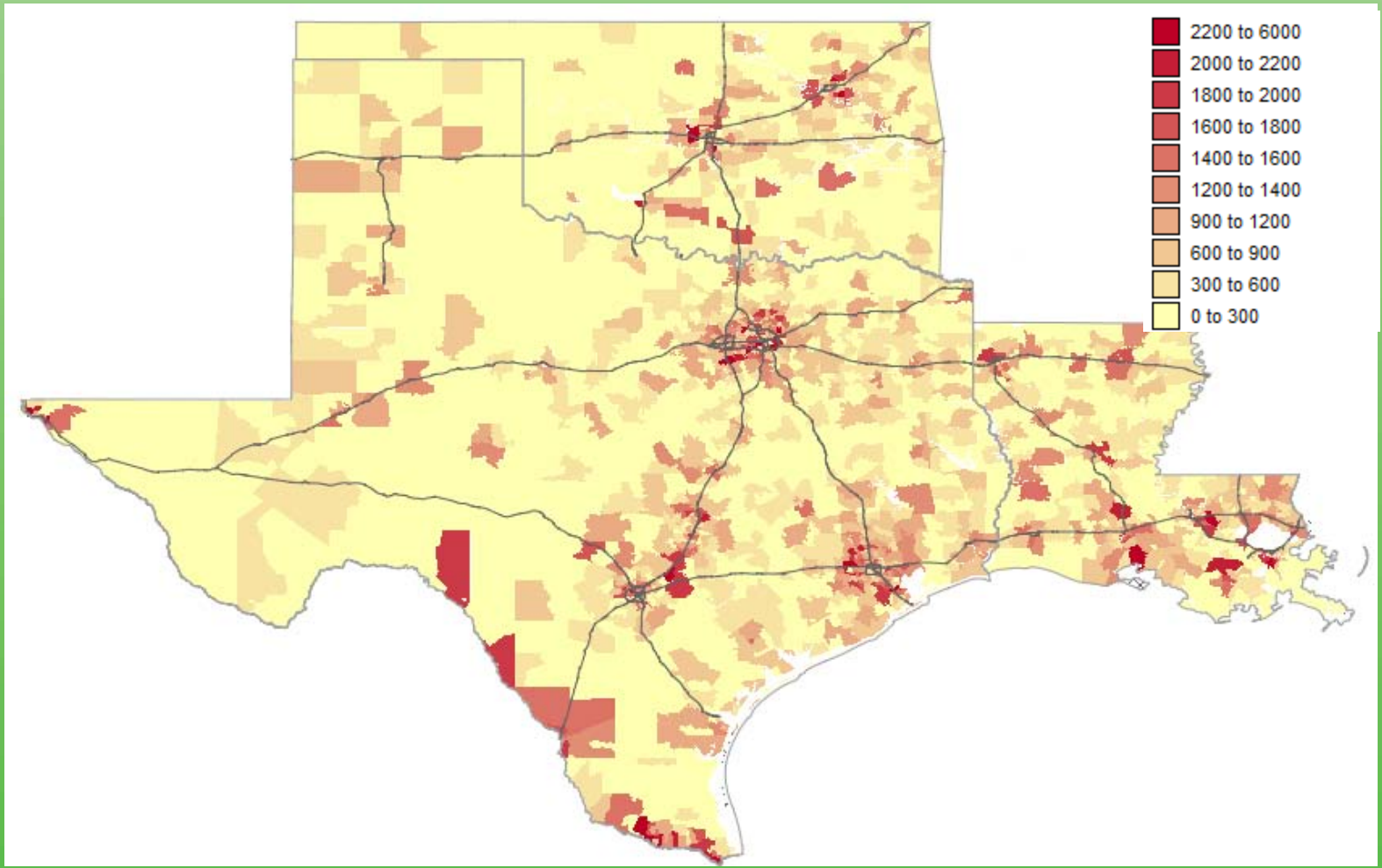


Adjusted Model $R^2 = 0.978$

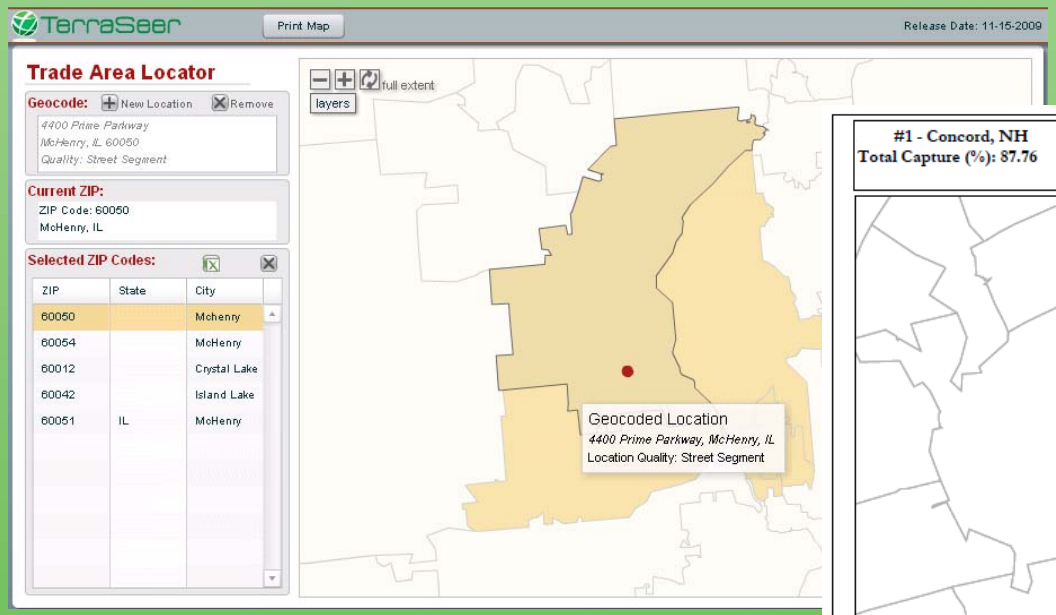


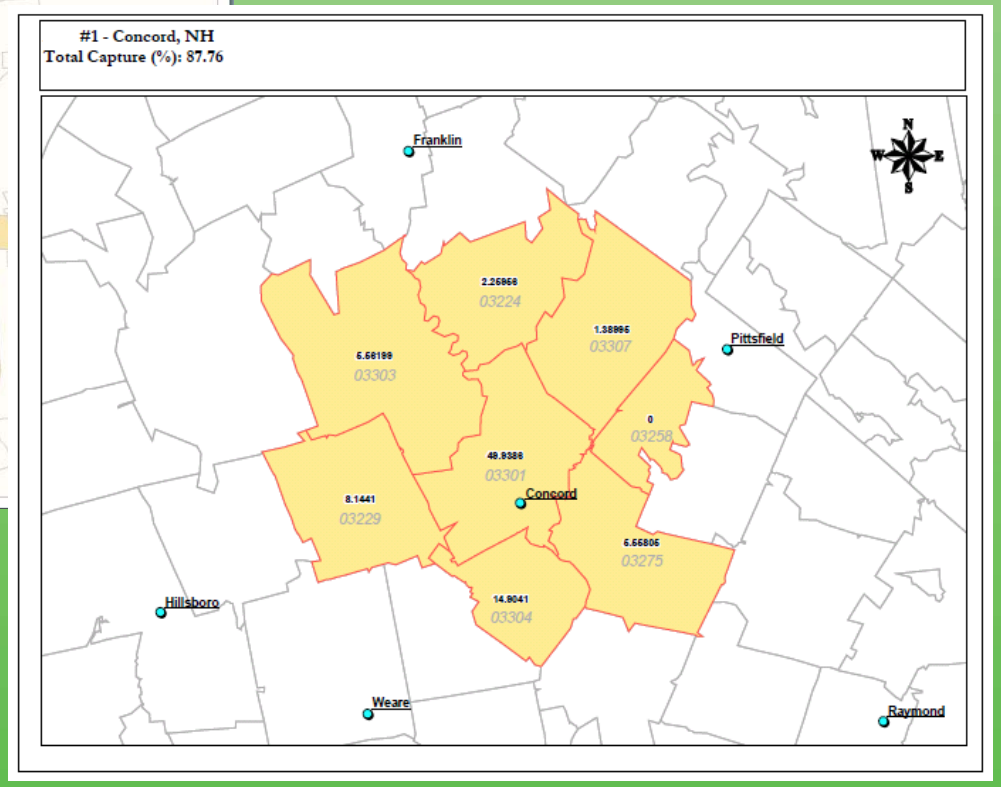
Generate Total Demand Estimates

Replacement Rate x VIO = Total Demand



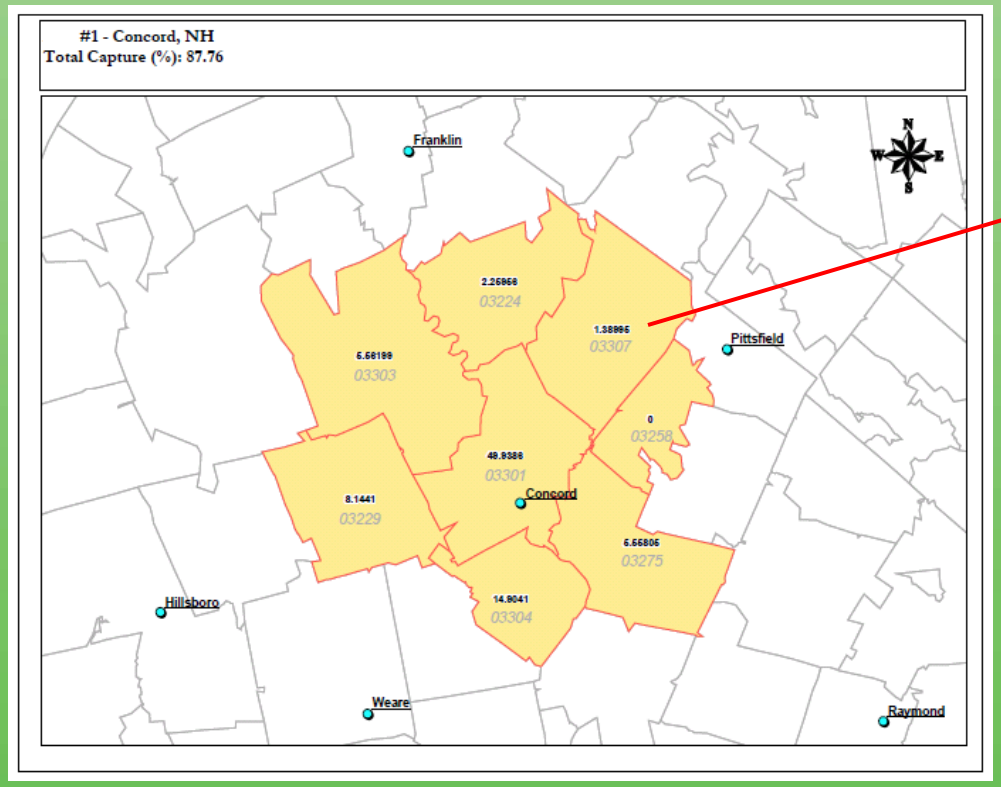
Forecast Sales By Store Trade Area





- Aftermarket Adjustment, Proximity to Store Location, Competition, Premium vs. Economy

Forecast Sales By Store Location
Sum Population of Likely Customers/Vehicles



- **ZIP Code (e.g., 03307)**
  - VIO x Replacement Rate = Total Demand
  - Market Share is a function of
    - % Aftermarket,
    - Proximity to Store
    - Competition
    - Premium vs Economy
  - ***Total Demand x Market Share = ZIP Forecast***

- **Store Location (e.g., Concord, NH)**
  - Sum all ZIP Forecasts in Trade Area
  - Add “Beyond the Trade Area” Estimate
  - ***Store Sales Forecast***

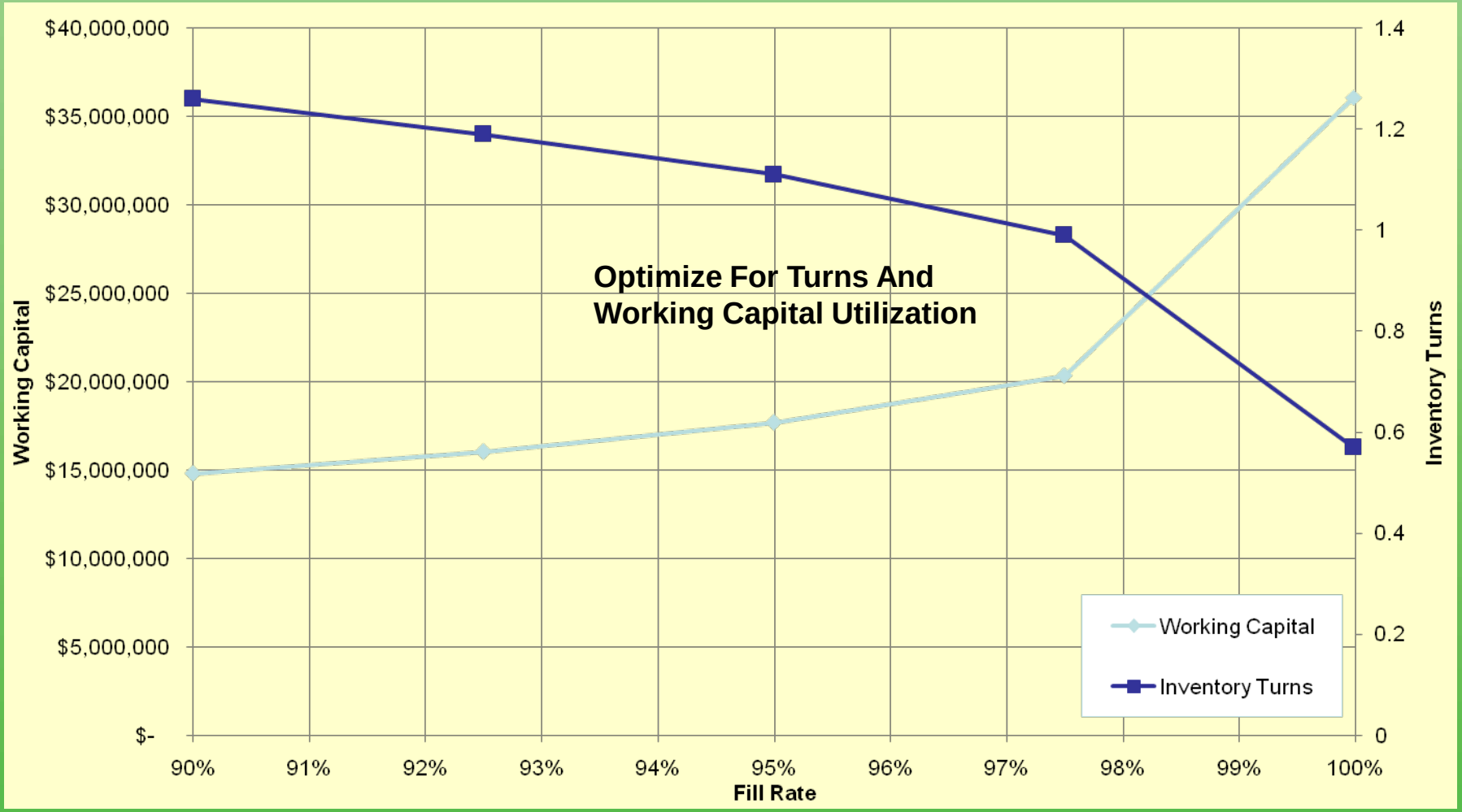
Optimize Inventory

- Sales Forecast
- Target Service Level
- Review Interval
- Replenishment Lead Time
- Holding Cost

Optimization Engine

SKU Level Inventory Recommendations

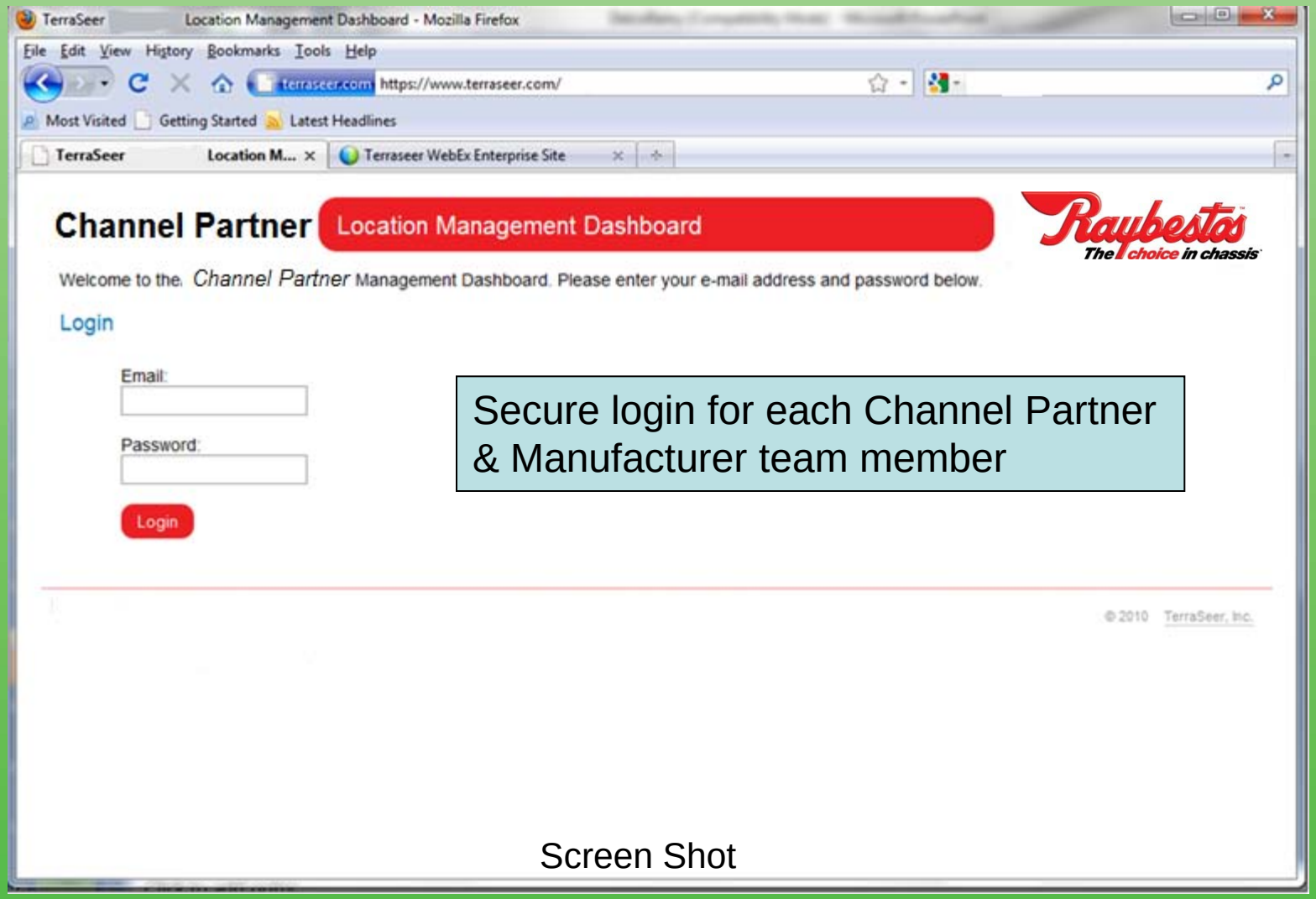
Optimize Inventories For Efficiency & Effectiveness



Recommendations Provided In Excel Or Via Custom Web Portal

Store Id	Part Number Raybestos	Rotor Base Number	10_15_20 Inventory Reco	On Hand Quantity	LS T12 QTY	Vehicle Count	Buyers Guide
2	96795	86795	2	2	2	5554	Acura:3.2CL(2001-2003),3.2TL(1999-2003,2006),TL(2007-2008),TSX(2004-2008);AcuraTrk:MDX(2001-20
2	96795R	86795	2	0	0	5554	Acura:3.2CL(2001-2003),3.2TL(1999-2003,2006),TL(2007-2008),TSX(2004-2008);AcuraTrk:MDX(2001-20
2	96795PER	86795PER	0	0	0	5537	Acura:3.2CL(2001-2003),3.2TL(1999-2003,2006),TL(2007-2008),TSX(2004-2008);AcuraTrk:MDX(2001-20
2	96711	86711	2	2	4	4222	Acura:CSX <Acura>(2006-2010);Hon:Accord(1998-2010),Civic(2006-2009,2011);HonTrk:Element(2003-2
2	96711R	86711	2	0	0	4222	Acura:CSX <Acura>(2006-2010);Hon:Accord(1998-2010),Civic(2006-2009,2011);HonTrk:Element(2003-2
2	96711PL	HP86711L	0	0	0	4222	Acura:CSX <Acura>(2006-2010);Hon:Accord(1998-2010),Civic(2006-2008);HonTrk:Element(2003-2011)
2	96711PR	HP86711R	0	0	0	4222	Acura:CSX <Acura>(2006-2010);Hon:Accord(1998-2010),Civic(2006-2008);HonTrk:Element(2003-2011)
2	56825	86825	2	2	25	4140	CadTrk:Escalade(2002-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Astro(2003-20
2	56825R	86825	2	0	0	4140	CadTrk:Escalade(2002-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Astro(2003-20
2	56825PER	86825PER	0	0	0	4140	CadTrk:Escalade(2002-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Astro(2003-20
2	56825PL	HP86825L	1	0	0	4127	CadTrk:Escalade(2002-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Astro(2003-20
2	56825PR	HP86825R	1	0	0	4127	CadTrk:Escalade(2002-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Astro(2003-20
2	980470	880470	2	2	6	4035	Lex:ES350(2007-2010);Pont:Vibe(2009-2010);Scion:tC(2011);Toy:Avalon(2008-2011),Camry(2007-2011)
2	980470R	880470	2	0	0	4035	Lex:ES350(2007-2010);Pont:Vibe(2009-2010);Scion:tC(2011);Toy:Avalon(2008-2011),Camry(2007-2011)
2	580165	880165	2	2	2	3532	CadTrk:Escalade(2004-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Avalanche 150
2	580165R	880165	2	0	0	3532	CadTrk:Escalade(2004-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Avalanche 150
2	580165PER	880165PER	0	0	0	3333	CadTrk:Escalade(2004-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Avalanche 150
2	580165PL	HP880165L	2	0	0	3332	CadTrk:Escalade(2004-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Avalanche 150
2	580165PR	HP880165R	2	0	0	3332	CadTrk:Escalade(2004-2006),Escalade ESV(2003-2006),Escalade EXT(2002-2006);ChevTrk:Avalanche 150
2	96217	86217	2	0	2	3215	Lex:ES300(1992-1997);Toy:Avalon(1995-1997),Camry(1992-1997,2002-2006)
2	96217R	86217	2	0	0	3215	Lex:ES300(1992-1997);Toy:Avalon(1995-1997),Camry(1992-1997,2002-2006)
2	96216	86216	2	0	2	3076	Lex:ES300(1997-2001);Toy:Camry(1992-2001),Solara(1999-2003)
2	96216R	86216	2	0	0	3076	Lex:ES300(1997-2001);Toy:Camry(1992-2001),Solara(1999-2003)
2	96087	86087	2	0	2	3053	Acura:1.6 EL(1997-2000),1.7 EL(2001-2005),Integra(1990-2001);Hon:Civic(1990-2005),Del-Sol(1994-199
2	96087R	86087	2	0	0	3053	Acura:1.6 EL(1997-2000),1.7 EL(2001-2005),Integra(1990-2001);Hon:Civic(1990-2005),Del-Sol(1994-199
2	96934	86934	2	2	2	3048	Pont:Vibe(2003-2008);Scion:tC(2005-2010);Toy:Celica(2000-2005),Corolla(2003-2008),Matrix(2003-200

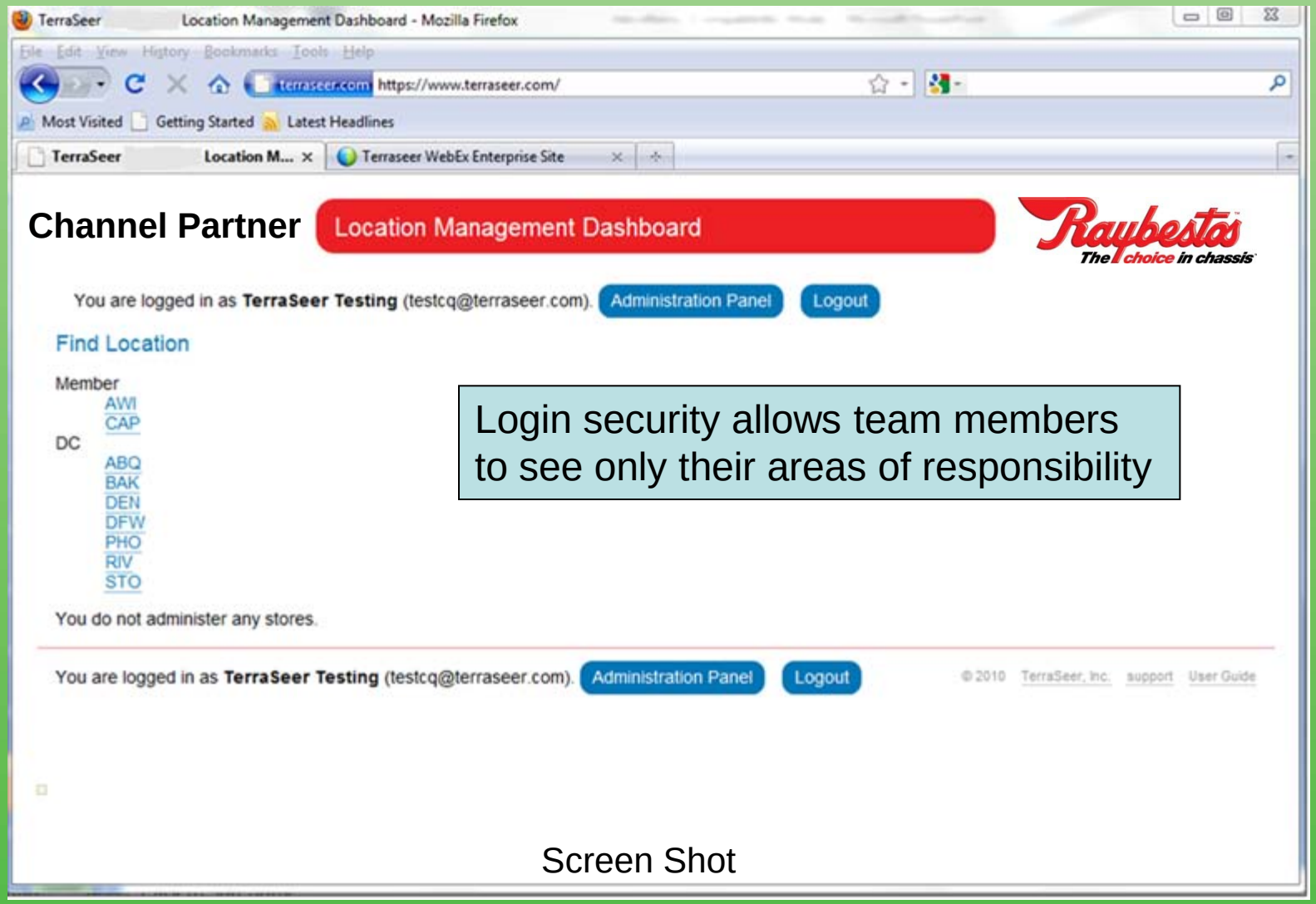
Custom Web Portal Communicates Orders, Helps Manage Store Network



Secure login for each Channel Partner & Manufacturer team member

Screen Shot

Custom Web Portal Communicates Orders, Helps Manage Store Network



Login security allows team members to see only their areas of responsibility

Screen Shot

Custom Web Portal Communicates Orders, Helps Manage Store Network

Channel Partner

Location Management Dashboard

Raybestos The choice in chassis

You are logged in as **TerraSeer Testing** (testcq@terraseer.com). Administration Panel Logout

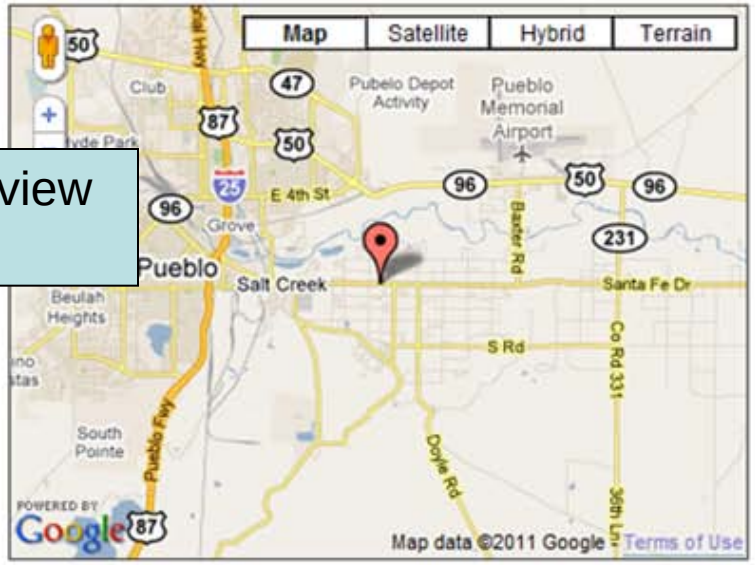
Location Info

PERFORMANCE AUTO PARTS (Account #310008)

Western IND

23898 EAST
Pueblo, CO
USA

Landing page provides overview & inventory summary



Account Manager	John Doe	**SKU count**	336
Date	No Date Specified	**SKU Count**	351
Store Key	76	**UNIT INC/DEC**	15
Store Name	Pueblo Auto Parts	**Inv. Value**	$10,906.24
Serving DC	DEN	**Inv. Value**	$10,340.32
Store Manager	John Doe	**Inv. Value INC/DEC**	$-565.92
Type	IND	Parts Not Interchanged: 3	

Screen Shot

Custom Web Portal Communicates Orders, Helps Manage Store Network

TerraSeer Location Management Dashboard - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://www.terraseer.com/

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TerraSeer Location Mana...

Inventory detail is completely interactive online, can also be downloaded in Excel

Recommended Inventory

1 2 3 > Last ›

Submit Changes | Finalize Assortment | Part Number for Go Clear

Unhide all Columns

Part Number hide	Category Description hide	Last 12 Month Sales hide	Inventory as of 9/29/2010 hide	Store Cost hide	Part Number hide	Vehicles in Operation (VIO) of Servicing Trade Area hide	Proposed Stock Qty hide	Store Cost hide	Buyer's Guide hide	Stocking Rec. hide	Change Suggested Qty hide
ES800086	OUTER TIE ROD END	15	3	21.18	401-2059	2578	4	20.00	Chevrolet Malibu, 20...	Keep	4
K90477	ECCENTRIC CAM BOLT	2	3	10.68	616-1039	19413	4	9.58	Toyota Camry (87-94)...	Keep	4
K90211	CASTER ADJUSTER	0	2	15.57	614-1022	7318	2	14.57	ACURA - Vigor (1992-...	Keep	2
K80604	ADJUSTABLE BALL JOINT	1	2	42.97	615-4010	735	2	64.65	JEEP - Commander (20...	Keep	2
K80065	ECCENTRIC CAM BOLT	-2	2	18.93	616-1011	7278	2	16.98	FORD - Explorer 4x2 ...	Keep	2
K90473	ECCENTRIC CAM BOLT	4	2	10.68	616-1035	28797	2	9.58	AMC (86-87), Chevrol...	Keep	2
ES370R	OUTER TIE ROD END	2	2	11.75	401-1058	18	2	10.83	Chev, 1965-68; Cvr ...	Keep	2

How Can We Enhance Demand Forecasting with Mosaic and Simmons?

1. Customer Profile Analysis
2. Market Share Adjustments
3. Replacement Rate Model Validation

Generate Customer Profile

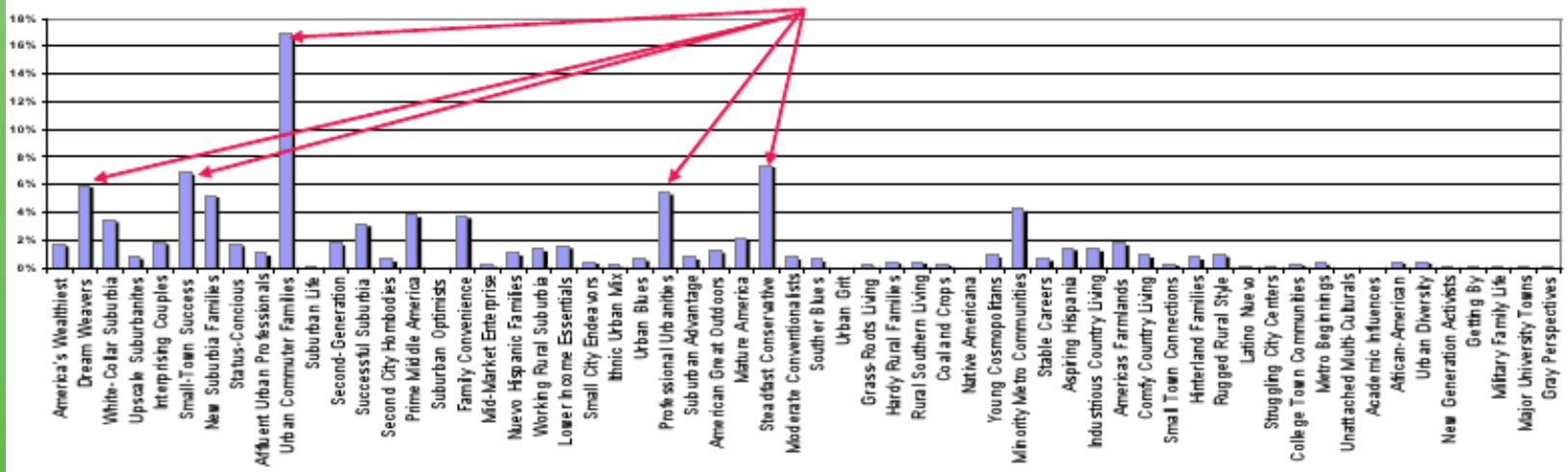
Profiling the Target
Universal Customer Insight

Solution Components:
- *Simmons NCS/NHCS*
- *Insource*
- *USGA Member Database (segment coded)*
- *Mosaic*

As the name implies, Golf Fanatics are revealed to be more golf focused and more valuable member prospects for the USGA. Fanatics...

- remain USGA members longer and have a lower rate of membership lapse than other golfers
- have higher pledge amounts among members spending ~$25 more than the average member
- are more likely to become members of country clubs
- etc...

A Mosaic Profile reveals Golf Fanatics to be primarily urban, successful, conservative, professionals



Experian

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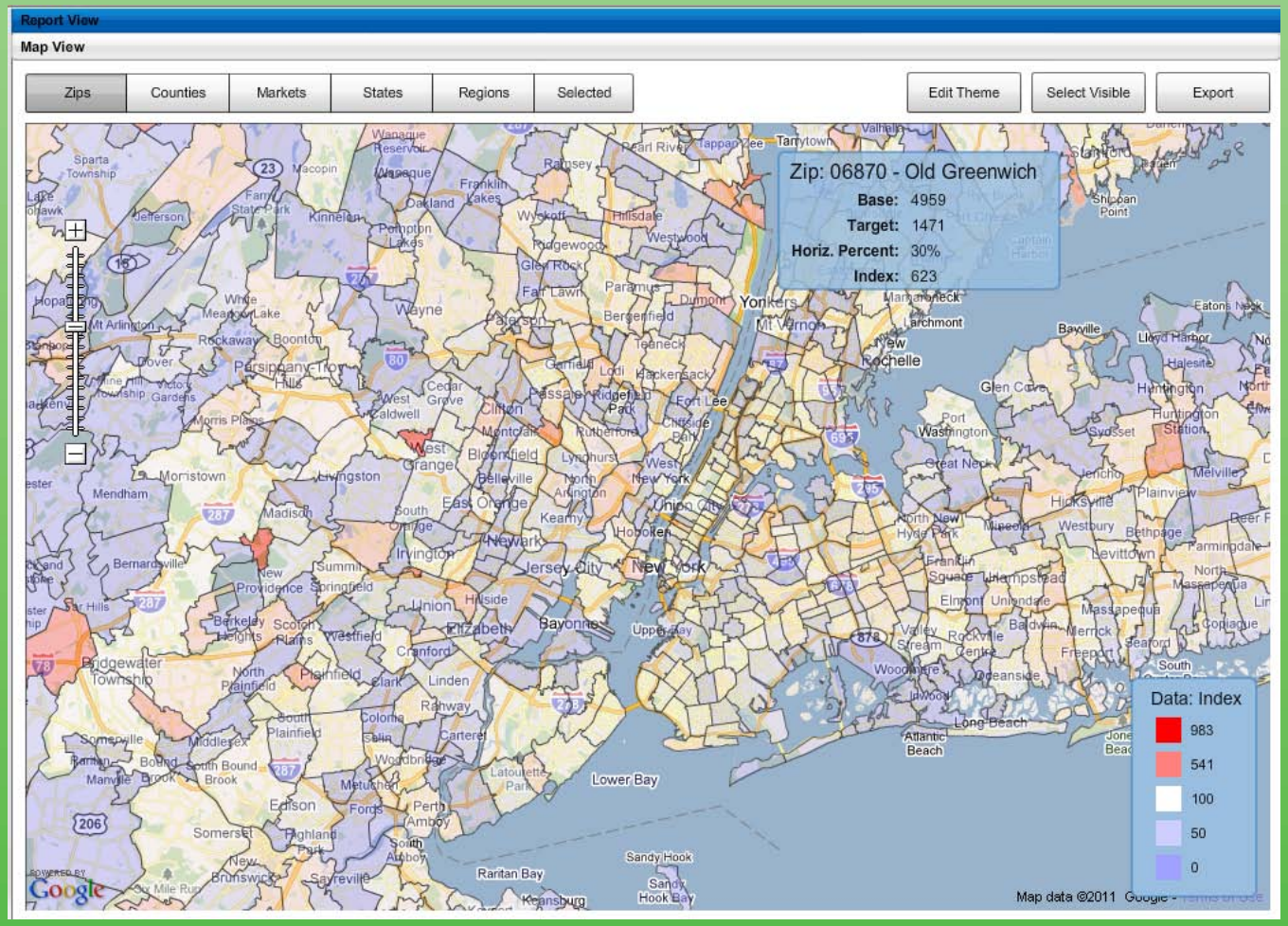
Automotive Psychographics

ZDX TARGET	INDEX TO A18+
I LIKE TO GET A NEW CAR EVERY TWO OR THREE YEARS	144
I NORMALLY BUY CARS BRAND NEW	139
A SPORT UTILITY VEHICLE MATCHES MY ACTIVE LIFESTYLE	133
I KEEP UP ON THE LATEST ADVANCES IN AUTOMOBILE TECHNOLOGY	130
I GET MANY OF THE OPTIONS WHEN I BUY A CAR	128
I PREFER DRIVING A LUXURY VEHICLE	126
BEFORE BUYING A CAR, I FIND OUT ABOUT THE CARS SAFETY RATING	124
I LIKE TO DRIVE FASTER THAN NORMAL TRAFFIC	117
I CHOOSE A CAR MAINLY ON THE BASIS OF LOOKS	116
MY CAR SHOULD EXPRESS MY PERSONALITY	115
MY CAR SHOULD CATCH PEOPLES ATTENTION	114
FRIENDS AND FAMILY ALWAYS ASK MY ADVICE ON WHAT CAR THEY SHOULD BUY	113
HAVING A VEHICLE THAT IS FUN TO DRIVE IS AN IMPORTANT FEATURE WHEN I AM BUYING A CAR	112

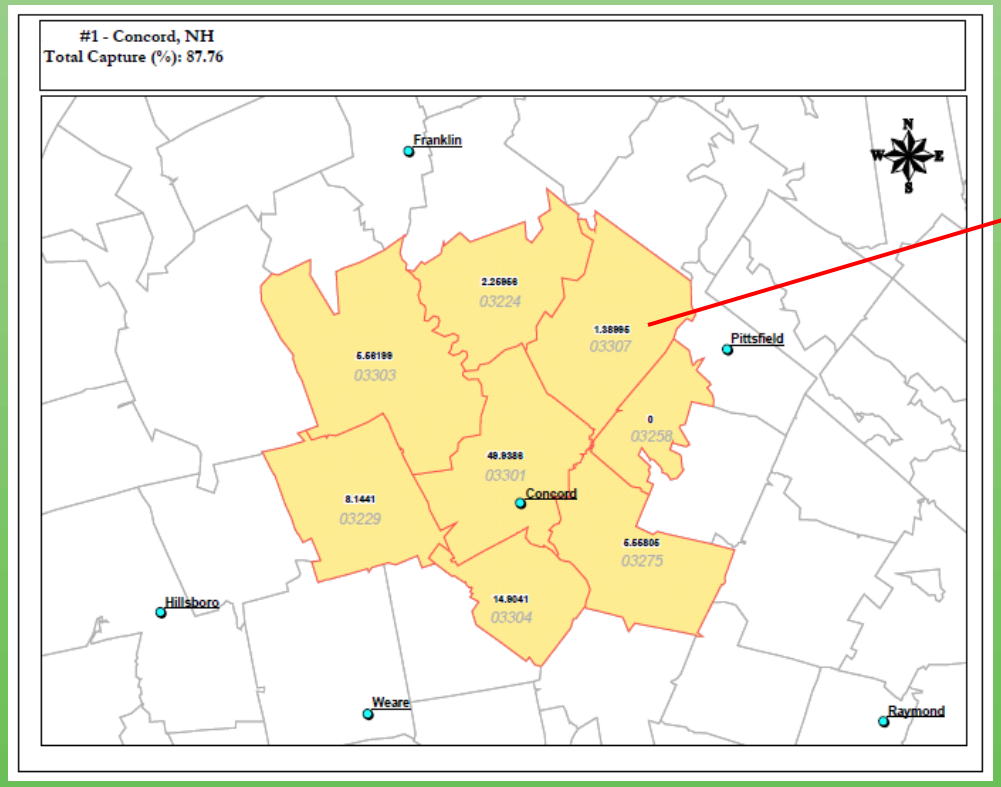
Source: Experian Simmons NCS Winter 2010 Full Year Study.

Experian SimmonsLOCAL Mapping

Identify areas of the market that most likely contain your target customers (map estimated adults, % of ZIP, index of ZIP, etc.)



Forecast Sales By Store Location
Sum Population of Likely Customers/Vehicles



- **ZIP Code (e.g., 03307)**
  - VIO x Replacement Rate = Total Demand
  - Market Share is a function of
    - % Aftermarket,
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    - Competition
    - Premium vs Economy
  - ***Total Demand x Market Share = ZIP Forecast***

- **Store Location (e.g., Concord, NH)**
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  - ***Store Sales Forecast***

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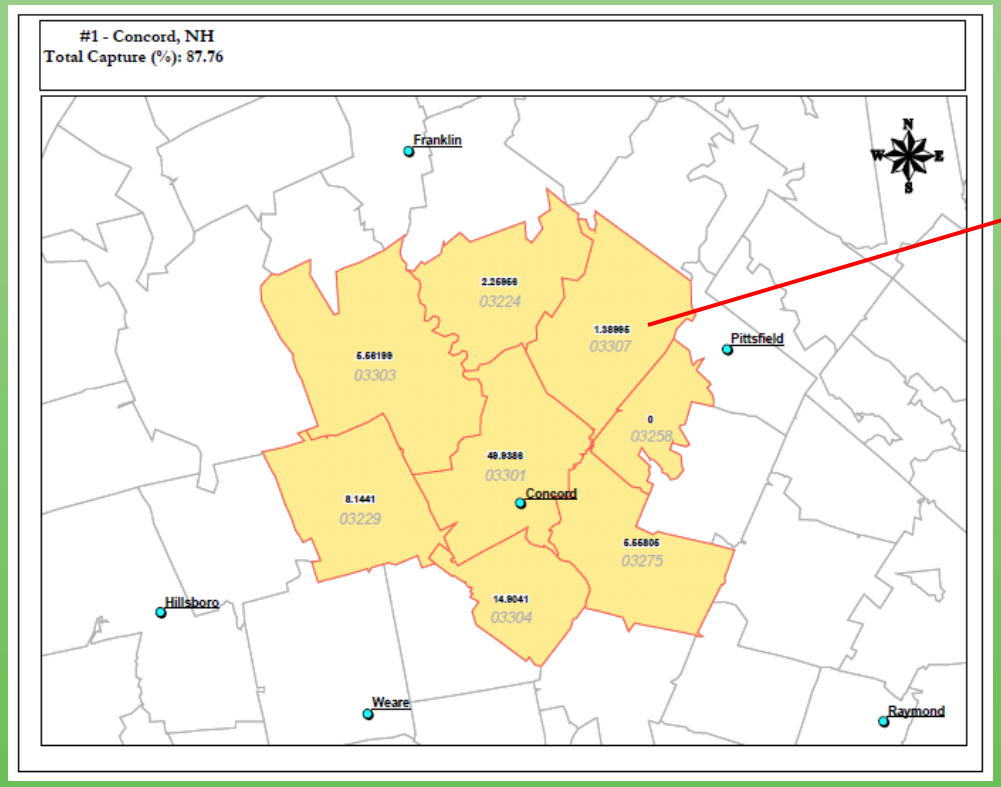

- **ZIP Code (e.g., 03307)**
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    - ***Customer Profile Index***
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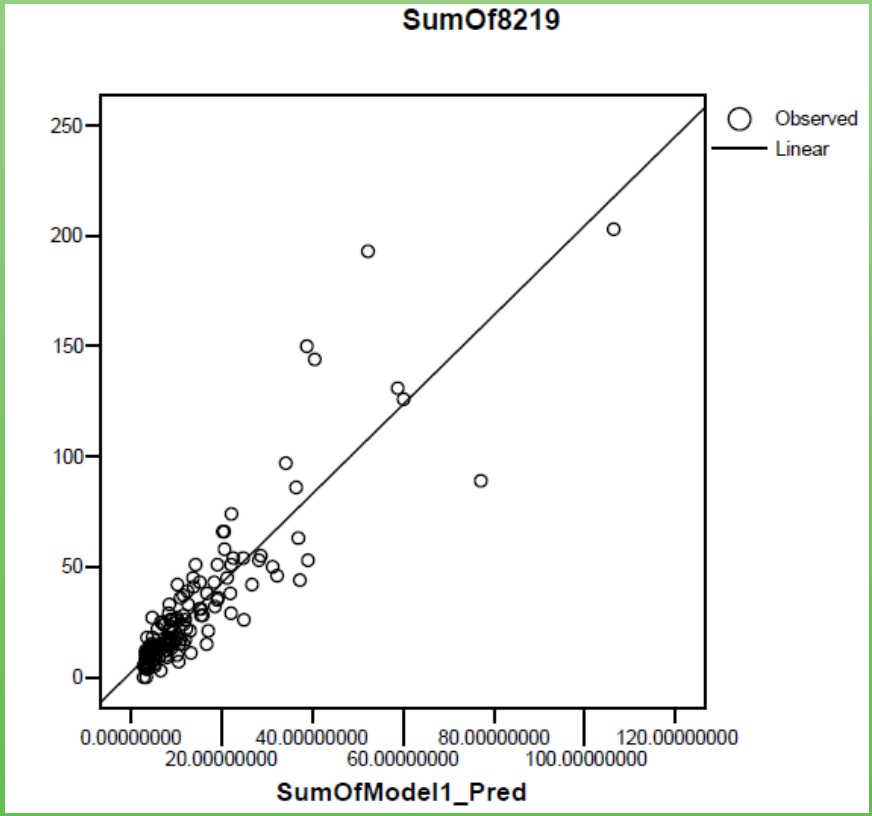
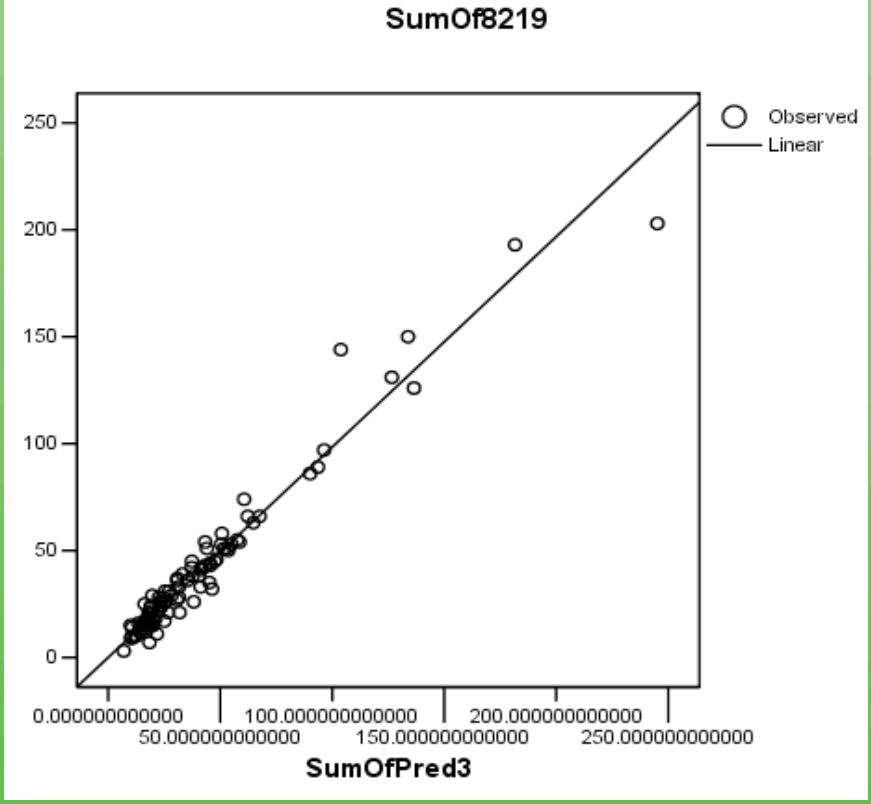


Adjusted Model $R^2 = 0.978$



Experian Simmons – custom survey could provide a more robust validation data set

Key Data Elements

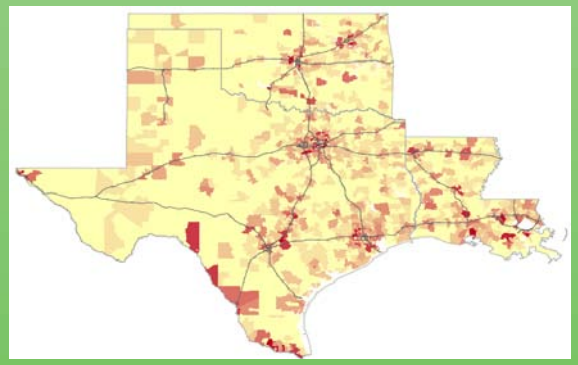
- **Third Party Data**
  - VIO (Experian or Polk)
  - Mosaic and/or Simmons (Experian)
  - Replacement Rates (IMR, possibly Simmons)

- **Data from your Supply Chain**
  - Channel Partner Store List with Locations
  - Customer Locations (ZIP Codes)
  - 12-24 Month Sales History
  - Holding Costs and Target Service Levels by SKU
  - Review Interval and Replenishment Lead Times (Store and DC)
  - Current Inventory Positions

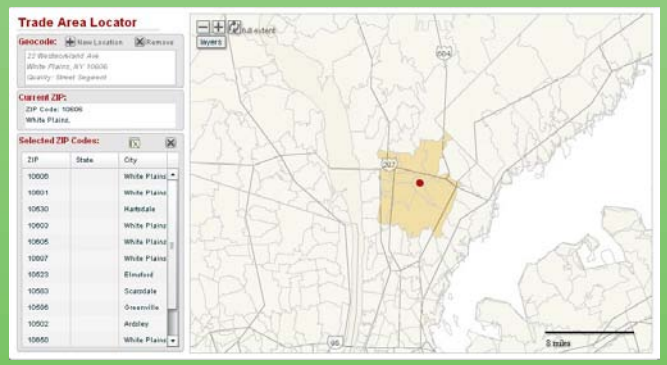
- **Additional Data if Available**
  - Estimated Market Share by Region
  - Competition

Inventory Optimization Process

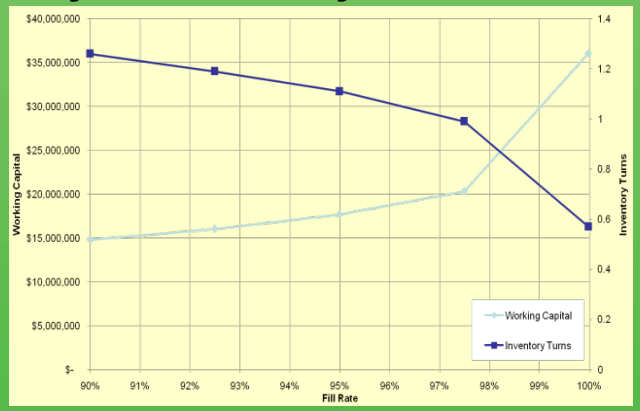
1. **Develop Total Demand Model**
   - Vehicle Registrations
   - Repair Rates By Part



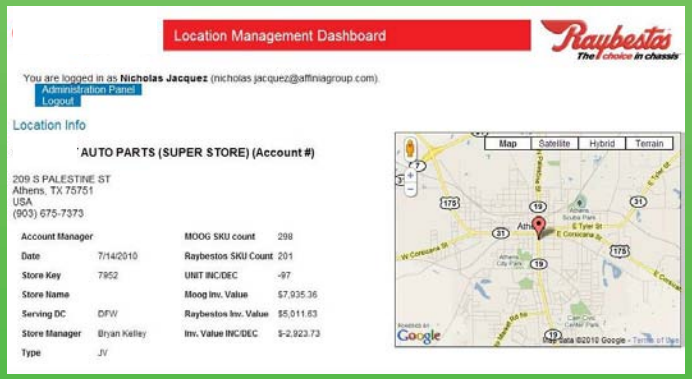
2. **Forecast Demand By Location**
   - Industry/Trade Area Dynamics
   - Market Share



3. **Optimize Store & DC Inventories**
   - By Location, By SKU

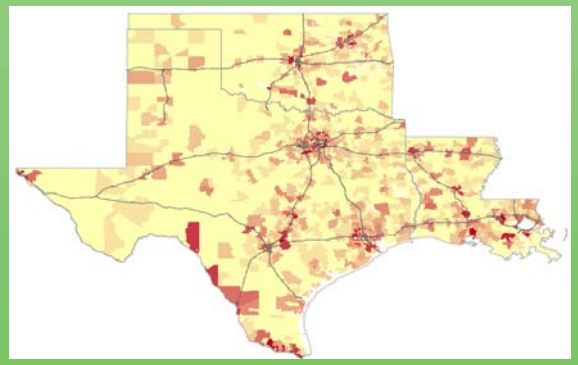


4. **Communicate & Manage Network**
   - Web Tools Enable Collaboration



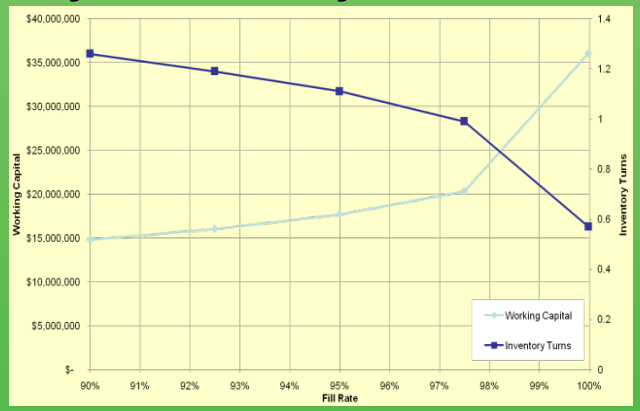
Inventory Optimization Process

1. **Develop Total Demand Model**
   - Vehicle Registrations
   - Repair Rates By Part

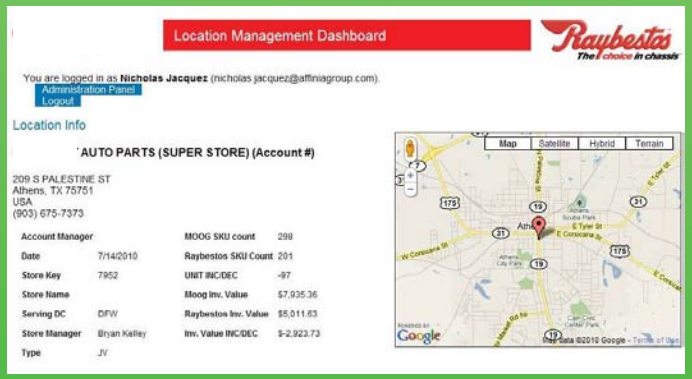


2. **Forecast Demand By Location**
   - Industry/Trade Area Dynamics
   - Market Share w Customer Profile

3. **Optimize Store & DC Inventories**
   - By Location, By SKU



4. **Communicate & Manage Network**
   - Web Tools Enable Collaboration



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