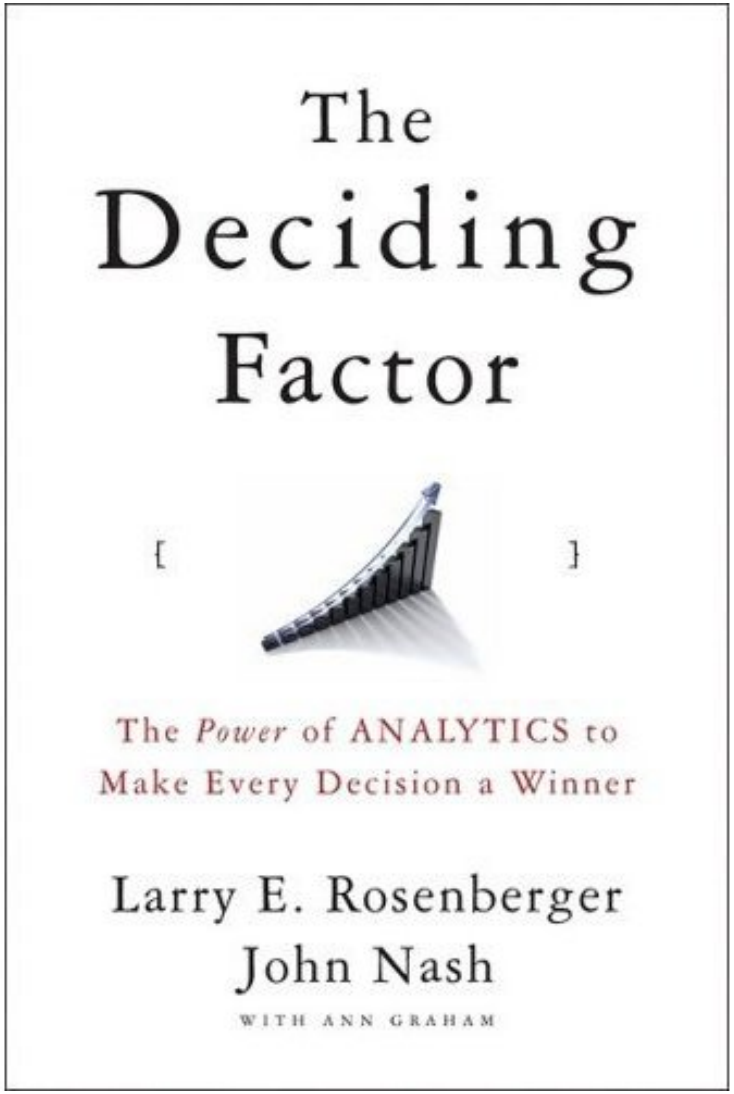
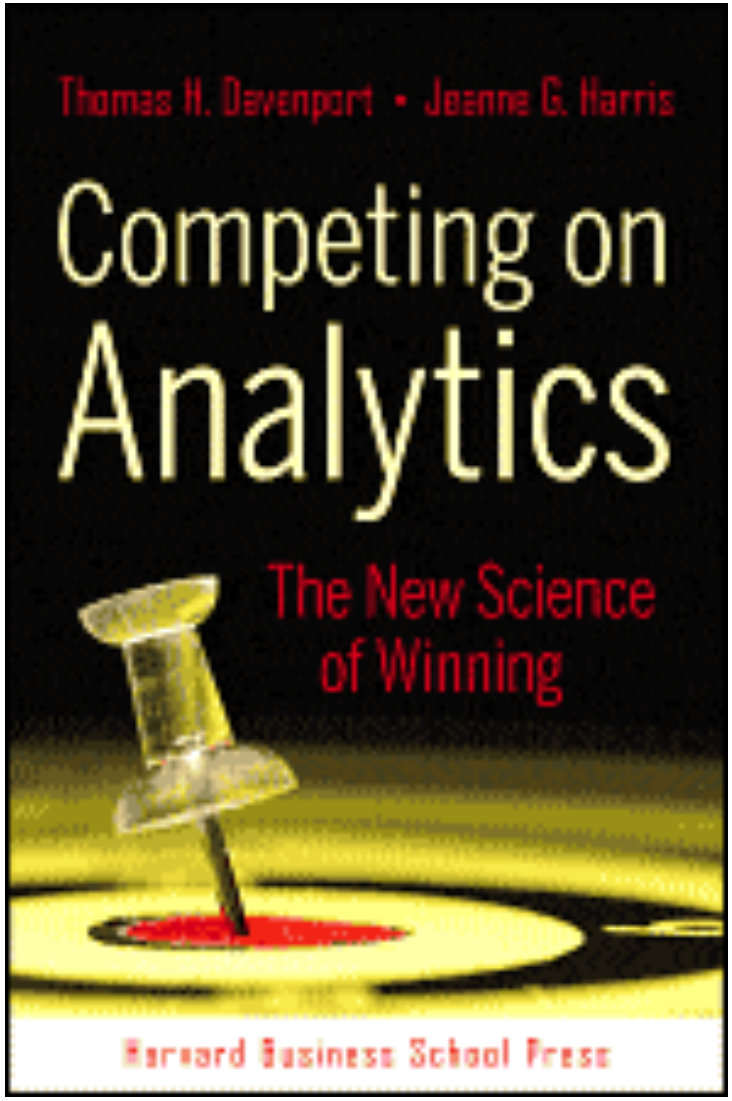
Many Thanks!


The
Deciding
Factor
The *Power* of ANALYTICS to
Make Every Decision a Winner
Larry E. Rosenberger
John Nash
WITH ANN GRAHAM


Thomas H. Davenport • Jeanne G. Harris
Competing on Analytics
The New Science of Winning
Harvard Business School Press

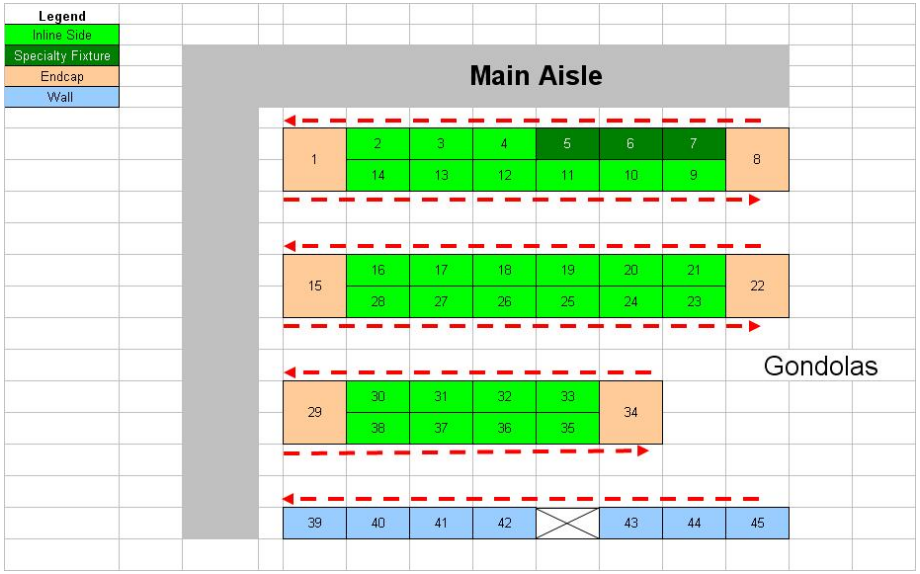
Agenda

- **Rules Everywhere/ OR applications and Rules**
- What problems do we solve in FS/Insurance/Retail
- Rules for Segmentation and Dynamic Pricing
- Treatments – Offer Optimization
- More……
- Generate Rules
- Select Rules
- Robust Rules

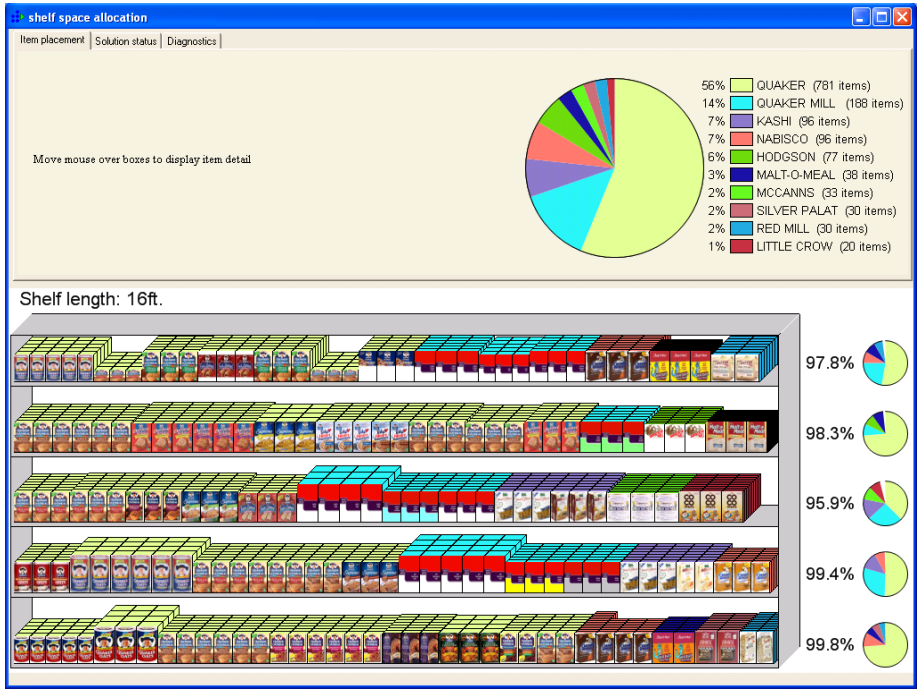
Applications: Retail

Rule-Based Systems

Macro Space Planning



Micro Space Planning



Goal: To reduce manual effort in merchandising 6,000+ adjacencies

Goal: Link POS stats to merchandising quality

Decision Areas Inside Space Planning Solution
Micro Space Example

Powered by Blaze Advisor Business Rules Engine

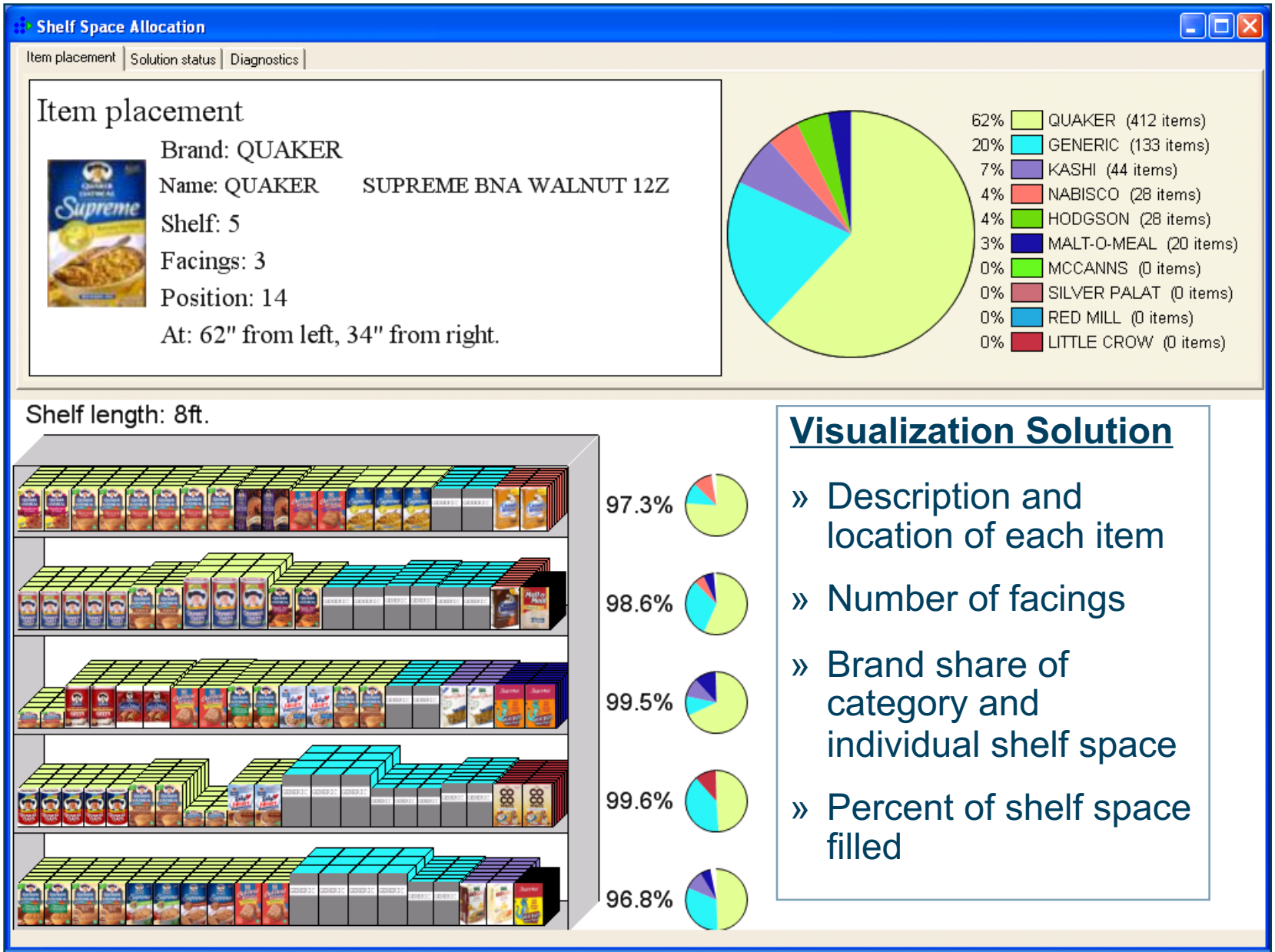
Assortment/planogram rules codified for future use

- »**Manage key learnings as a corporate asset**
- »**Assign priority / ranking to rules**
- »**Create different rule sets & rule flows by store / cluster**

Assortment/planogram decisions based on customer demand

Shelf layout parameters factored in — by cluster or store

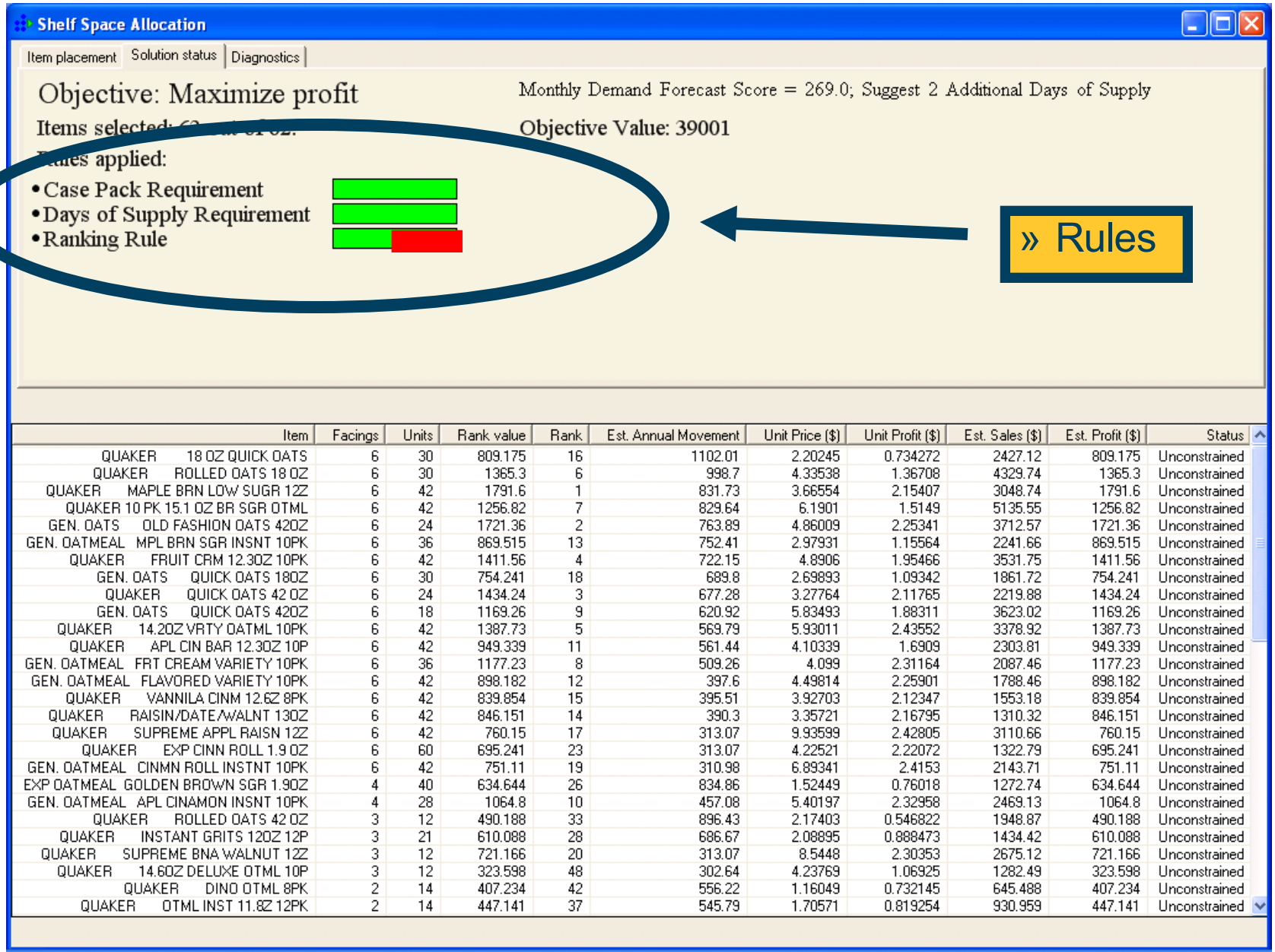
Space Optimization:
Visualization Results — 8 foot shelf



Visualization Solution

- Description and location of each item
- Number of facings
- Brand share of category and individual shelf space
- Percent of shelf space filled

Space Optimization:
Constrained Assortment Optimization

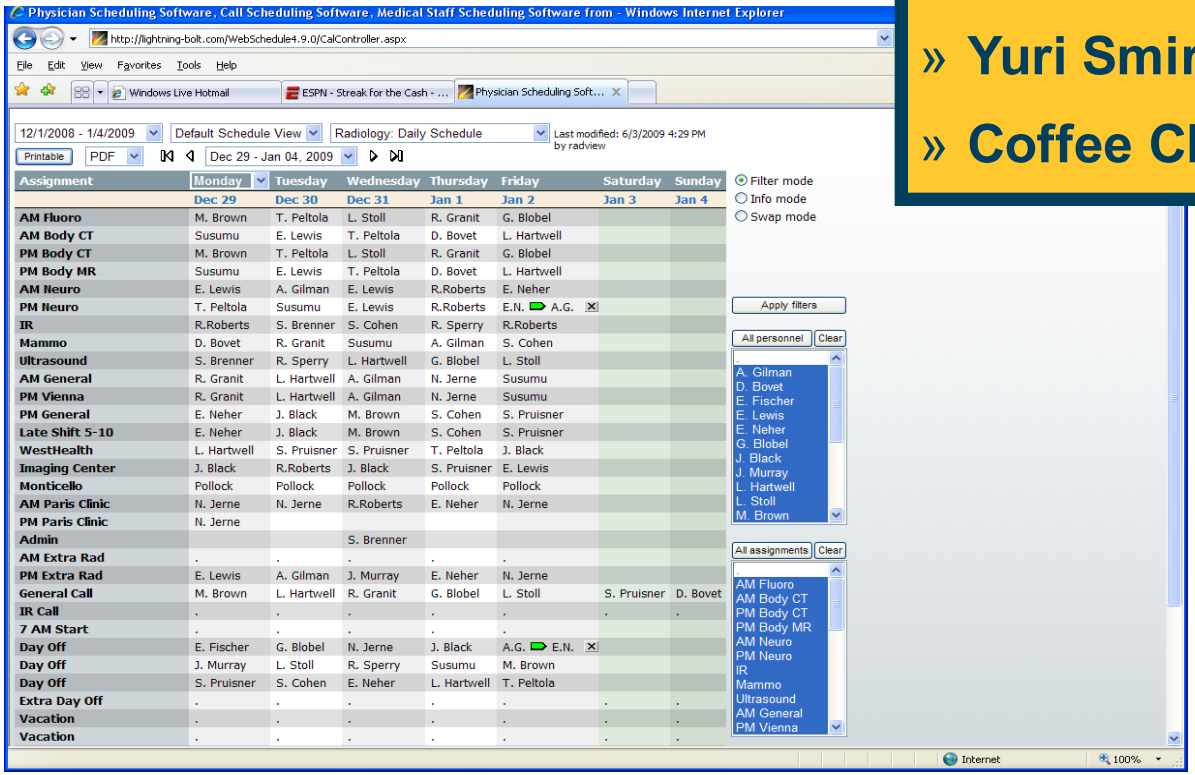


Item	Facings	Units	Rank value	Rank	Est. Annual Movement	Unit Price ($)	Unit Profit ($)	Est. Sales ($)	Est. Profit ($)	Status
QUAKER 18 OZ QUICK OATS	6	30	809.175	16	1102.01	2.20245	0.734272	2427.12	809.175	Unconstrained
QUAKER ROLLED OATS 18 OZ	6	30	1365.3	6	998.7	4.33538	1.36708	4329.74	1365.3	Unconstrained
QUAKER MAPLE BRN LOW SUGR 12Z	6	42	1791.6	1	831.73	3.66554	2.15407	3048.74	1791.6	Unconstrained
QUAKER 10 PK 15.1 OZ BR SGR OTML	6	42	1256.82	7	829.64	6.1901	1.5149	5135.55	1256.82	Unconstrained
GEN. OATS OLD FASHION OATS 42OZ	6	24	1721.36	2	763.89	4.86009	2.25341	3712.57	1721.36	Unconstrained
GEN. OATMEAL MPL BRN SGR INSNT 10PK	6	36	869.515	13	752.41	2.97931	1.15564	2241.66	869.515	Unconstrained
QUAKER FRUIT CRM 12.3OZ 10PK	6	42	1411.56	4	722.15	4.8906	1.95466	3531.75	1411.56	Unconstrained
GEN. OATS QUICK OATS 18OZ	6	30	754.241	18	689.8	2.69893	1.09342	1861.72	754.241	Unconstrained
QUAKER QUICK OATS 42 OZ	6	24	1434.24	3	677.28	3.27764	2.11765	2219.88	1434.24	Unconstrained
GEN. OATS QUICK OATS 42OZ	6	18	1169.26	9	620.92	5.83493	1.88311	3623.02	1169.26	Unconstrained
QUAKER 14.2OZ VRTY OATML 10PK	6	42	1387.73	5	569.79	5.93011	2.43552	3378.92	1387.73	Unconstrained
QUAKER APL CIN BAR 12.3OZ 10P	6	42	949.339	11	561.44	4.10339	1.6909	2303.81	949.339	Unconstrained
GEN. OATMEAL FRT CREAM VARIETY 10PK	6	36	1177.23	8	509.26	4.099	2.31164	2087.46	1177.23	Unconstrained
GEN. OATMEAL FLAVORED VARIETY 10PK	6	42	898.182	12	397.6	4.49814	2.25901	1788.46	898.182	Unconstrained
QUAKER VANNILA CINM 12.6Z 8PK	6	42	839.854	15	395.51	3.92703	2.12347	1553.18	839.854	Unconstrained
QUAKER RAISIN/DATE/WALNT 13OZ	6	42	846.151	14	390.3	3.35721	2.16795	1310.32	846.151	Unconstrained
QUAKER SUPREME APPL RAISN 12Z	6	42	760.15	17	313.07	9.93599	2.42805	3110.66	760.15	Unconstrained
QUAKER EXP CINN ROLL 1.9 OZ	6	60	695.241	23	313.07	4.22521	2.22072	1322.79	695.241	Unconstrained
GEN. OATMEAL CINMN ROLL INSTNT 10PK	6	42	751.11	19	310.98	6.89341	2.4153	2143.71	751.11	Unconstrained
EXP OATMEAL GOLDEN BROWN SGR 1.9OZ	4	40	634.644	26	834.86	1.52449	0.76018	1272.74	634.644	Unconstrained
GEN. OATMEAL APL CINAMON INSNT 10PK	4	28	1064.8	10	457.08	5.40197	2.32958	2469.13	1064.8	Unconstrained
QUAKER ROLLED OATS 42 OZ	3	12	490.188	33	896.43	2.17403	0.546822	1948.87	490.188	Unconstrained
QUAKER INSTANT GRITS 12OZ 12P	3	21	610.088	28	686.67	2.08895	0.888473	1434.42	610.088	Unconstrained
QUAKER SUPREME BNA WALNUT 12Z	3	12	721.166	20	313.07	8.5448	2.30353	2675.12	721.166	Unconstrained
QUAKER 14.6OZ DELUXE OTML 10P	3	12	323.598	48	302.64	4.23769	1.06925	1282.49	323.598	Unconstrained
QUAKER DINO OTML 8PK	2	14	407.234	42	556.22	1.16049	0.732145	645.488	407.234	Unconstrained
QUAKER OTML INST 11.8Z 12PK	2	14	447.141	37	545.79	1.70571	0.819254	930.959	447.141	Unconstrained

Applications: Healthcare

Rule-Based Systems

Staff Scheduling

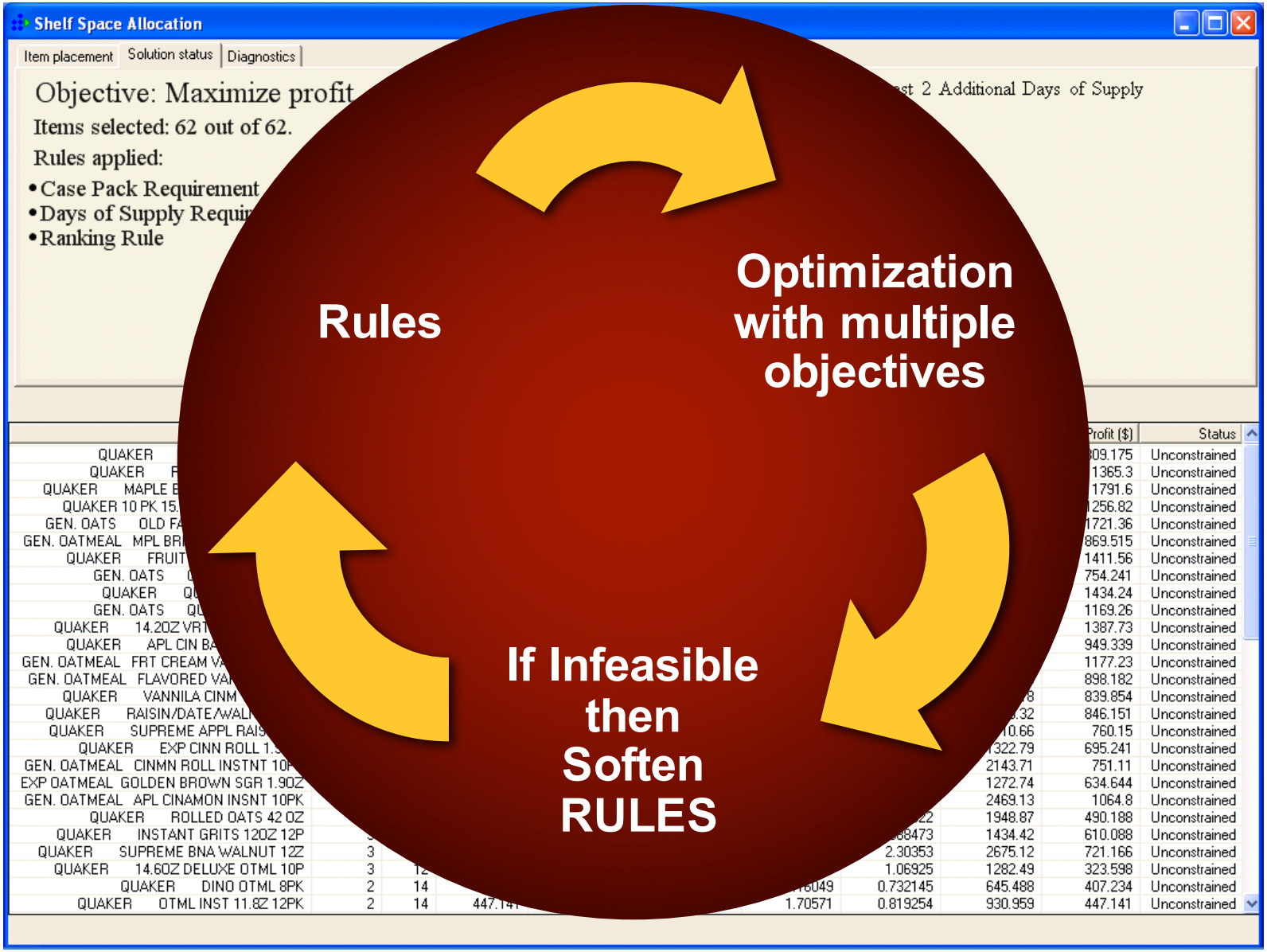


- » Using Xpress in Complex Rule-Based Systems
- » **Yuri Smirnov**
- » **Coffee Chat**

Goal: To reduce manual effort of 20-80 hours/month spent on Doc & Nurse Scheduling

Future Goal: Recommend staffing policy

Space Optimization:
Constrained Assortment Optimization



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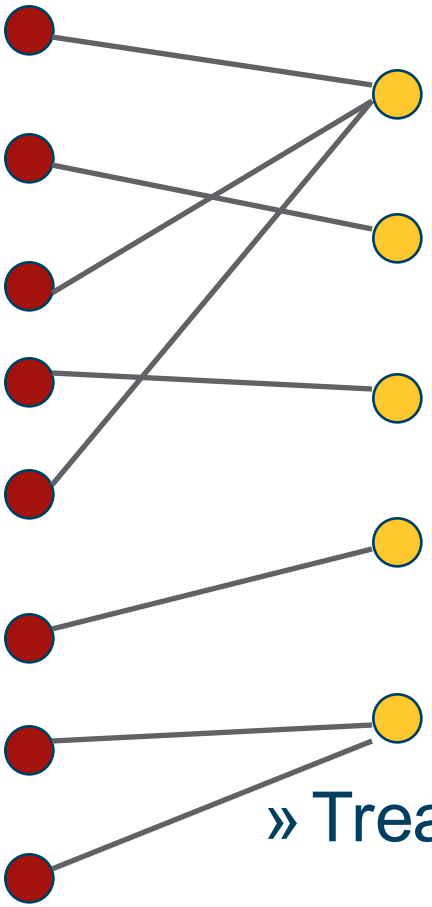
Solving problems in FS and Insurance



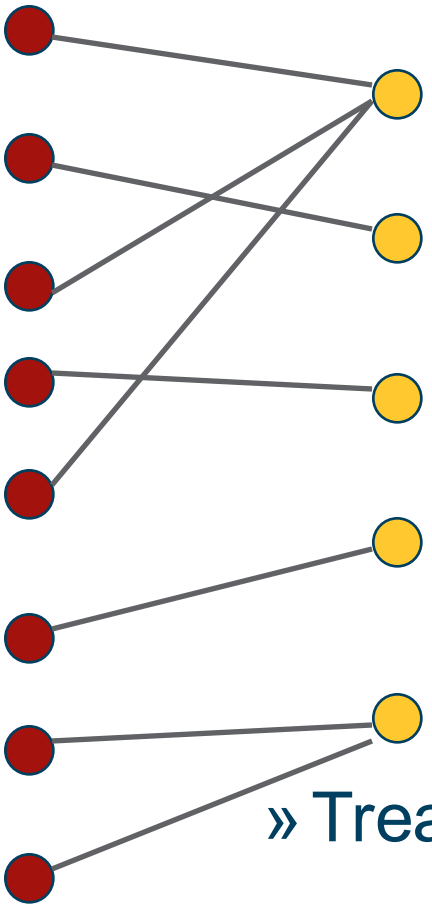
» Treatments

» Customers

- » Objective
- » Maximize profit
- » Assign customer to treatments

- » Marketing
- » Pricing
- » Initial Credit Line
- » Credit Line Management
- » Retention
- » Fraud
- » Collections

Where are the rules ?

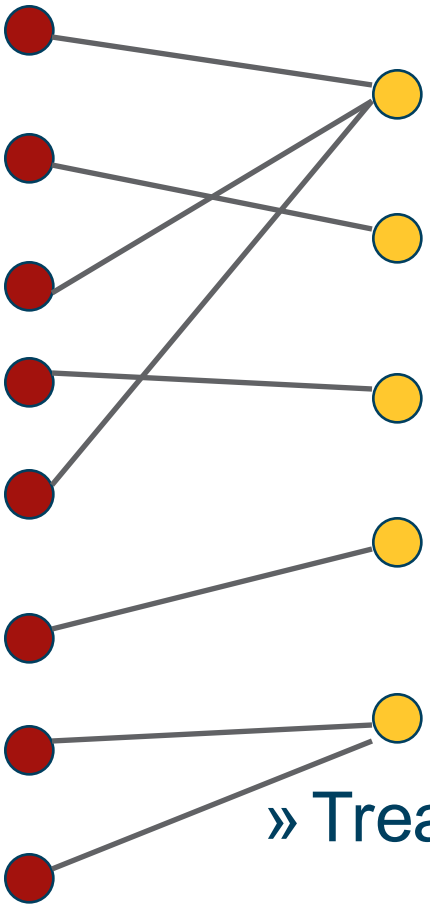


» Treatments

» Customers

- » Constraints
- » Objectives
- » Eligibility for treatment
- » Product configuration

Typical problems in our FS and Insurance

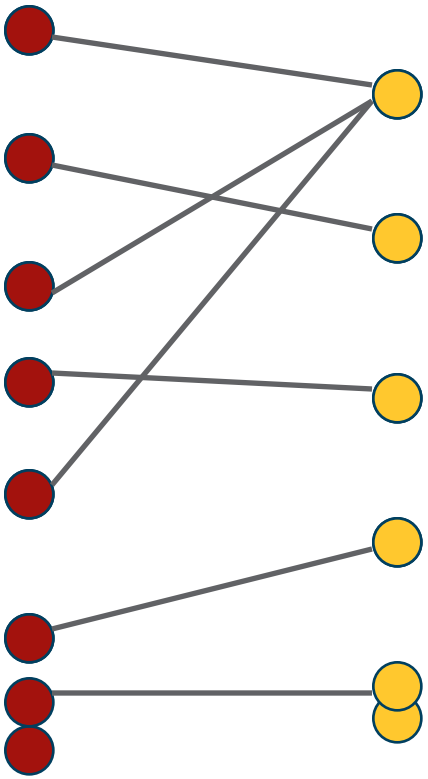


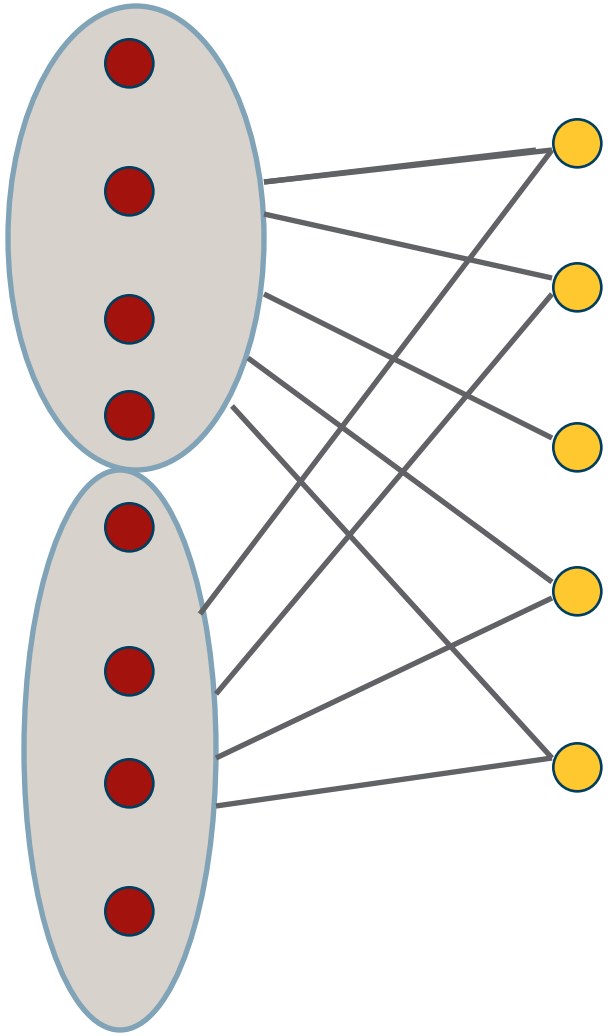
» Treatments

» Customers

» Decision Optimizer

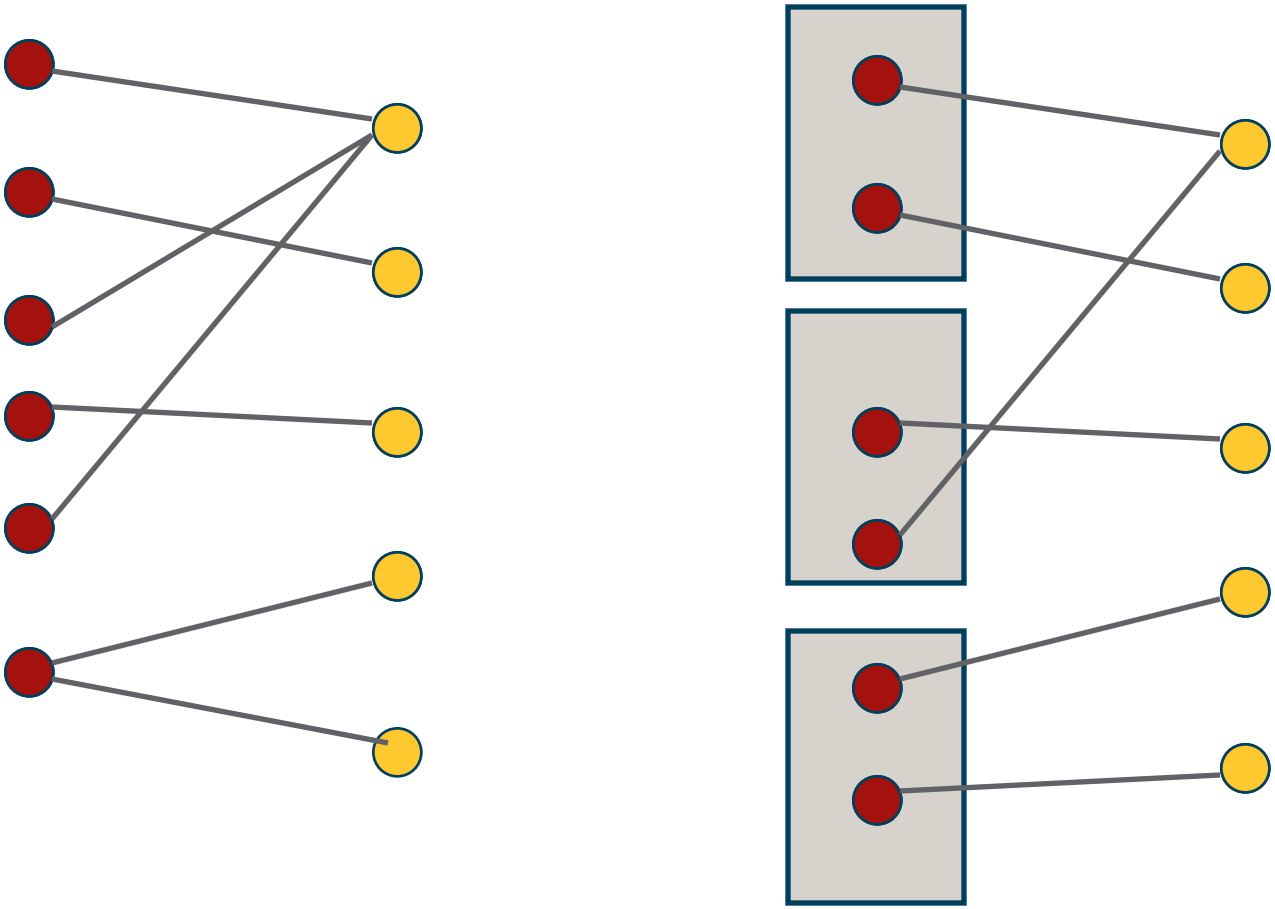
Segment and Solve





» Create Segments and solve a smaller problem

Randomized partitioning and Solve



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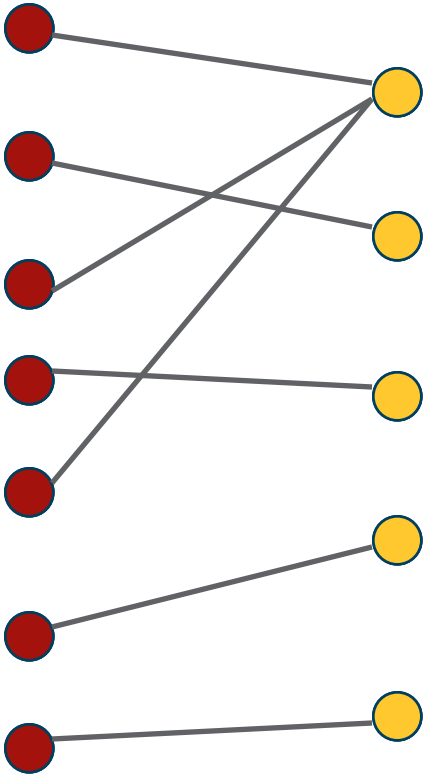
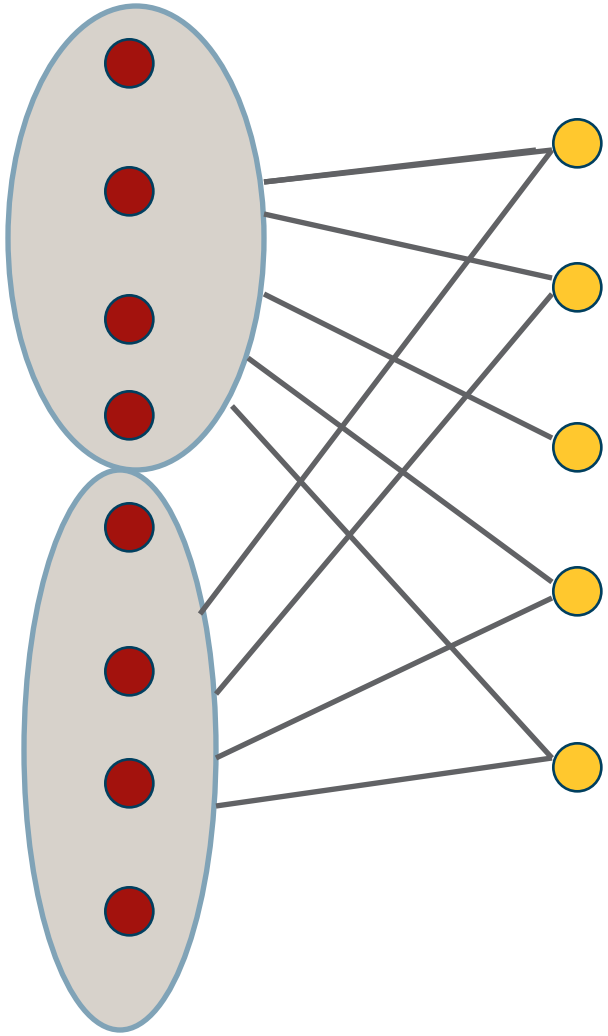
- More……
- Generate Rules
- Select Rules
- Robust Rules
- Rules for Monitoring Systems

Another way for looking at the Segmentation !!!!

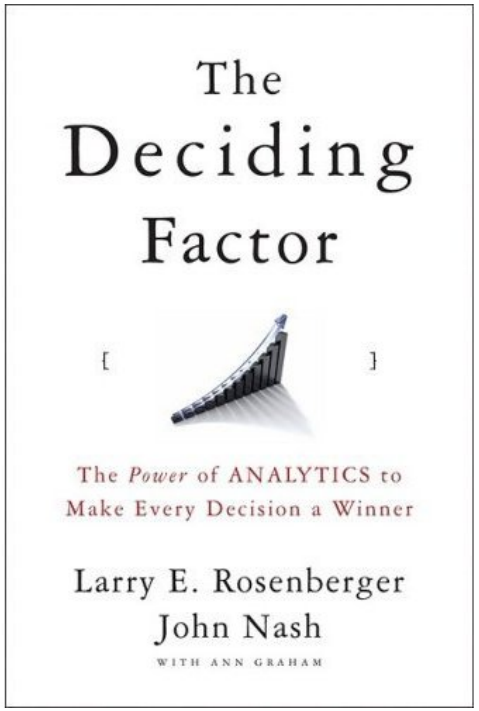




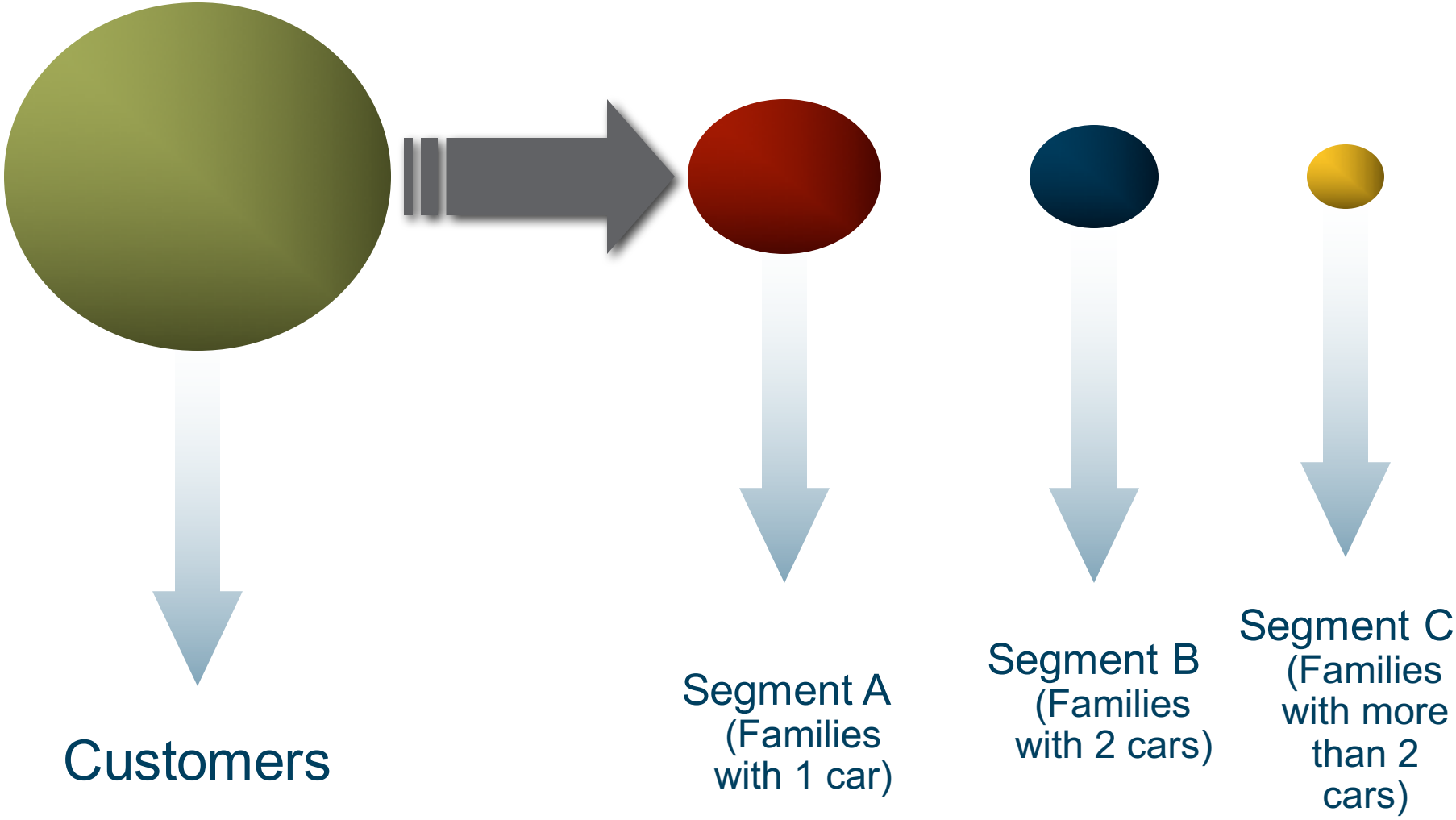
» Segment your population according to rules

Business Problem
Auto Insurance Price Optimization

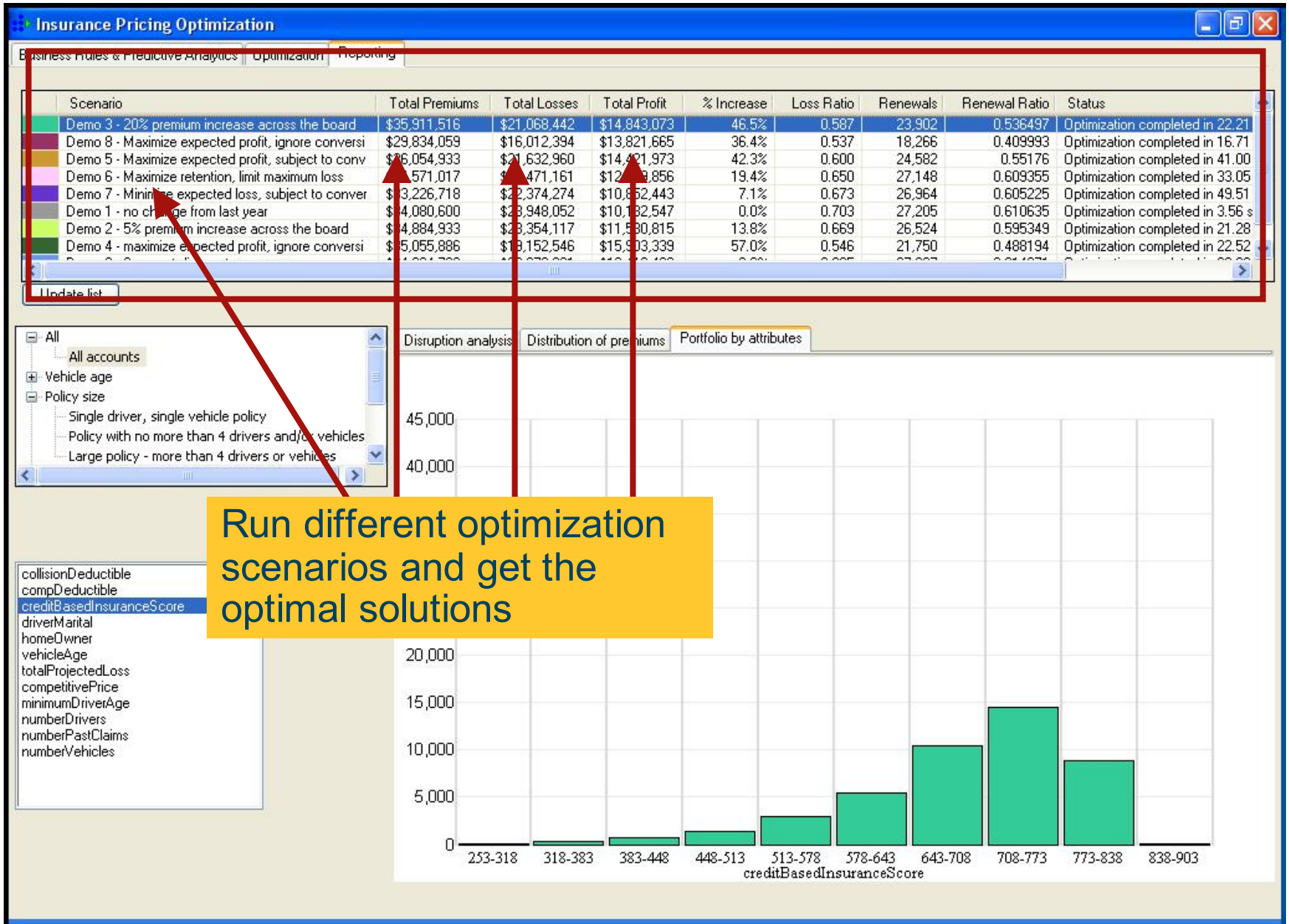
» Given a set of policyholders and prospects, what premium amount should I offer them so as to meet an overall business objective



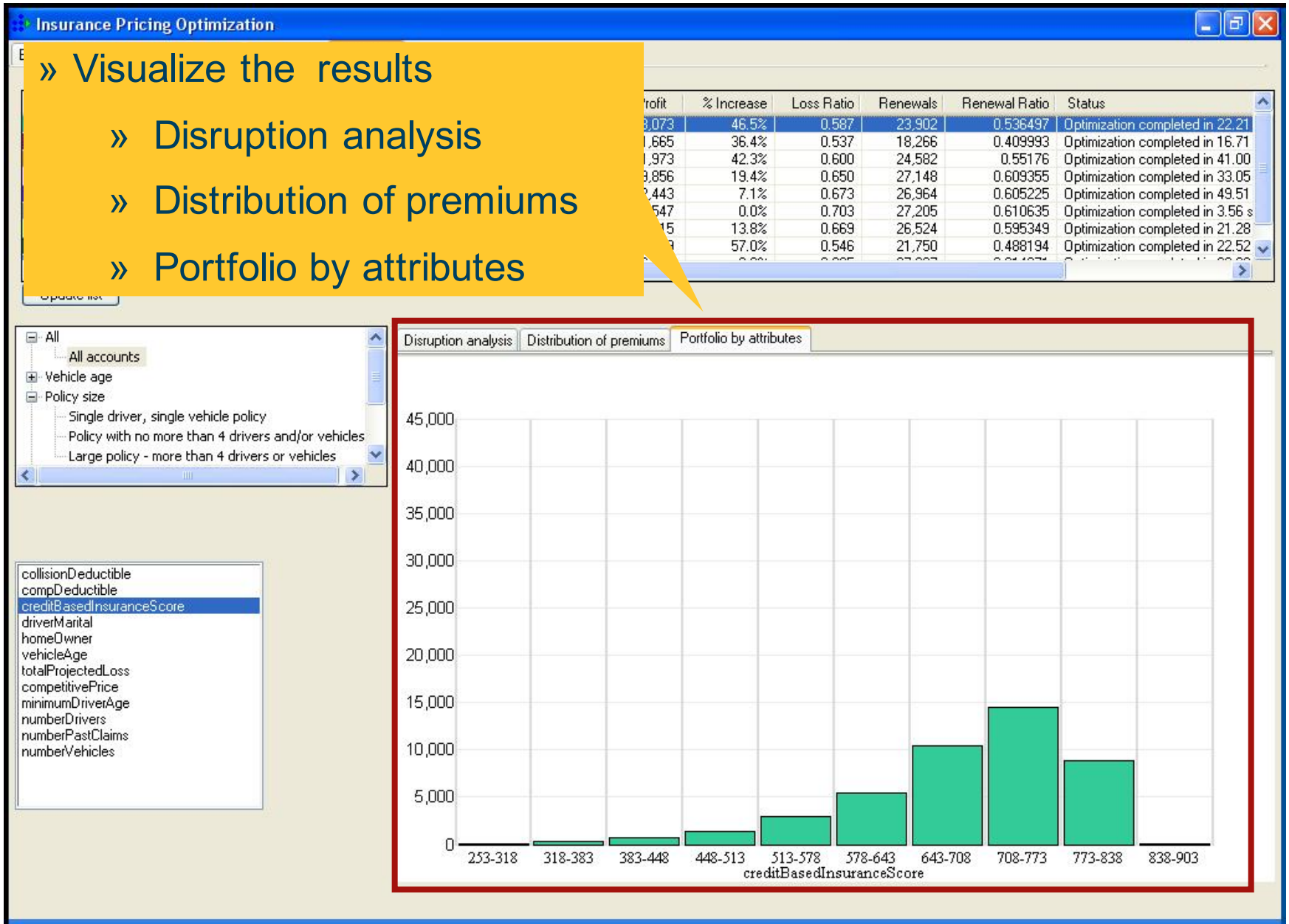
Use rules to do segmentation



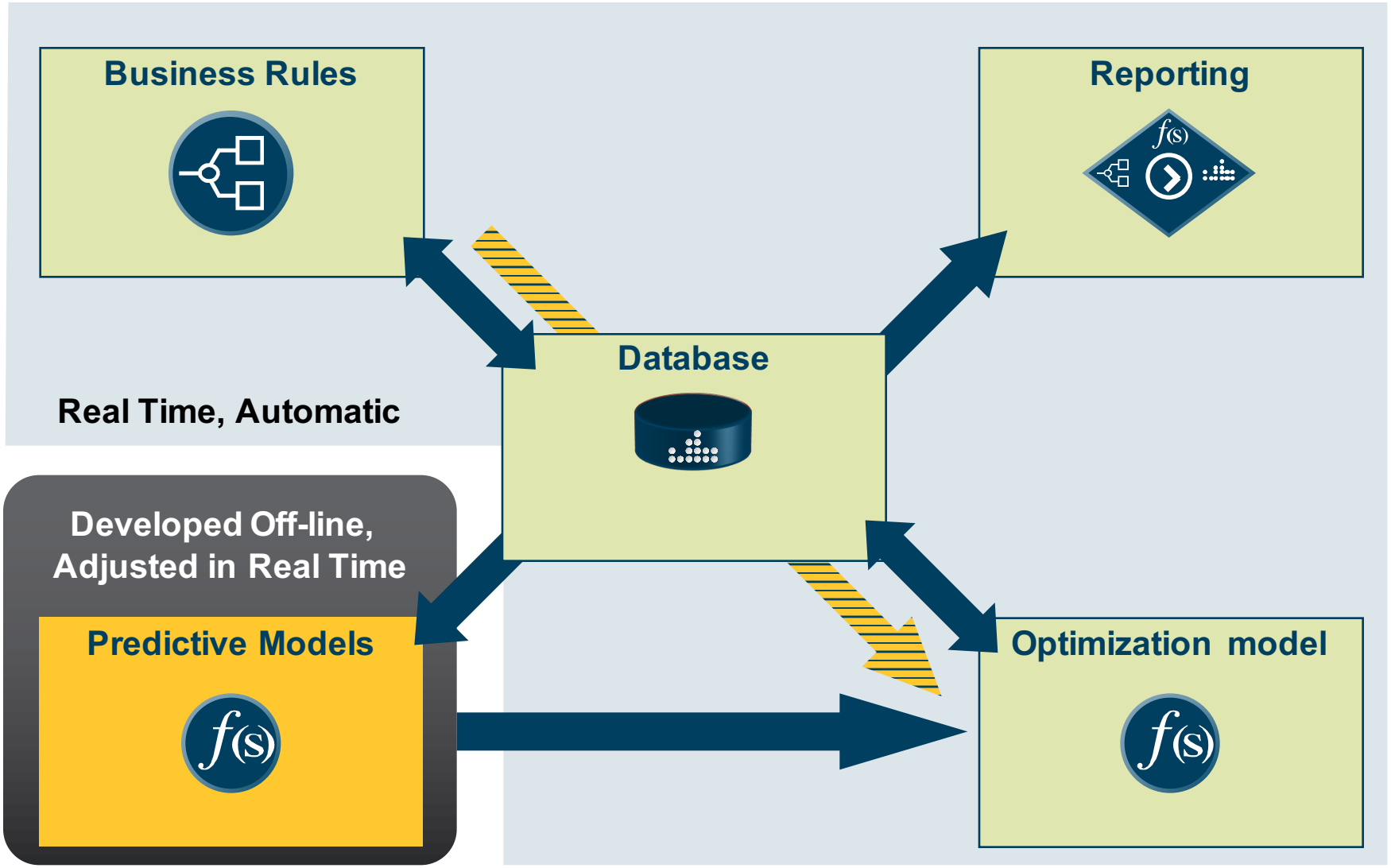
Insurance Pricing: Run Scenarios



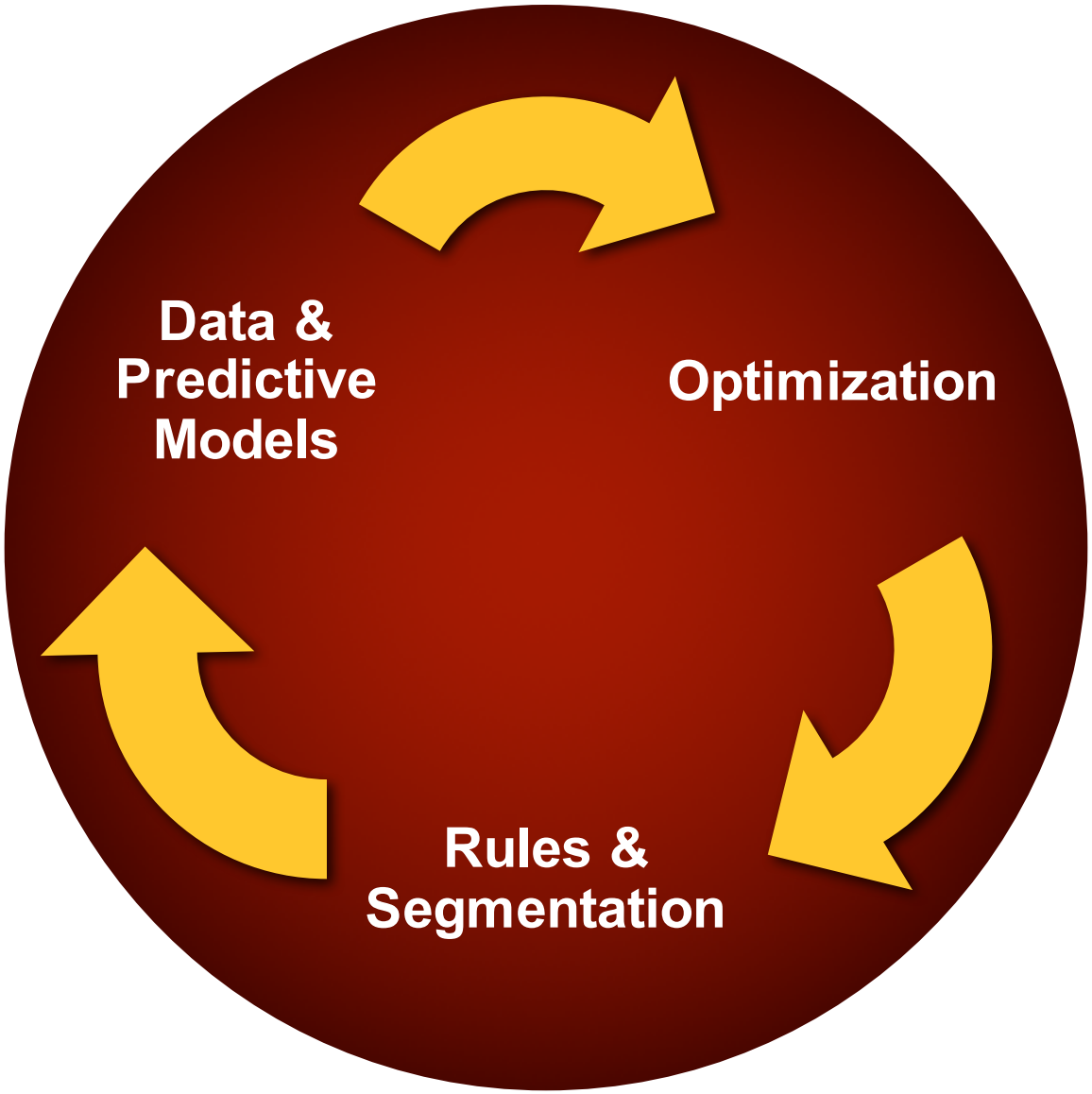
Insurance Pricing: Decisions



Insurance Pricing Framework Structure – User Classification



Insurance Pricing Framework



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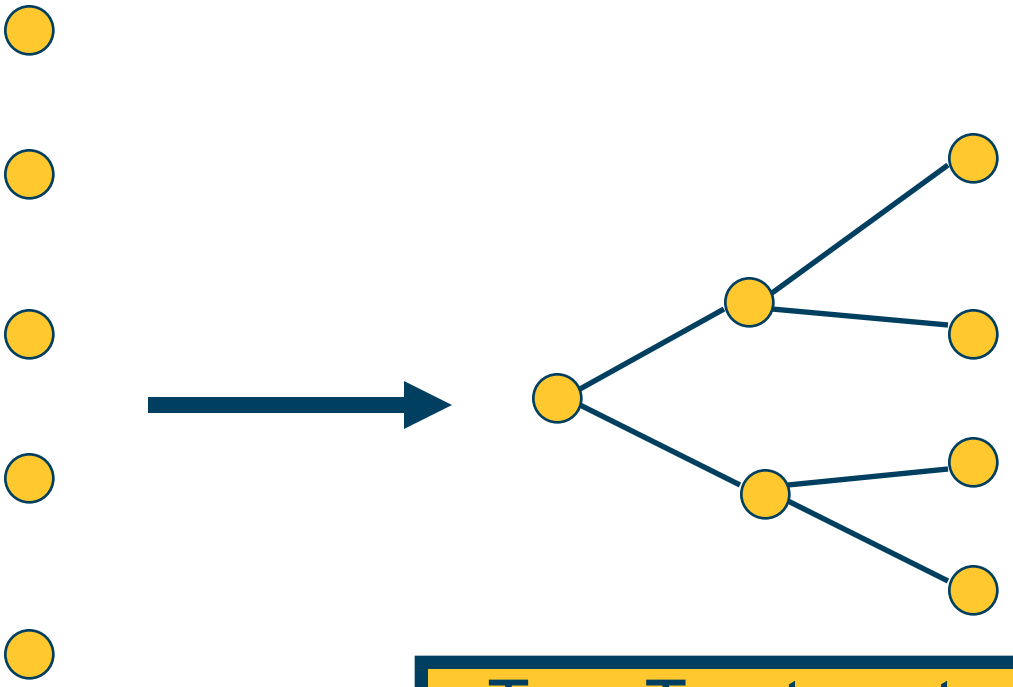
Trends: Explosion of Treatment space

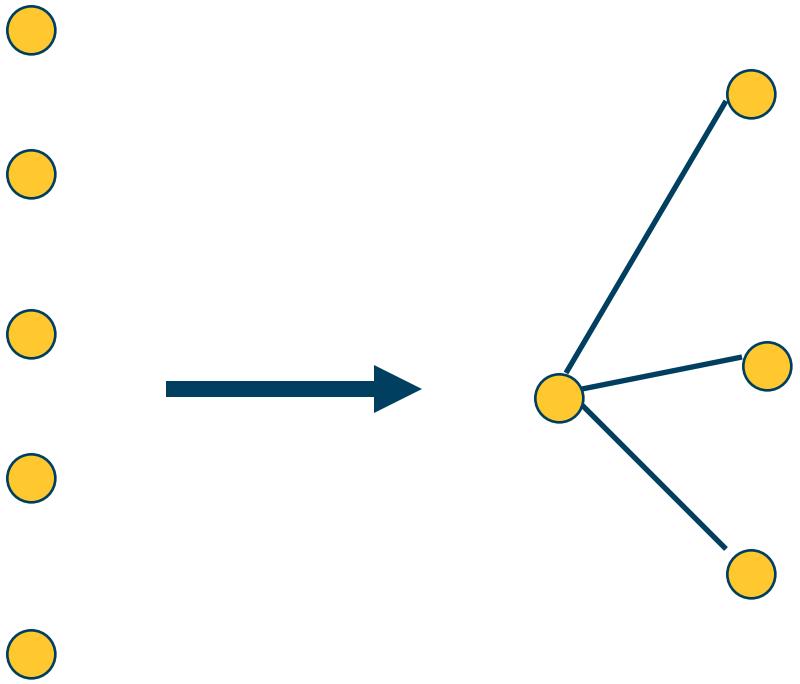


» Simple Treatment Space

» Tree Treatment Space

» Examples – Loan mod, Collections, etc.

Trends: Segmentation of Account base

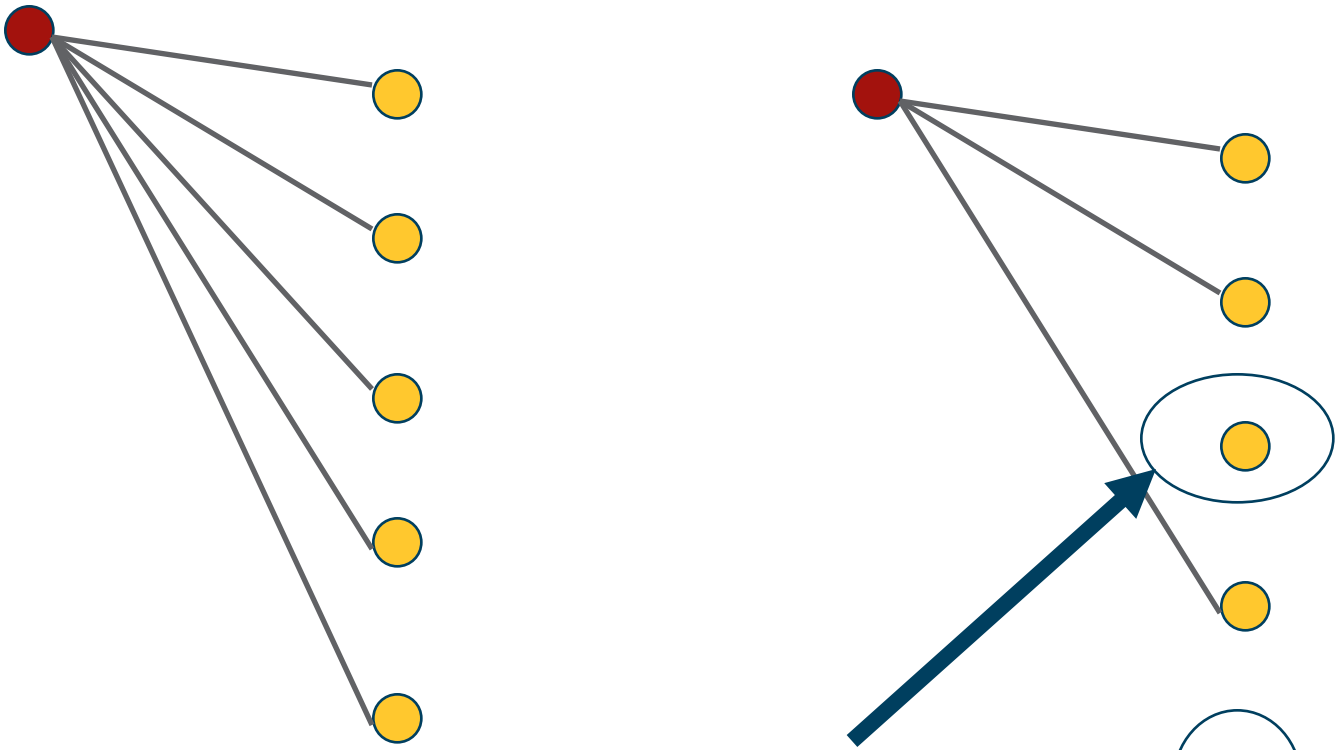


» Simple Account Space

» Account Space

» Example: Family,Company

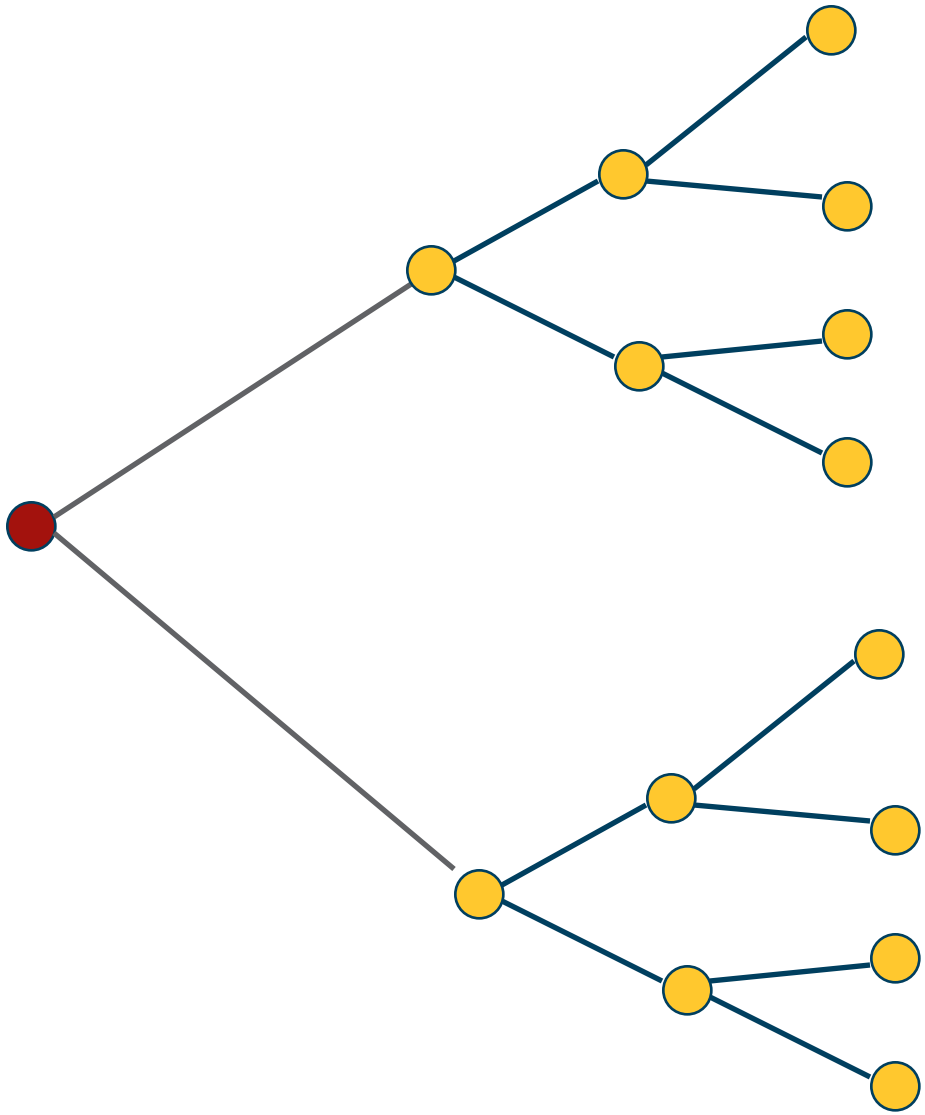
Reduce the space for Treatments using rules ?
Why?



Not Eligible Treatments

Why?

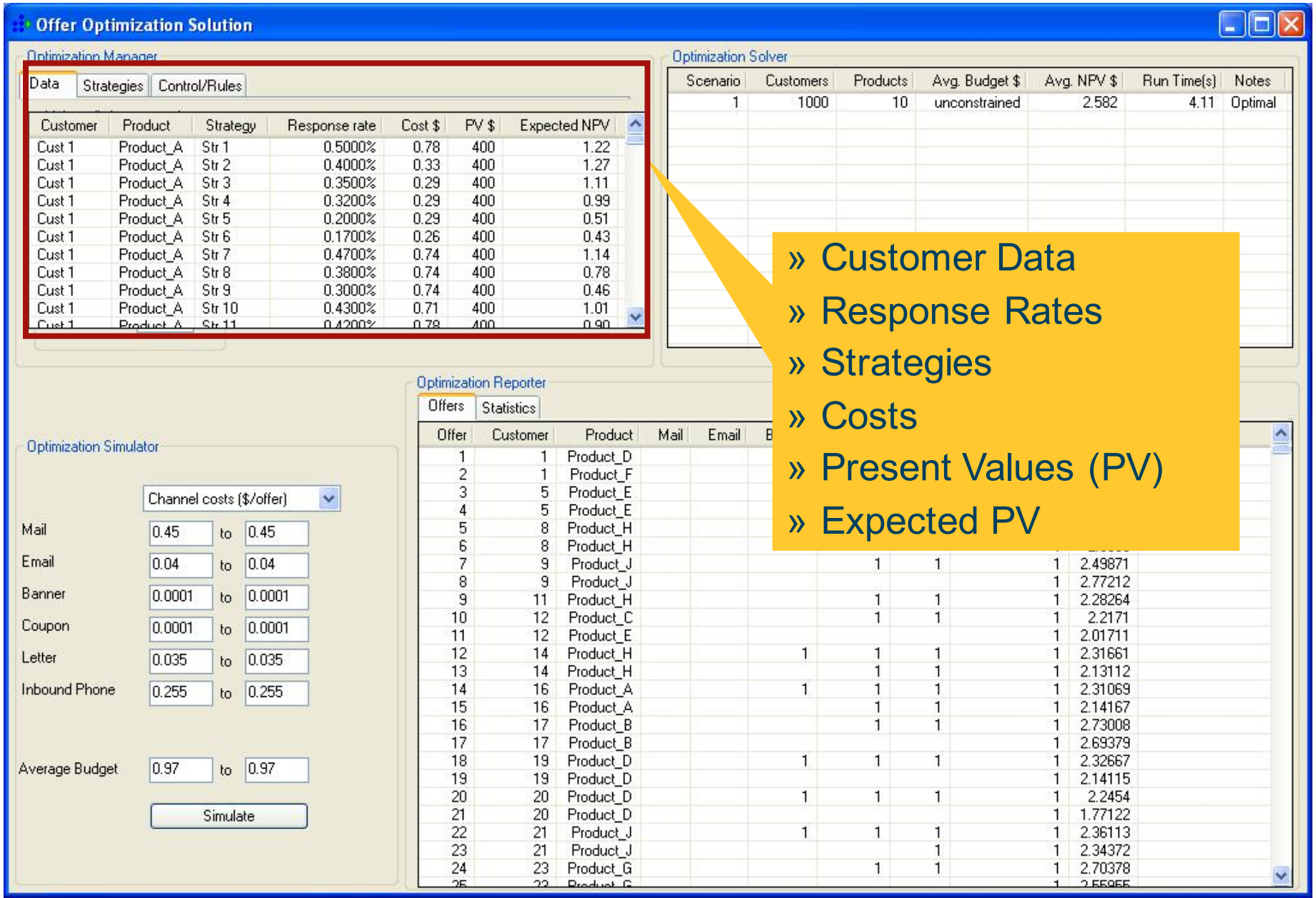
Treatment Space explodes again?????



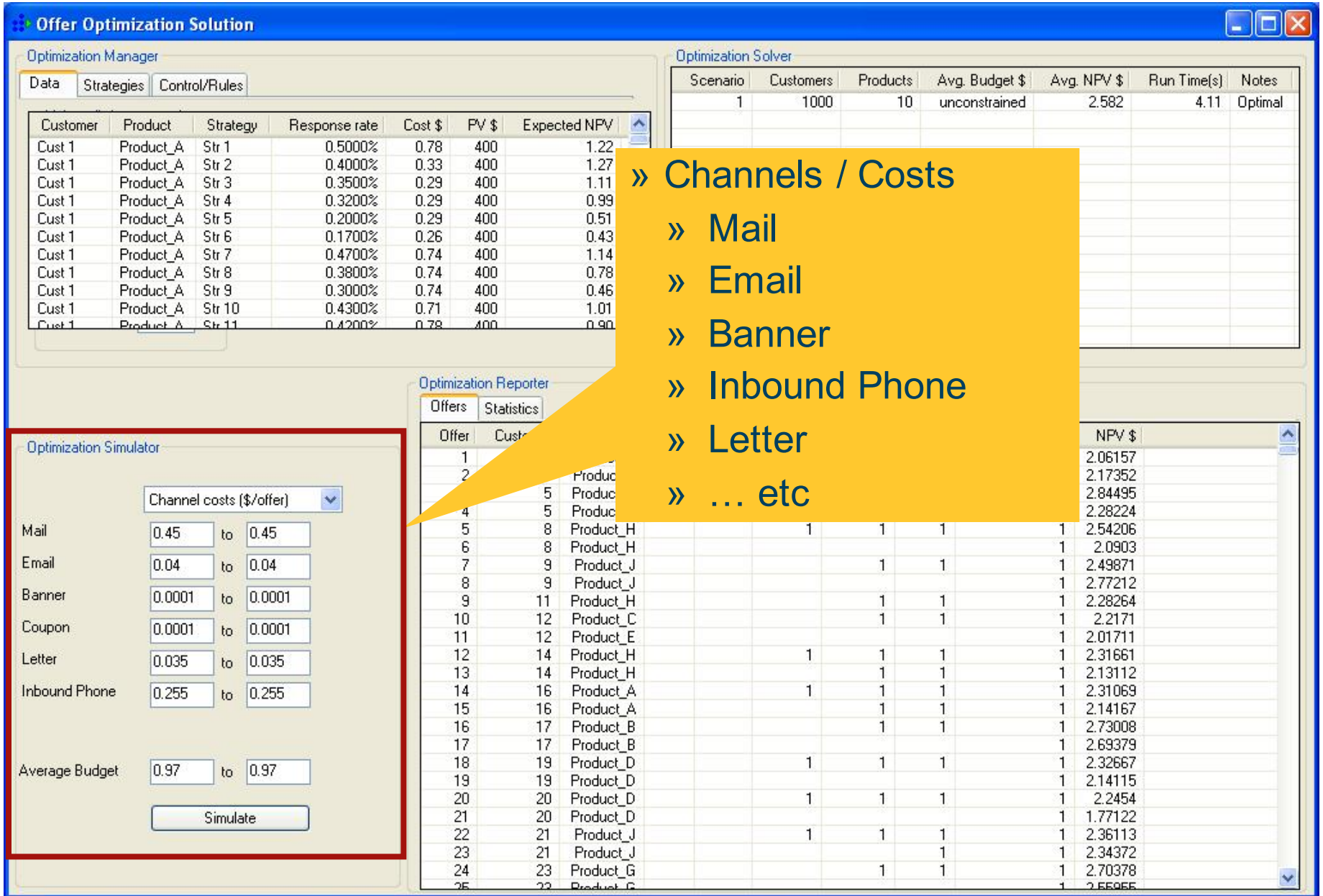
Business Problem: Offer Optimization

- **Given**
  - Customers
  - Offers
  - Channels
  - Strategies/Budgets/Constraints
- **The decisions are to**
  - Assign the customers to the right strategy (treatment)
- **And the Goal is to Maximize profit**

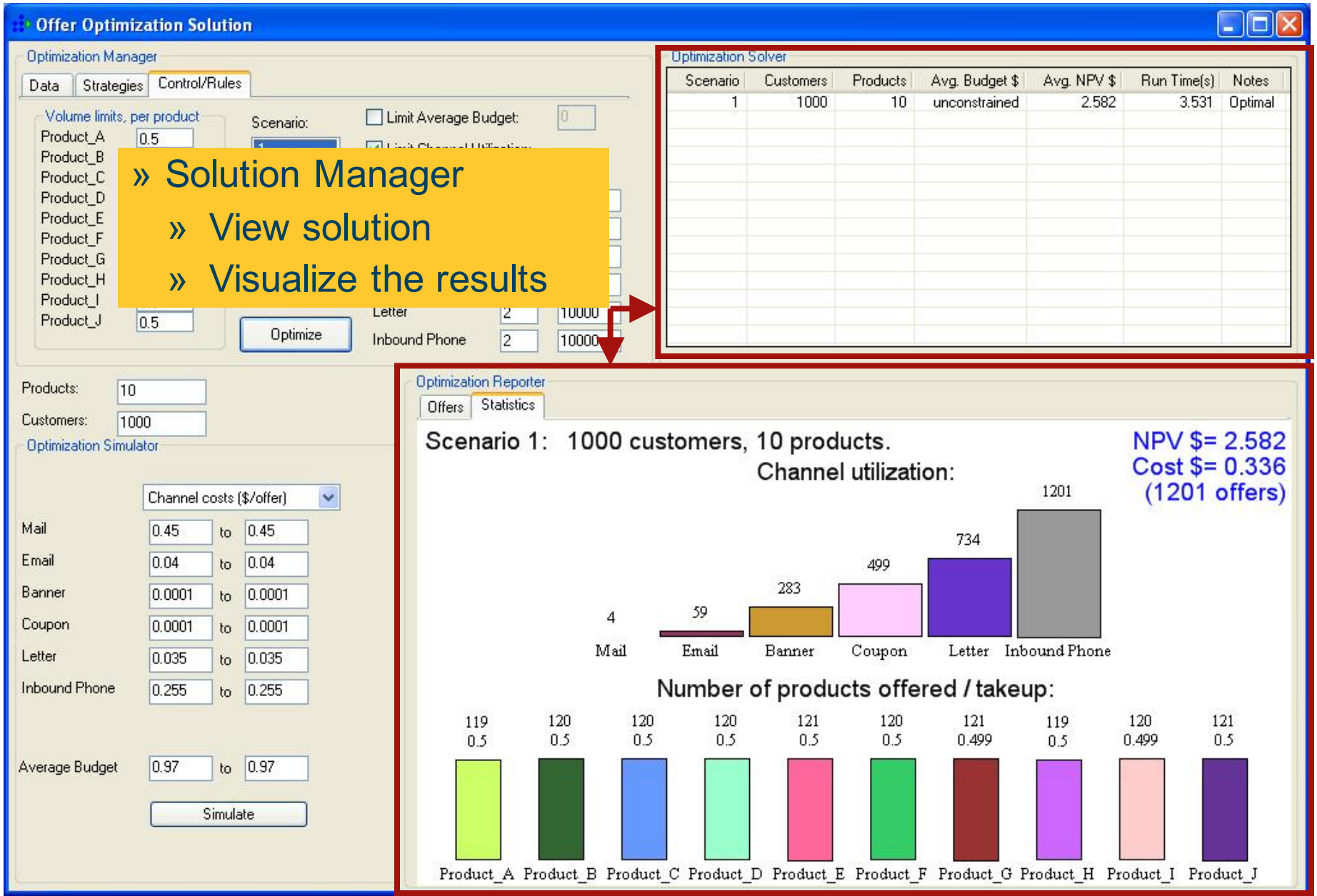
Offer Optimization: Data



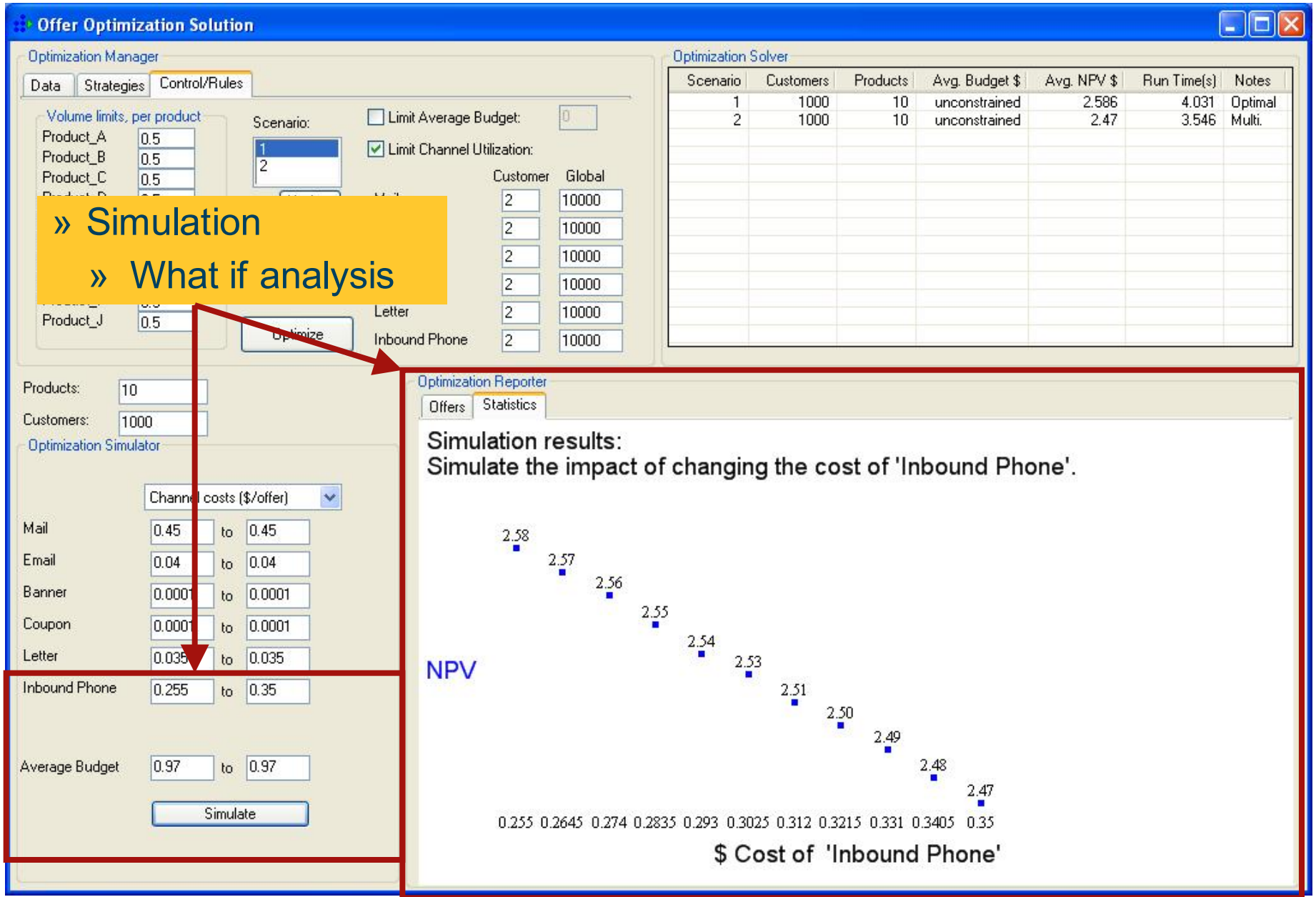
Offer Optimization: Channels



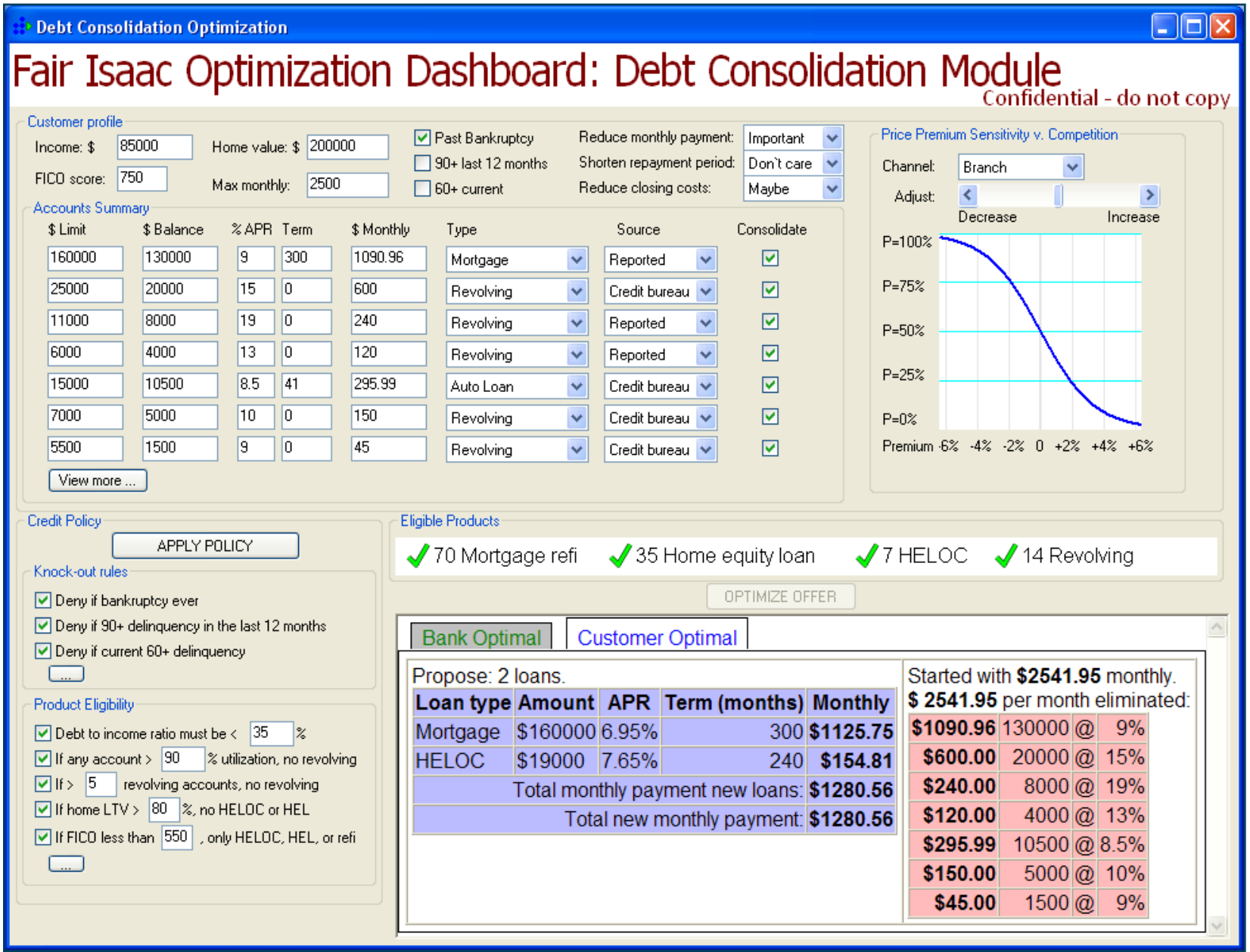
Offer Optimization: Decisions



Offer Optimization: Simulation



Debt Consolidation: Dashboard – Single Account



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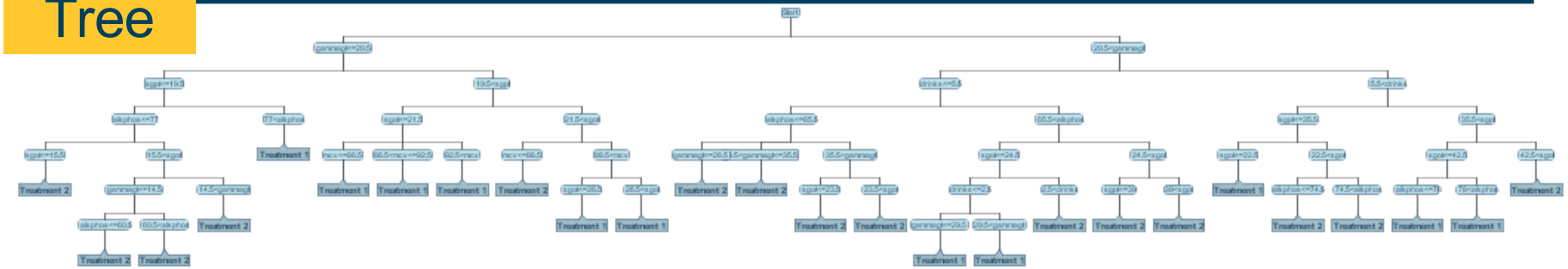
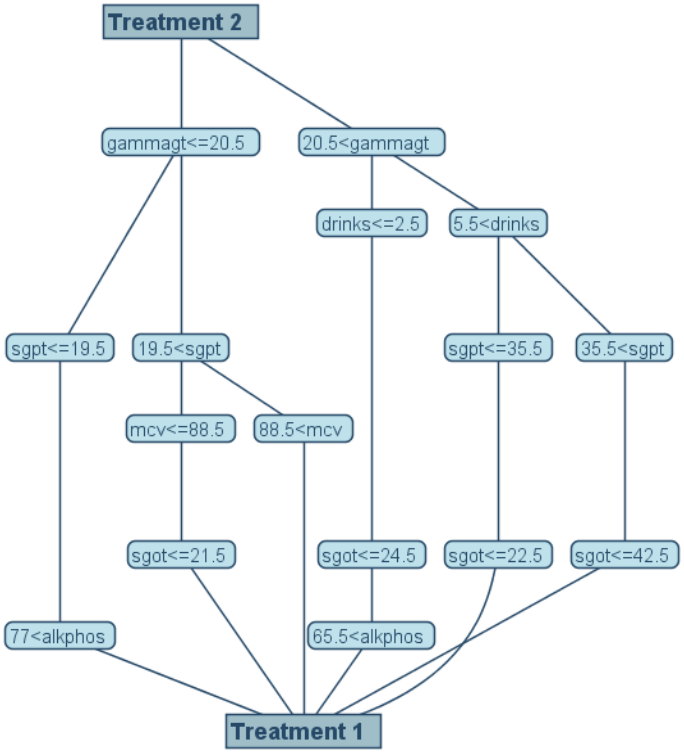
- **Select Rules**
- Robust Rules

Develop Rules - MBDT

Tree

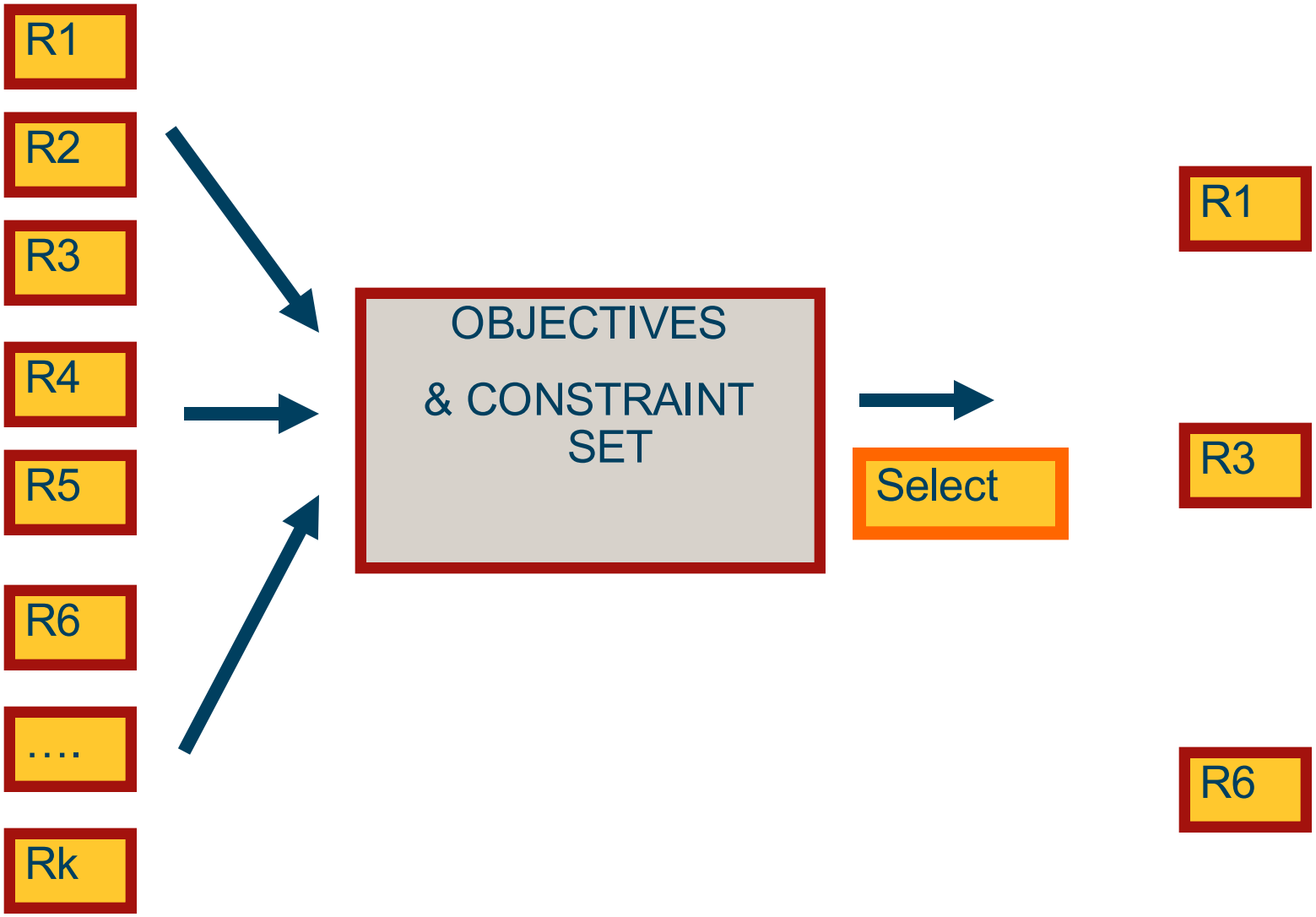


EDAG



Reduce size of the Tree

Select Rules (FRAUD other verticals)



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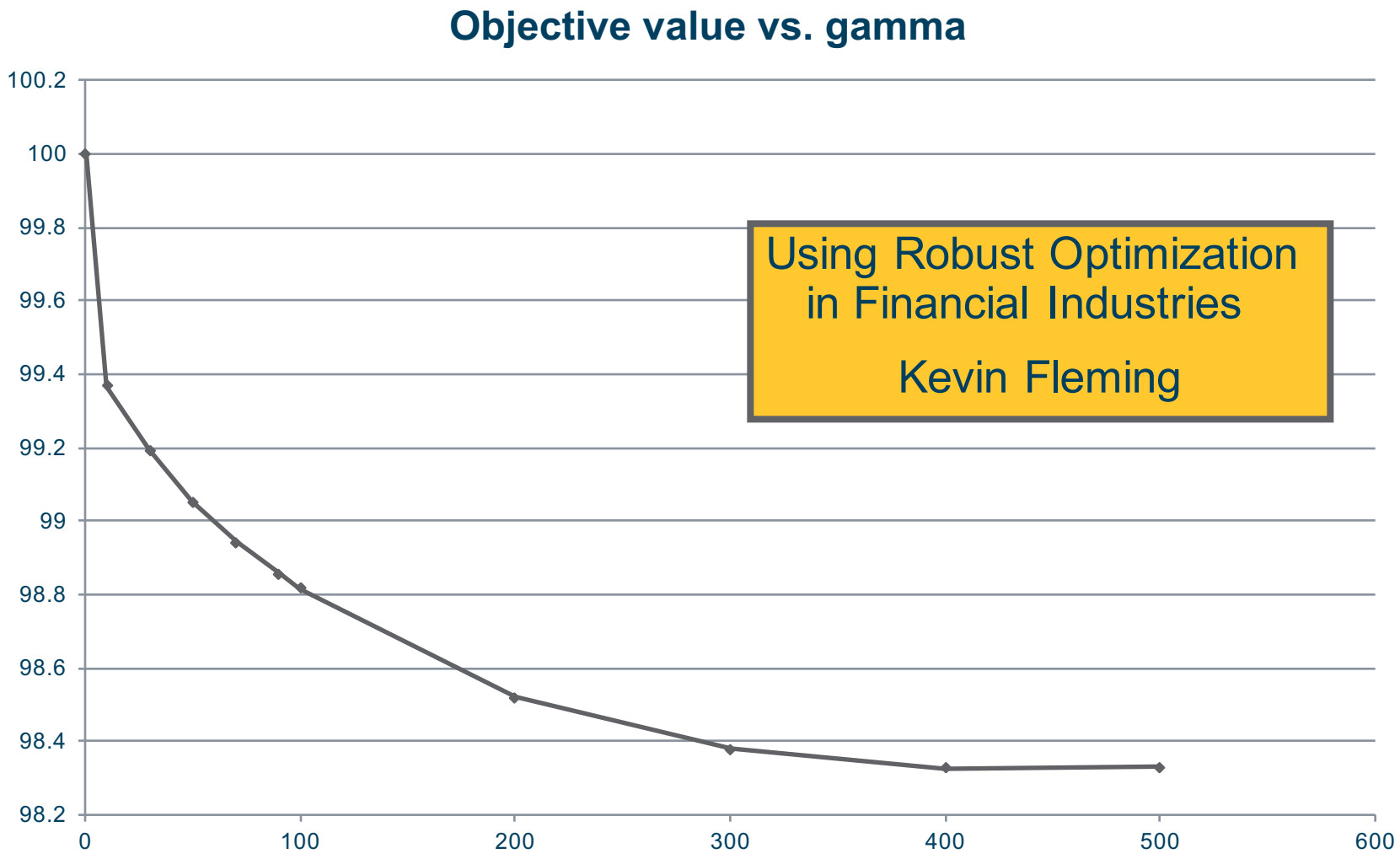
- **Robust Rules**

Robust Optimization: Loan Modification project



Robust Optimization: Loan Modification project