



**SOA Predictive Analytics Seminar – Hong Kong**

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## **Session 2**

# **The Role of Predictive Analytics in US Healthcare Market**

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# Role of Predictive Analytics

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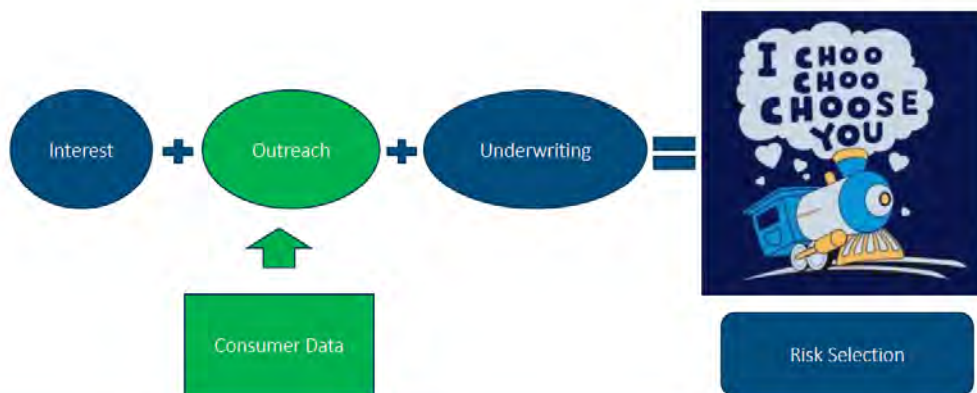
## Agenda

- Background - Post-Reform Marketplace
- Integrated Profitability Analysis
- Industry Talking Points
- Modeling Opportunities
- Summary

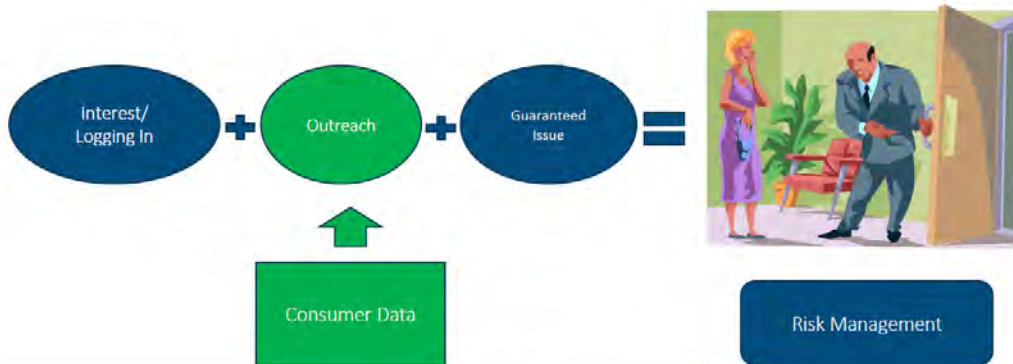
# Background - Post-Reform Marketplace



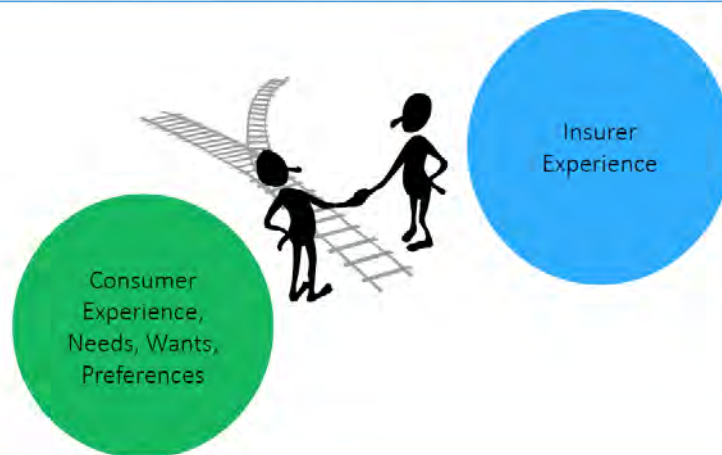
## Where We Were



# Where We Are



# Where We Are Going



## Health Insurance Coverage in the United States: 2017

Coverage Type	Year		
	2013	2016	2017
Any Health Plan	86.7%	91.2%	91.2%
Any Private Plan	64.1%	67.5%	67.2%
Any government plan	34.6%	37.3%	37.7%
uninsured	13.3%	8.8%	8.8%
Population	313,401,000	320,372,000	323,156,000

## 2010 FL Health Insurance Coverage

Sector	Population (million)
Uninsured	4.3
Medicaid/SCHIP (Non-Risk)	1.3
Medicaid/SCHIP (Risk)	1.3
TRICARE/Other	1.2
Medicare	2.4
Under 65	0.8
Small Group	2.2
Large Group	5.4

# Integrated Profitability Analysis



# Integrated Profitability Analysis

$$\begin{aligned} \text{Gross Margin} = & \\ & (\text{Premium} + \text{Transfer} + \text{CSR} \\ & + \text{Risk Corridor}^* + \text{Reinsurance}^*) \\ & - \text{Paid Claim Liability} \end{aligned}$$

Transfer: risk adjustment zero sum money transfer  
 CSR: cost-sharing reduction for Silver variants  
 \*: temporary programs

## 2014 Number of HCCs - Adult

Reinsurance	Members	Exposure Distribution	Average Risk Score	Paid	Paid Distribution	Premium	Transfer	CSR	Reinsurance	Gross Margin	Gross Margin PMPM
No	362,956	97.94%	1.74	\$1,077,736,593	58.07%	\$1,729,901,015	-\$82,356,142	\$72,184,703	\$0	\$641,992,993	\$207
Yes	6,524	2.00%	23.64	\$778,120,380	41.93%	\$49,545,682	\$329,426,363	\$35,501,362	\$326,941,805	-\$363,646,973	-\$5,580
<b>Overall</b>	<b>369,480</b>	<b>100.00%</b>	<b>2.10</b>	<b>\$1,855,856,963</b>	<b>100.00%</b>	<b>\$1,779,446,697</b>	<b>\$247,070,221</b>	<b>\$107,686,065</b>	<b>\$326,941,805</b>	<b>\$278,346,020</b>	<b>\$88</b>

### No Reinsurance

Number of HCC	Members	Exposure Distribution	Average Risk Score	Paid	Paid Distribution	Premium	Transfer	CSR	Reinsurance	Gross Margin	Gross Margin PMPM
0	273,163	73.00%	0.58	\$378,510,203	35.12%	\$1,194,326,450	-\$615,015,794	\$28,200,116	\$0	\$229,000,629	\$301
1	66,596	18.08%	3.23	\$404,452,400	37.53%	\$385,246,550	\$164,584,129	\$24,746,413	\$0	\$170,126,697	\$276
2	16,577	4.50%	6.96	\$175,306,054	16.27%	\$105,896,998	\$173,100,536	\$11,288,135	\$0	\$114,949,556	\$729
3	4,491	1.23%	11.89	\$70,964,791	6.58%	\$30,346,290	\$96,479,803	\$4,847,931	\$0	\$60,709,232	\$1,412
4+	2,129	0.55%	23.91	\$48,443,136	4.49%	\$14,014,787	\$98,495,123	\$3,140,109	\$0	\$67,306,884	\$3,341
<b>Total</b>	<b>362,956</b>	<b>100.00%</b>	<b>1.74</b>	<b>\$1,077,736,593</b>	<b>100.00%</b>	<b>\$1,729,901,015</b>	<b>-\$82,356,142</b>	<b>\$72,184,703</b>	<b>\$0</b>	<b>\$641,992,993</b>	<b>\$207</b>

### Reinsurance

Number of HCC	Members	Exposure Distribution	Average Risk Score	Paid	Paid Distribution	Premium	Transfer	CSR	Reinsurance	Gross Margin	Gross Margin PMPM
0	557	8.56%	0.76	\$49,452,247	6.36%	\$4,525,936	-\$2,101,132	\$1,975,561	\$16,629,757	\$45,251,882	-\$8,111
1	1,544	23.95%	8.70	\$146,868,712	19.13%	\$11,620,250	\$24,179,865	\$6,973,855	\$56,191,527	-\$106,085,703	-\$6,796
2	1,481	22.41%	14.91	\$144,114,422	18.52%	\$10,998,726	\$41,439,005	\$6,612,740	\$98,094,912	-\$85,073,951	-\$5,826
3	981	15.23%	21.41	\$106,800,147	13.73%	\$7,576,155	\$44,679,021	\$5,393,596	\$45,436,877	-\$49,150,476	-\$4,953
4+	2,011	29.85%	50.34	\$328,884,851	42.27%	\$15,025,576	\$221,228,703	\$14,545,611	\$150,598,734	-\$78,084,962	-\$4,014
<b>Total</b>	<b>6,524</b>	<b>100.00%</b>	<b>23.64</b>	<b>\$778,120,380</b>	<b>100.00%</b>	<b>\$49,545,682</b>	<b>\$329,426,363</b>	<b>\$35,501,362</b>	<b>\$326,941,805</b>	<b>-\$363,646,973</b>	<b>-\$5,580</b>

# Profitability Analysis

Number of HCCs	Profitability
0	120%
1	96%
2	90%
3+	93%

Variable	Description	Profitability
HHS_HCC037	Chronic Hepatitis	316%
HHS_HCC001	HIV/AIDS	158%
HHS_HCC118	Multiple Sclerosis	149%
HHS_HCC048	Inflammatory Bowel Disease	133%
HHS_HCC056	Rheumatoid Arthritis and Specified Autoimmune Disorders	112%
HHS_HCC120	Seizure Disorders and Convulsions	105%

Variable	Description	Profitability
HHS_HCC142	Specified Heart Arrhythmias	76%
HHS_HCC132	Unstable Angina and Other Acute Ischemic Heart Disease	83%
HHS_HCC011	Colorectal, Breast (Age < 50), Kidney, and Other Cancers	87%
HHS_HCC088	Major Depressive and Bipolar Disorders	88%
HHS_HCC008	Metastatic Cancer	90%

Variable	Description	Profitability
INT_GROUP_H	Severe illness interaction	85%
INT_GROUP_M	Severe illness interaction	87%

# Industry Talking Points





## Industry Talking Points (I)



### Targeted Marketing, Outreach, and Retention Strategies

Together with Milliman and Pacific Market Research, GreenRubino has developed a process for identifying and attracting a health plan's best prospective members, called Risk-Based Marketing. This unique combination of actuarial modeling, segmentation and marketing helps health plans determine where and how to focus their Healthcare Exchange product development and marketing efforts for the highest profitability.



### Optimized Product Design and Pricing Strategies

Focus on entire consumer experience and data driven product development

Knowing each member

Narrow networks widely offered

2016: United, Aetna, UPMC Health Plan rate increases < 10%; Highmark requested increases 25-35%

2017 and beyond: Premium inflation year over year; factors other than price must be considered; value added services

## Industry Talking Points (II)

### Risk Adjustment

- EDGE server data submission >> Risk Score Optimization
- ICD-10
- 1-2% of population representing most of coding gaps
- Targeted top opportunities
- Transfer is only part of equation

### Clinical Outcomes

- Third party risk score is not designed for care management
- 10-15% high cost remained next year
- Regression to the mean
- Over 90% of vendors not working
- ROI is not a good metric
- Predicting Future Events (H2H and L2H)

# Modeling Opportunities



## Modeling Opportunities



# Predictive Modeling Methodology

1. Define the business problem.
2. Translate business problems into predictive modeling problems.
3. Select appropriate data.
4. Get to know the data.
5. Create a model set.
6. Fix problems with the data.
7. Transform the data.
8. Build models.
9. Assess models.
10. Deploy models.
11. Assess results.



## Targeted Marketing



## Example: Diabetes via Consumer Data

X	Description	Prevalence
A	Health focused	6.66%
B	Success-oriented	4.99%
C	DIY	8.11%
D	Undisciplined	15.40%
E	Family centered	5.58%
F	Poor health	15.53%

For Illustrative Purpose Only.

## Example: Diabetes via Modeling

Segmentation	Prevalence
1	0.98%
2	1.74%
3	2.49%
4	3.40%
5	4.68%
6	6.39%
7	8.13%
8	10.78%
9	15.00%
10	26.67%

For Illustrative Purpose Only.

# Profitability Model

Profit Decile	Mean Risk Score	Mean Allowable Rating Factor	Loss Ratio
1	1.83	2.048	97.1%
2	1.71	1.823	87.0%
3	1.51	1.729	84.9%
4	1.52	1.739	82.1%
5	1.47	1.659	81.8%
6	1.33	1.539	77.7%
7	1.38	1.534	77.3%
8	1.39	1.576	72.7%
9	1.55	1.621	69.3%
10	2.07	1.995	66.9%
<b>Overall</b>	<b>1.58</b>	<b>1.726</b>	<b>80.0%</b>

# Risk Adjustment



## Silver Risk Score for a 53 Year Old Male

Diagnosis	Description
25000	Diabetes mellitus without mention of complication
V5867	Long-term use of insulin
4160	Primary pulmonary hypertension
49320	Chronic obstructive asthma
9946	Sea sickness
30029	Other isolated or specific phobias

Distinct Diagnosis Codes from allowable sources for 2014



HCC Grouper

HCC	Description
21	Diabetes without Complication
21	Diabetes without Complication
130	Congestive Heart Failure
160	Chronic Obstructive Pulmonary Disease
N/A	Not Mapped
N/A	Not Mapped

$$RS_{Silver} = 0.484 + 1.120 + 3.587 + 0.904 = 6.095$$

Silver Risk Score
Demographic Weight for Male Aged 50-54
Weight for HCC 21
Weight for HCC 130
Weight for HCC 160



## Risk Score Monthly Development

HCC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
G01	25%	43%	58%	67%	75%	81%	85%	89%	92%	95%	98%	100%
G02A	13%	25%	35%	44%	52%	60%	68%	76%	82%	89%	95%	100%
G02	18%	33%	47%	59%	67%	74%	80%	85%	88%	92%	95%	100%
G03	13%	22%	31%	40%	47%	56%	62%	71%	79%	87%	93%	100%
G04	14%	25%	35%	43%	51%	61%	69%	77%	83%	90%	94%	100%
G06	27%	32%	43%	53%	59%	70%	75%	80%	85%	89%	96%	100%
G07	19%	29%	39%	46%	56%	66%	75%	79%	88%	92%	96%	100%
G08	16%	28%	38%	47%	54%	63%	69%	77%	83%	89%	95%	100%
G09	22%	35%	44%	50%	58%	64%	71%	77%	83%	89%	94%	100%
G10	19%	31%	44%	53%	58%	67%	70%	75%	81%	86%	91%	100%
G11	17%	22%	39%	44%	50%	56%	62%	69%	79%	85%	93%	100%
G12	24%	38%	48%	58%	65%	70%	75%	79%	85%	90%	97%	100%
G13	11%	20%	28%	37%	44%	51%	58%	65%	72%	81%	89%	100%
G14	27%	45%	53%	62%	71%	80%	85%	89%	91%	95%	95%	100%
G15	17%	30%	41%	50%	58%	65%	71%	77%	82%	88%	94%	100%
G16	21%	36%	46%	55%	62%	68%	73%	78%	83%	90%	96%	100%
G17	10%	19%	27%	36%	44%	53%	61%	70%	77%	85%	93%	100%
G18	8%	17%	24%	32%	40%	49%	57%	65%	74%	83%	92%	100%

## Top 10 Revenue Contribution

Variable	Silver Level	Description	Revenue Contribution
G01	1.12	Diabetes with Acute Complications (19); Diabetes with Chronic Complications (20); Diabetes without Complication (21)	5.22%
HHS_HCC008	24.376	Metastatic Cancer	4.84%
G15	0.904	Chronic Obstructive Pulmonary Disease, Including Bronchiectasis (160); Asthma (161)	3.10%
HHS_HCC088	1.601	Major Depressive and Bipolar Disorders	2.96%
G18	3.134	Completed Pregnancy With Major Complications (207); Completed Pregnancy With Complications (208); Completed Pregnancy with No or Minor Complications (209)	2.78%
HHS_HCC142	3.112	Specified Heart Arrhythmias	2.57%
G13	12.612	Respiratory Arrest (126); Cardio-Respiratory Failure and Shock, Including Respiratory Distress Syndromes (127)	2.52%
HHS_HCC012	3.194	Breast (Age 50+) and Prostate Cancer, Benign/Uncertain Brain Tumors, and Other Cancers and Tumors	2.52%
HHS_HCC130	3.507	Congestive Heart Failure	2.36%
HHS_HCC002	13.429	Septicemia, Sepsis, Systemic Inflammatory Response Syndrome/Shock	1.85%

## STAR Quality



## 2016 STAR Ratings

- Part C: 32 individual measures, categorized into 5 separate domains
  - 1) Staying Healthy: Screening, tests and vaccines
  - 2) Managing Chronic: (Long-Term) Conditions
  - 3) Member Experience
  - 4) Member Complaints
  - 5) Health Plan Customer Service
- Part D, 15 individual measures
  - 1) Drug Plan Customer Service
  - 2) Member Complaints
  - 3) Member Experience
  - 4) Drug Pricing and Patient Safety



## Star Rating Financial Impact

- Bonus dollars only available for plans at 4 Stars or above

	If We Scored Better...	
Impact of new Star Ratings	If we had a 4 everywhere	If we had a 4.5/5 everywhere
2016	\$39M	\$48M

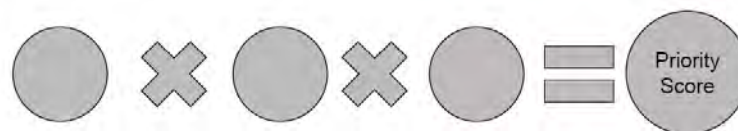




## Star Modeling

- To model the probability of achieving 4 Stars and to determine the effectiveness of Stars Interventions, including the extent to which they will impact member or provider behavior and alter the probability of achieving 4 Stars.

## Star Priority Score



- Impactability
- Likelihood
- Star Weights

# Care Management and Cost Reduction



## Important Studies



Patient Identification and Stratification



Patient Impactability Scorecard study



Patient Engagement Scorecard study



Hot spot analysis

# IT IS DIFFICULT TO MAKE PREDICTIONS, ESPECIALLY ABOUT THE FUTURE -Danish Proverb



## Summary

- **Targeted Product Design and Marketing:** to sell the right product to the right people at the right time for the right price at the micro level
- **Revenue Growth:** to select the right members for the right interventions to increase the risk and quality scores
- **Cost Reduction:** to proactively anticipate potential medical needs for all members and to be able to provide appropriate interventions before certain medical conditions develop or complications surface for these members
- **Risk Adjustment:** to quantify the risk and to identify opportunities under the risk adjustment
- **Risk Optimization:** to coordinate cross-functional strategies and to identify optimized solutions
- **Analytical Competitor:** to move Florida Blue from an analytical company to an analytical competitor



# Buying vs Building



## Buying vs Building



04/09/2019

## Be An Analytical Competitor

[https://www.youtube.com/watch?v=RRy\\_73ivcms](https://www.youtube.com/watch?v=RRy_73ivcms)

