Safety Analytics - Putting Data to Use

Chronology of Analytics

Risk Management Information System

Automated, Regular Downloads

Locations

Employees

Web-based, Intake Process

Claims

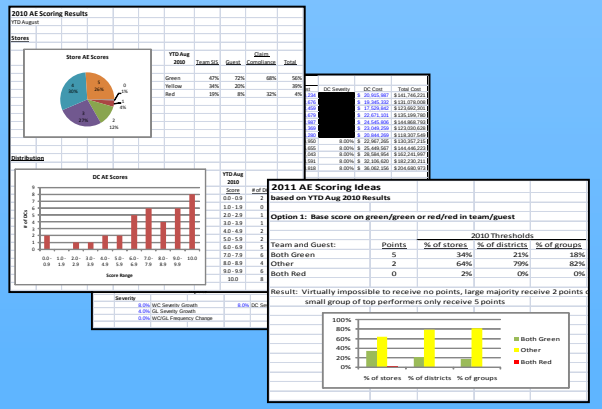
RMIS

Policies

- incident and claim records
- Employee information records
- years of history

Safety Performance Reporting

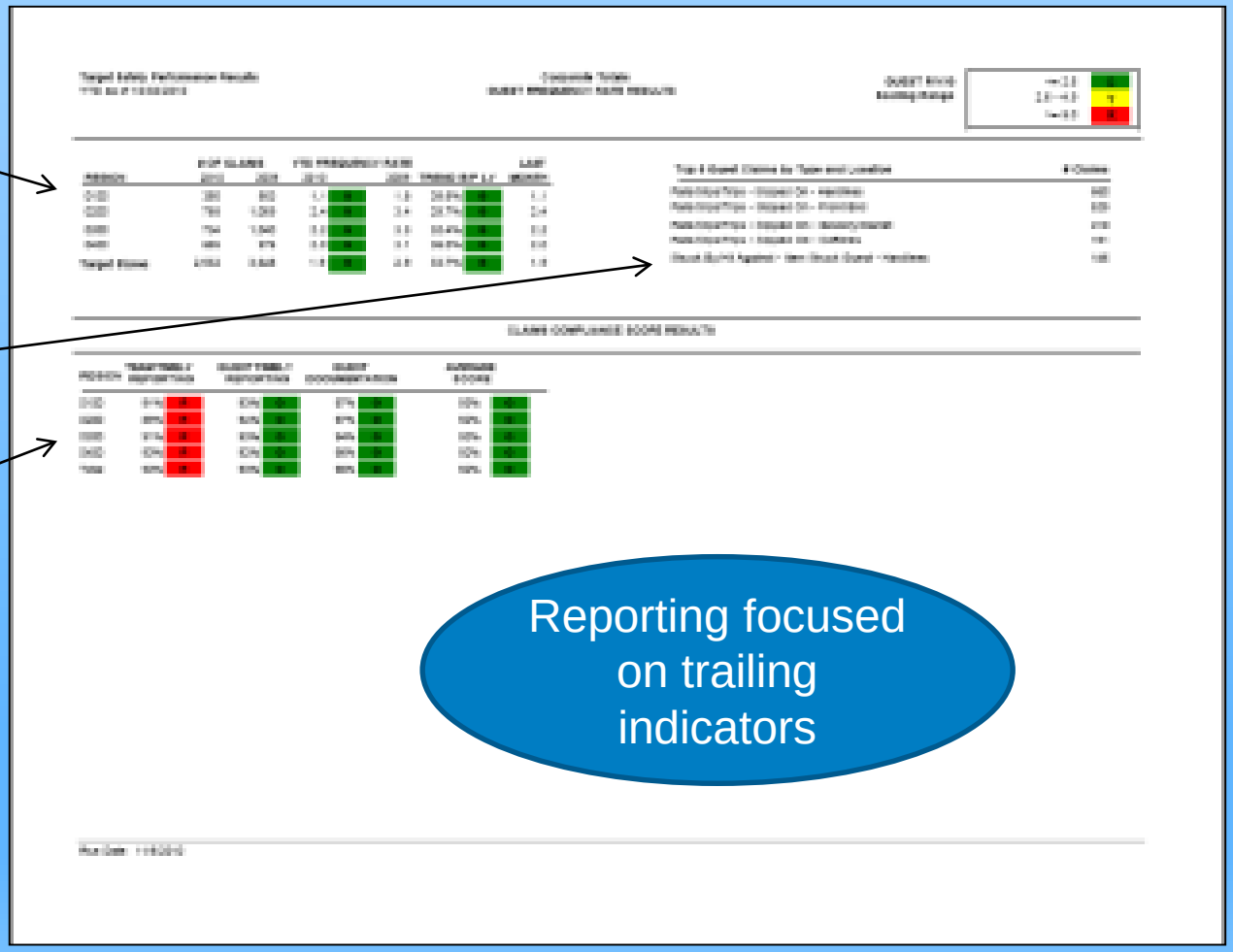
Internal Data Analytics Capability



Safety results are reported to locations each month

Metrics include:

- YTD claim frequency vs last year's performance
- Most common injury types and locations within buildings
- Buildings' compliance with claim reporting requirements



Reporting focused on trailing indicators

Risk analysts dedicated to safety and claims analysis

Root cause analysis done to determine largest drivers of losses

Deep-dive analysis on incidents includes factors such as:

- Location in country
- Location within facility
- Type of injury
- Object/activity/product associated with incident
- Tenure of employee involved
- Time/season of year

Frequency trends from recent history also compared to actuarial analyses to forecast possible challenges and opportunities in coming months

Claims Analytics

Data is the Key

By combining internal data with public external data, enhanced segmentation can be achieved.

Claimant Data

- Claimant Specific Information
- Employment & Personnel Info
- Medical History & Treatments
- Diagnosis Information

Claims Data

- Losses
- Frequency
- Timing/Patterns
- Settlement Data
- Loss Control Data
- Fraud/Lawsuit

External Public Databases

- Geographic / Demographic
- Check Cashing/Sub-Prime Lending
- Medical / Pharmacy Records
- Employment Records
- Consumer / Behavioral / Lifestyle
- Financial
- Real Estate
- Enhanced Census / Behavioral
- Litigation
- Physician Licensing / Disciplinary
- Medical Malpractice
- Industry Claims
- Crime Statistics

Line of Business Data

- Product, Coverage & Options
- Experience Data
- Policy Data

Weather

- Heat/Cold extremes
- Precipitation extremes
- Wind/Storms
- Event Extremes

Predictive Modeling for Claims
Conceptual Overview

Assessing Claim Exposure – Traditional Approach

First Notice of Loss information is evaluated by a Claims Supervisor when assessing claim exposure and assigning the claim. Below are three soft-tissue back claims. Which claim is likely to be most costly?

Carol

- Female
- 32 years old
- File Clerk
- 1 prior claim
- Employed 6 years
- Network doctor

Bill

- Male
- 38 years old
- Welder
- 3 prior claims
- Employed 2 years
- Out of network doctor

Joe

- Male
- 48 years old
- Mechanic
- No prior claims
- Employed 3 years
- Network doctor

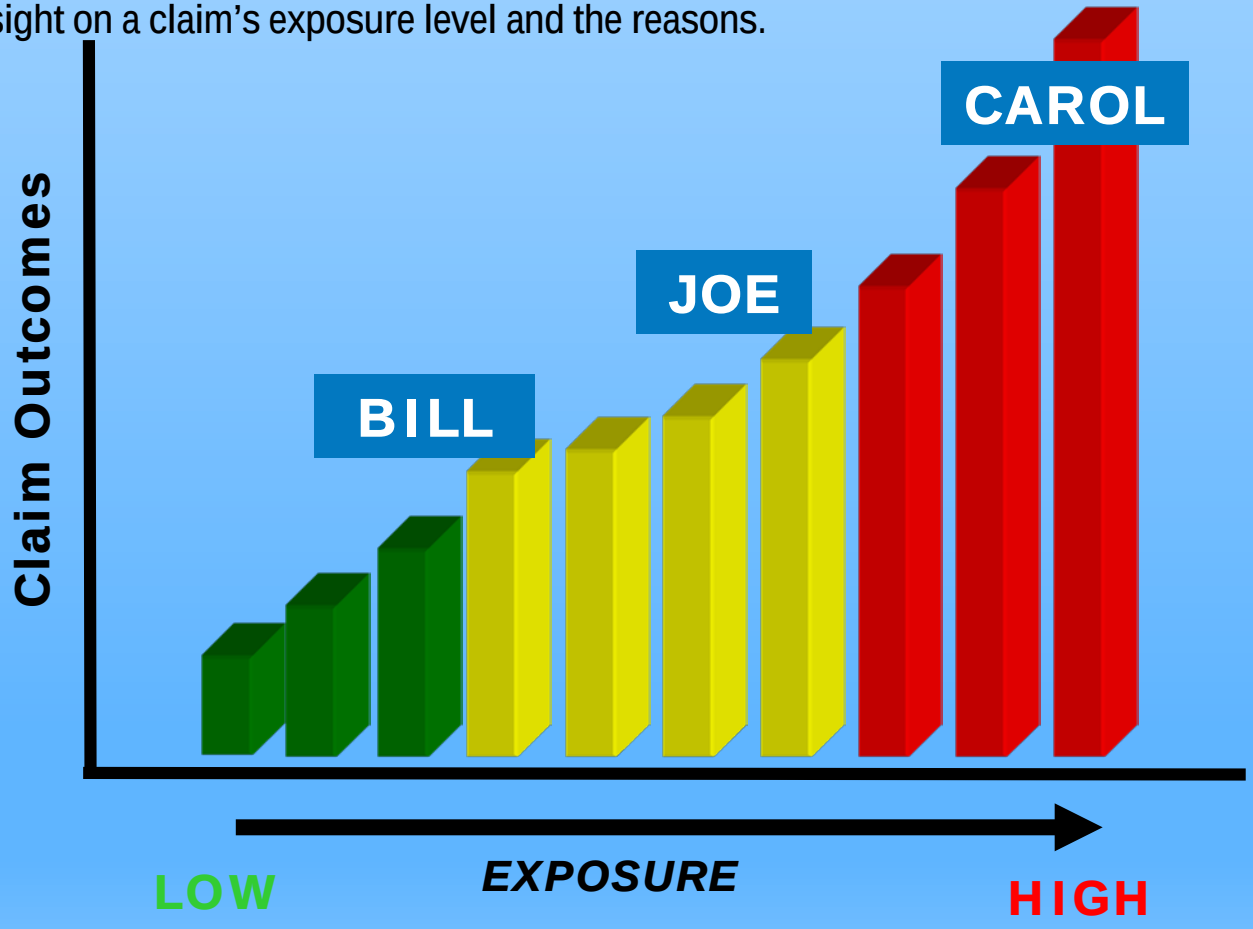
Assessing Claim Exposure – Leading Approach

Adding non-traditional data elements from multiple sources adds insight and perspective when evaluating the potential exposure of a claim.

Carol	Bill	Joe
• Female • 32 years old • File Clerk • 1 prior claim • Employed 6 years • Network doctor	• Male • 38 years old • Welder • 3 prior claims • Employed 2 years • Out of network doctor	• Male • 48 years old • Mechanic • No prior claims • Employed 3 years • Network doctor
• Lives 42 miles from job • Married • Working spouse • 3 children • (-) Physician treatment patterns • (-) Lifestyle indicator	• Lives 4 miles from job • Single • Lives alone • No children • Avg. Physician treatment patterns • (+) Lifestyle indicator	• Lives 16 miles from job • Married • Unemployed spouse • 2 children • (+) Physician treatment patterns • Avg. lifestyle indicator

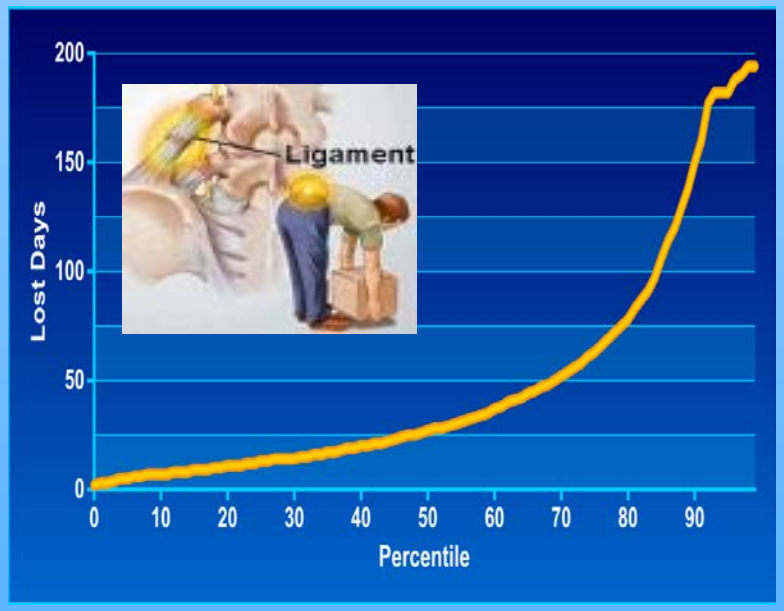
Assessing Claim Exposure – Leading Approach

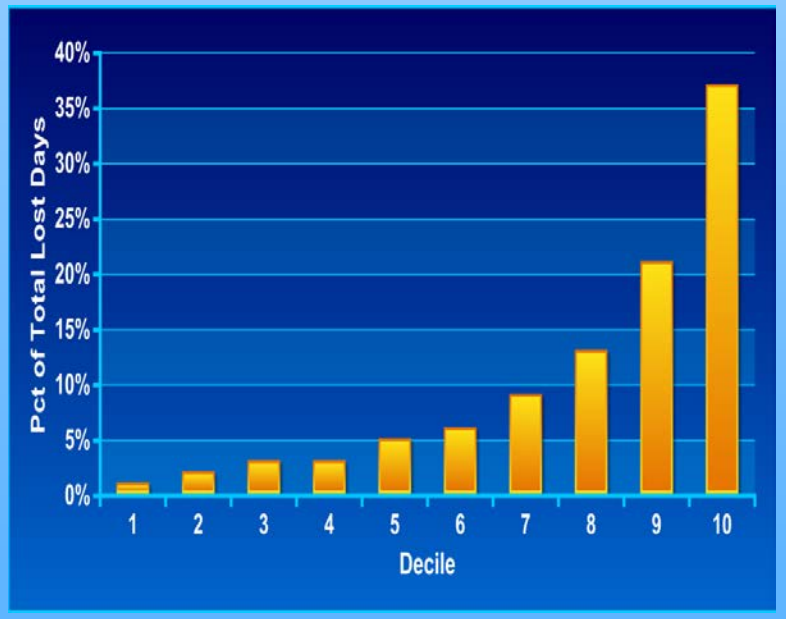
Predictive Modeling identifies different combinations of variables that provide valuable insight on a claim's exposure level and the reasons.



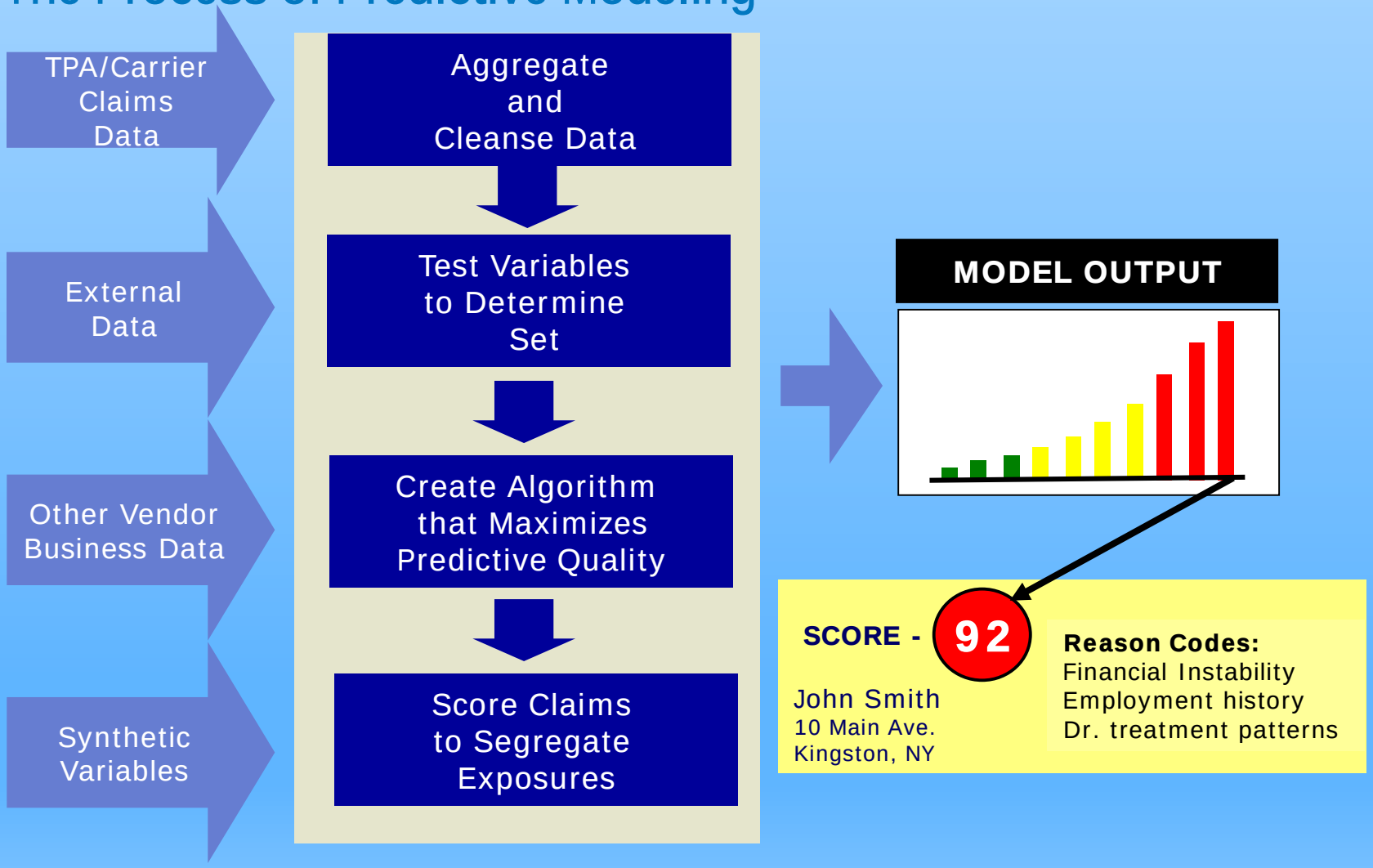
Pinpointing Costs through Claim Segmentation

The loss distributions below illustrate that the worst 30% of lower back claims represent almost 70% of total lost days/loss costs. The key to controlling loss costs and LAE is quickly identifying this adverse segment and taking action.





The Process of Predictive Modeling



The Mechanics of Predictive Modeling

The model produces a score of 1 – 100 that indicates the future severity relative to a claim or injury type.

~75-100s Univariates

Examples:

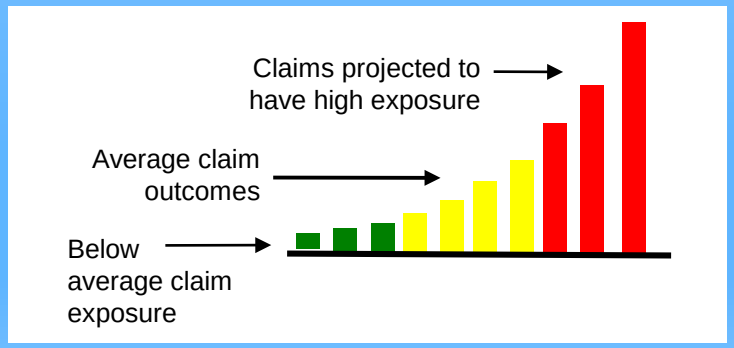
- Claimant age
- Marital status
- Prescription drug patterns
- Injury date / time
- Distance to attorney
- Change in physician
- Physician type
- In network / out of network
- Number physician changes
- Emergency room visit
- Years of employment
- Salary category
- Obesity / Diabetes Flag
- Ratio of AWW to comp rate

Sample Model Equation

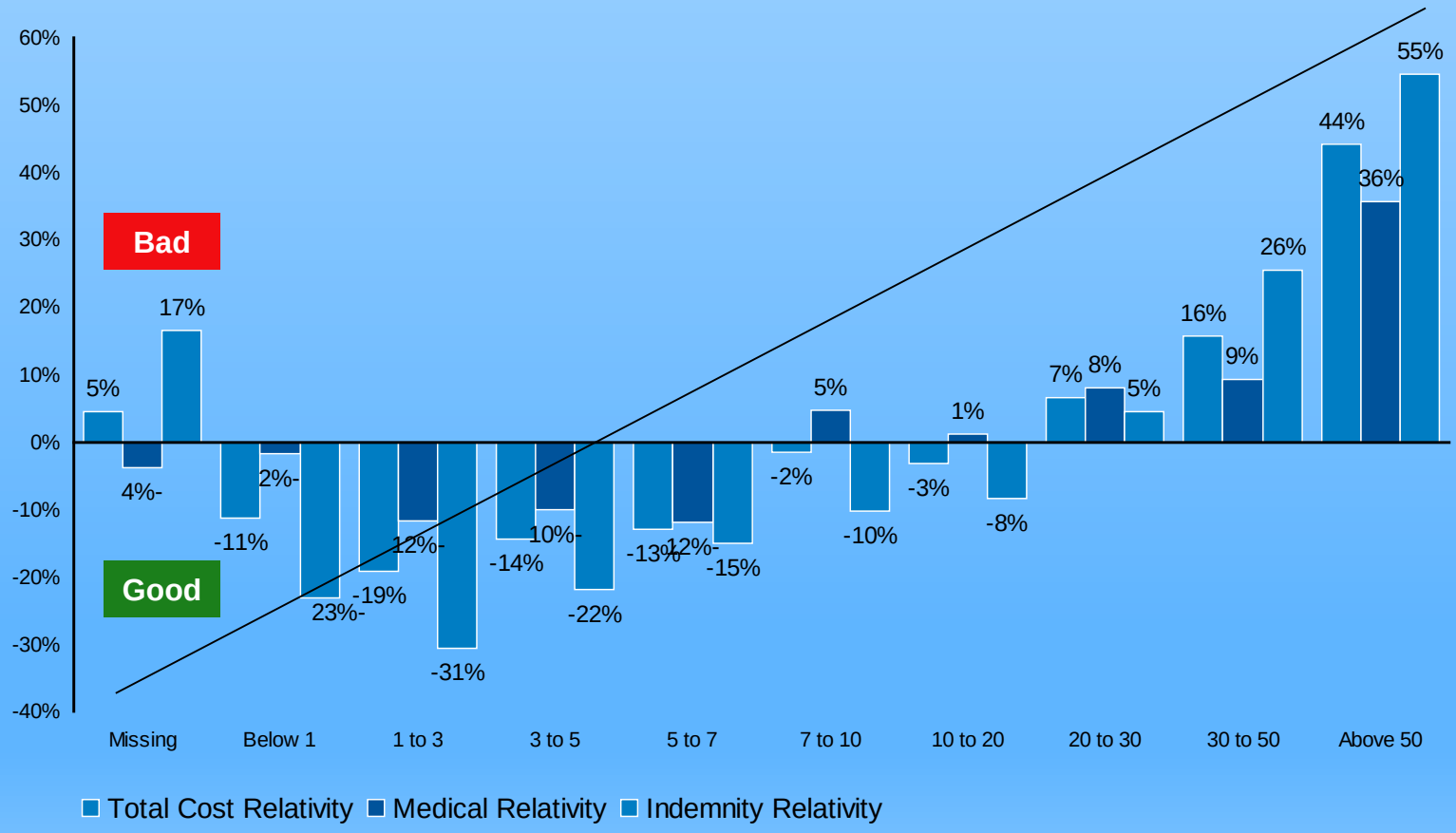
$$w_1(\text{JobClass}) + w_2(\text{Emp Distance}) + w_3(\text{In-Out Network}) + w_4(\text{Inj Date-Time}) + w_5(\text{Wage-Comp Ratio}) + w_6(\text{Clmt Age})\ldots$$

1 - 100

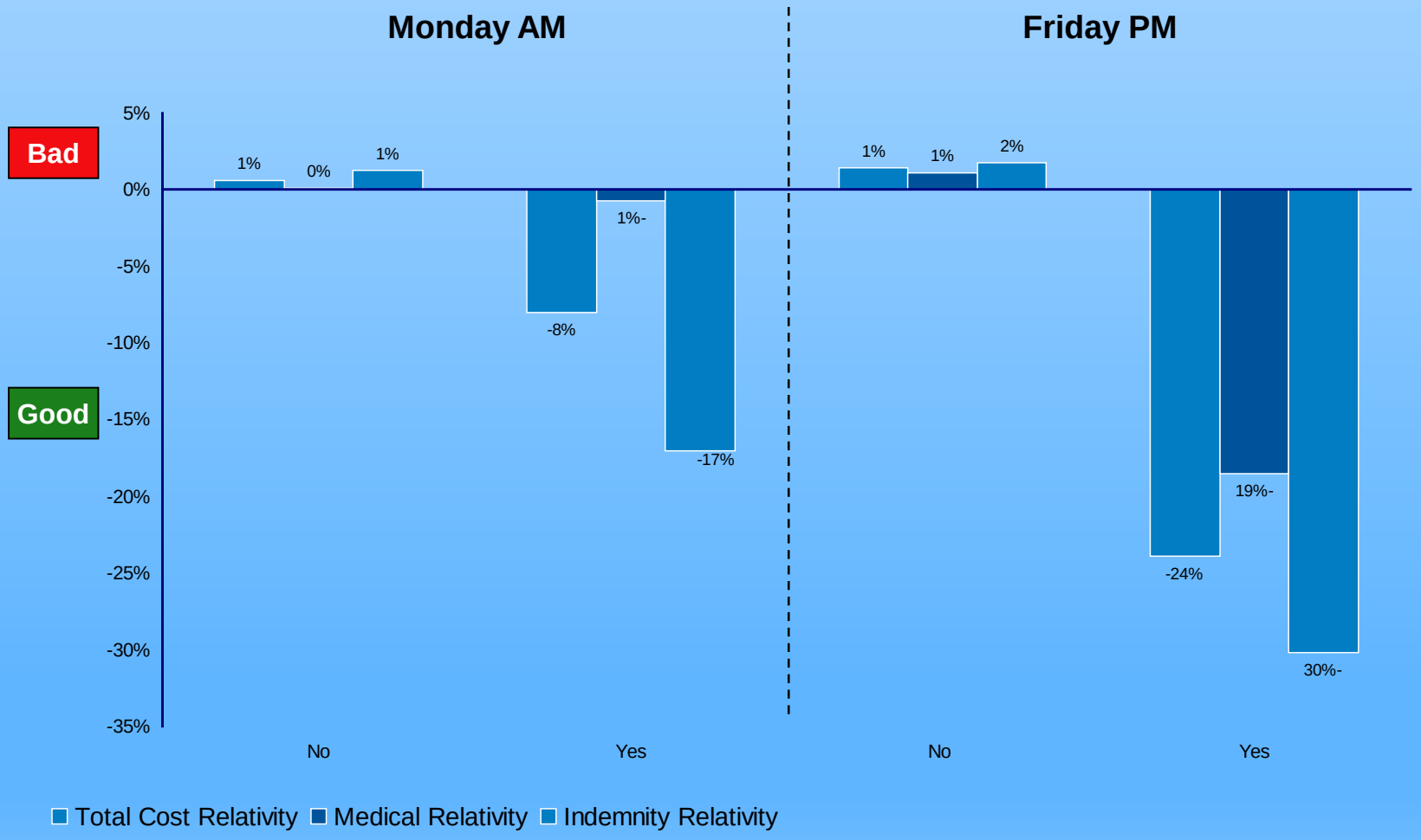
Score



Distance: Claimant Home to Treating Physician (Miles)



Claim: Monday AM/Friday PM Accident Indicator



Safety Analytics

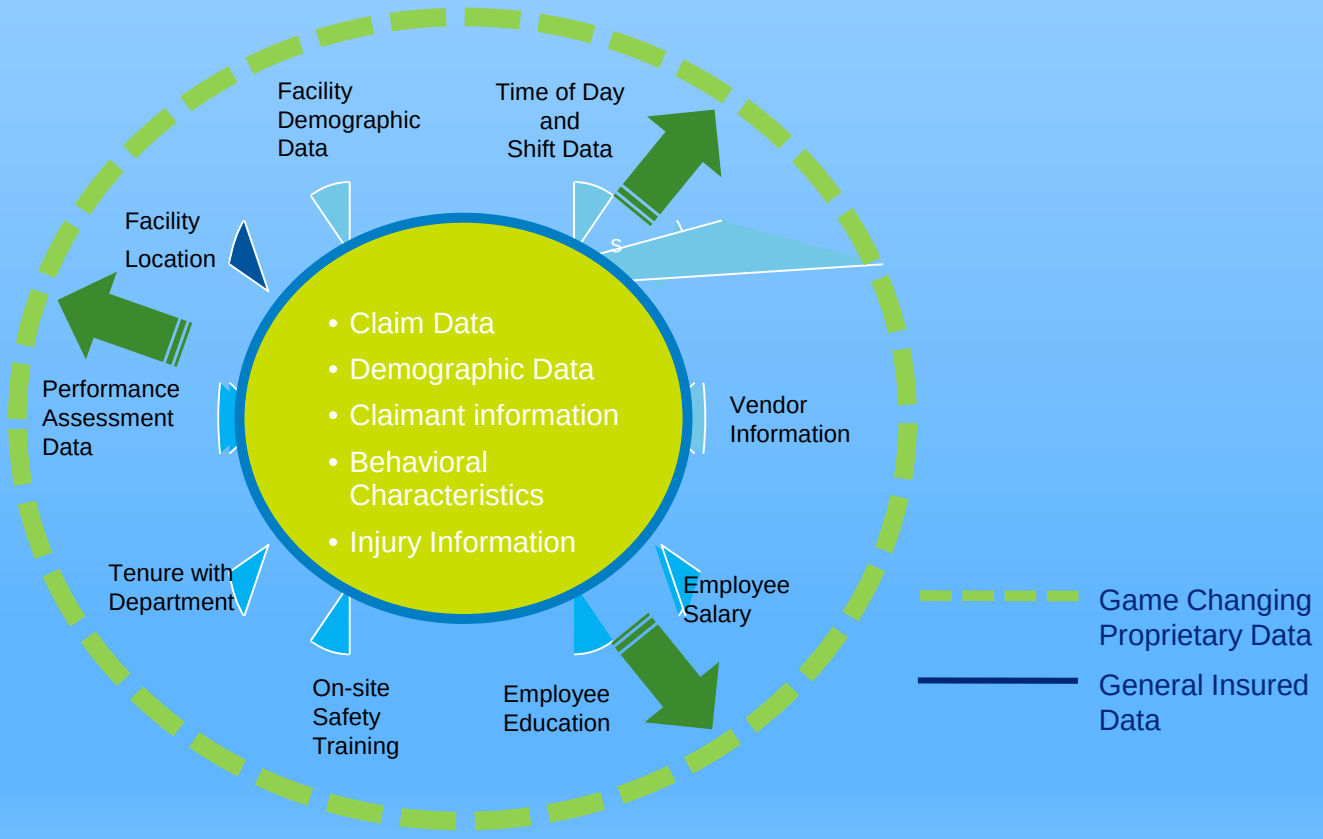
The costs of workplace injuries are increasing. Increases in severity are outweighing the reduction in frequency, causing real costs to rise.

If you knew where accidents were going to happen …

Then you could take measures to positively affect workplace safety

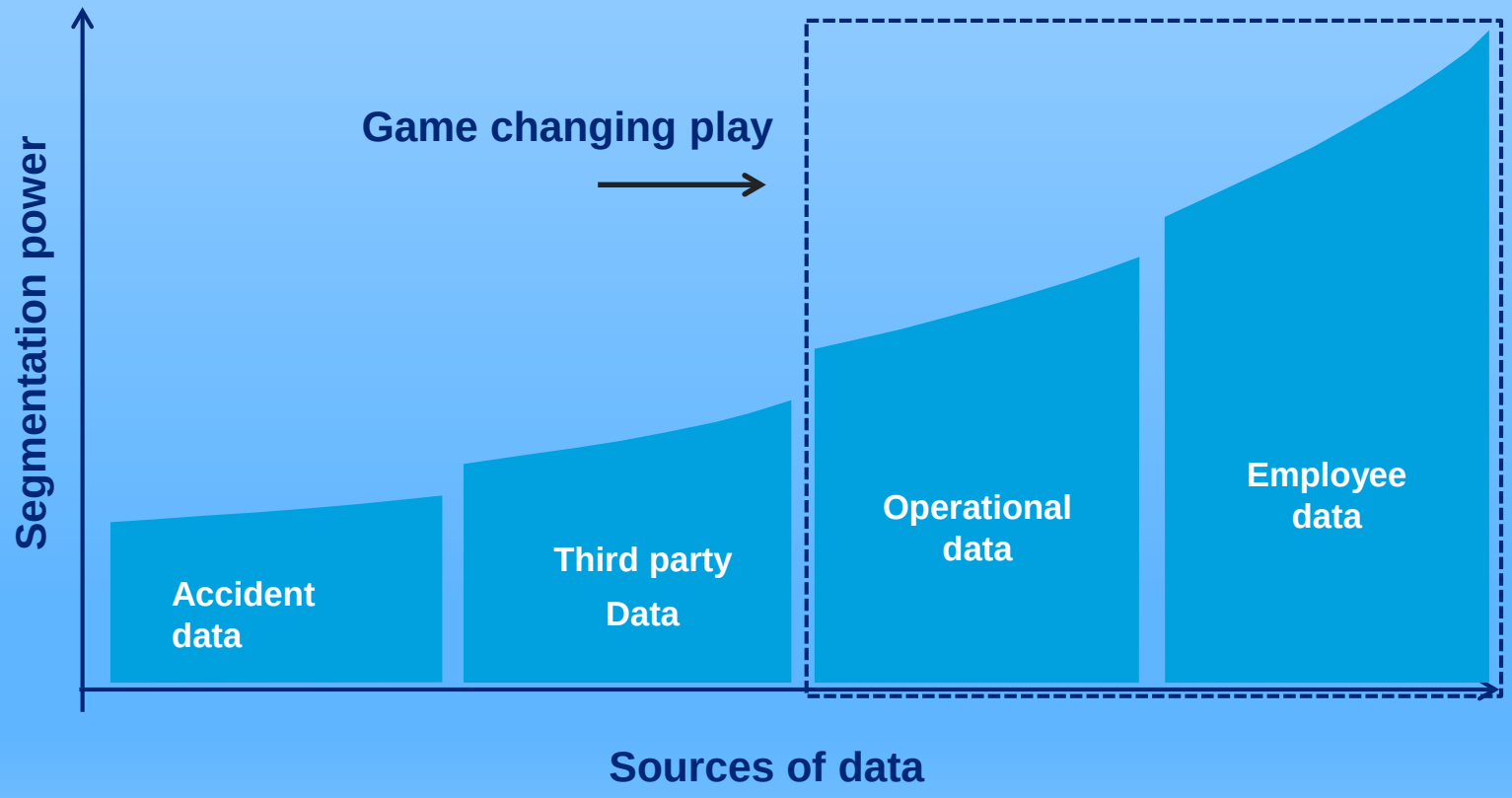
Predictive Analytics ‘Changes the Game’ by helping an organization get to “Then”

By leveraging proprietary data, safety initiatives become more targeted and measurable. Workforce data adds another dimension, making decisions more informed.



Game Changing data improves business decisions beyond the traditional data available to most organizations.

The power of your proprietary data provides large organizations with a Game Changing play when it comes to improving safety.



Safety Analytics – Where, When, and Who

Predictive modeling and analytics sorts through massive amounts of data to predict where accidents will likely occur – a key to improving safety is to know where to focus safety resources.

Warehouse #1

- Consistent accident and injury rates
- Recently implemented a safety training program
- Investment in safety equipment
- 25 employees on site
- Has local safety coordinator

Warehouse #2

- Increasing rate of accidents
- OSHA 300 Logs indicate many different types of injuries
- No recent safety training programs
- 60 employees on-site
- No local safety coordinator

Warehouse #3

- Average rates of accidents and injuries
- Effective workplace safety training programs
- 100 employees on site
- Has local safety coordinator

Which of the three warehouses just described has the "accidents waiting to happen" hot spot?

A. Warehouse #1
B. Warehouse #2
C. Warehouse #3
D. Don't know

Companies are leveraging traditional and more effective data to positively impact safety and reduce workforce injuries

	Warehouse #1	Warehouse #2	Warehouse #3
Traditional data	• Consistent accident and injury rates • Recently implemented a safety training program • Investment in safety equipment • 25 employees on site • Has local safety coordinator	• Increasing rate of accidents • OSHA 300 Logs indicate many different types of injuries • No recent safety training programs • 60 employees on-site • No local safety coordinator	• Average rates of accidents and injuries • Effective workplace safety training programs • 100 employees on site • Has local safety coordinator
More specific practice data	• Recent reductions in falls • Clean record on recent OSHA inspection • Improving safety record	• Recent changes to ergonomics to reduce repetitive stress injuries • Higher than average number of months since last safety training	• Accidents increasing on the 3rd shift • Cuts and bruises indicate low level of safety equipment usage

Based on the additional information which of the three warehouses just described has the “accidents waiting to happen” hot spot?

A. Warehouse #1
B. Warehouse #2
C. Warehouse #3
D. Don’t know

The impact of workforce data on focusing safety resources on the true emerging safety hot spots.

	Warehouse #1	Warehouse #2	Warehouse #3
Traditional data	• Consistent accident and injury rates • Recently implemented a safety training program • Investment in safety equipment • 25 employees on site • Has local safety coordinator	• Increasing rate of accidents • OSHA 300 Logs indicate many different types of injuries • No recent safety training programs • 60 employees on-site • No local safety coordinator	• Average rates of accidents and injuries • Effective workplace safety training programs • 100 employees on site • Has local safety coordinator
More specific practice data	• Recent reductions in falls • Clean record on recent OSHA inspection • Improving safety record	• Recent changes to ergonomics to reduce repetitive stress injuries • Higher than average number of months since last safety training	• Accidents increasing on the 3rd shift • Cuts and bruises indicate low level of safety equipment usage
Game changing data	**Loading Dock 3rd Shift** • Average job tenure < 2 years • High employee turnover rates • 73% employees working spouse • 6 workers commute > 50 miles • 8 workers recently divorced • 9 workers have school aged dependents, working spouse, and it's school vacation	**Data Entry** • Staff 95% clerical • Less than 50% participation in wellness program • Highly litigious jurisdiction • Average job tenure > 18 years • Average employee age = 53 • Uptick in average rating on performance appraisals	**City Delivery Route** • Average job tenure < 3 years • Average employee age = 28 • 95% of employees are male • Average household financial stress indicators = high • 83% employees are unmarried • 73% employees engaged in very active lifestyles and sports

Based on this final set of workforce level information which of the three warehouses just described has the “accidents waiting to happen” hot spot?

A. Warehouse #1
B. Warehouse #2
C. Warehouse #3
D. All of the above
E. Don’t know

Case Study

A Safety Analytics project was completed to identify key drivers of work place incidents in order to focus safety resources and planning where they will have the most impact.

Business Issue:

A national industrial services company was seeking to improve its safety record and garner a deeper understanding of the key cost drivers behind work-related injuries.

Overview of Project:

- Analyzed five years of accident data
- Data incorporated experience of an employee base of 20,000+ employees
- Internal and external risk characteristics considered
- Analysis identified clusters of locations and worker groups of workers with the highest propensity to be involved in one or more of the top six causes of workplace accidents
- Deloitte worked with the company to understand insights and help them develop immediate and longer-term action plans to mitigate identified exposure

Business Benefits:

- Client projected a reduction in frequency of 15% for top loss causes

Safety Analytics Case Study

A Safety Analytics project was completed to identify key drivers of work place incidents in order to focus safety resources and planning where they will have the most impact.

Business Issue:

A self-insuring national waste management company was seeking to improve its safety record and gain a deeper understanding of the key cost drivers behind work-related injuries

Overview of Project:

- Analyzed four years of self-insured workers compensation claims
- Data incorporated experience of an employee base of 24,000 employees
- Internal and external risk characteristics evaluated
- Analysis identified clusters of locations and groups of workers with the highest propensity to be involved in one or more of the top six causes of workplace accidents
- Deloitte worked collaboratively with the client to understand insights and develop immediate and longer-term action plans to mitigate identified exposure

Business Benefits:

- Client projected reduction in frequency of 15% for top six loss causes and 8% for all causes

Case study – Business Actions

Summary of results			
Key variable clusters	**Decile meter**	**Reason messaging**	**Business actions**
• Urban locations • Average supervisor tenure less than 5 years • Low supervisor to employee ratios • High concentration of unmarried males under 30 • Collection of workers who participate in high risk non work activities (hunting, motorcycling etc)		• Supervisor characteristics indicate higher exposure • Location characteristics indicate higher exposure • Lifestyle characteristics of employee base indicate higher exposure	• Increased frequency of mandatory supervisor training and increased minimal acceptable thresholds for passing the training • Refocused defensive driving program, moving these workers to the top of the queue for class • Introduced mandatory, random supervisor ride along program • Installed cameras to monitor driving with penalties for safety violations
• Rural location • Second and third shift workers work individually • High incidence of unexcused absences • Multiple safety violations • Large percentage of workers with high financial stress scores		• Location characteristics indicate higher exposure • Employee Behavioral characteristics indicate a higher exposure • Financial characteristics of employee indicate a higher exposure	• Established work teams comprised of workers with high and low safety management deciles so the low decile workers can influence the behavior of the high decile workers • Promoted safety compliance by adopting accident free and near accident reporting programs that give credits toward paid time off
• Employees between 40-50 years old • 15+ years tenure • High participation in wellness program • Average performance reviews • Unmarried • Lives less than 30 miles from worksite		• Employment characteristics indicate lower exposure • Lifestyle characteristics indicate lower exposure • Performance characteristics indicate neutral exposure	• Assigned to safety coordinator role to people in this work group • Paired people in this work group with high safety management decile worker as “Safety Mentors”
• Overnight drivers • Multiple back to back shifts • Males • 30+ years old • Prior soft tissue back injuries • Multiple claim history • Drives greater than 1/2hr to work		• Employment characteristics indicate a higher exposure • Prior claim history indicates a high exposure • Injury characteristics indicate a higher exposure • Demographic characteristics indicate higher exposure	• Developed driver teams for over-night shifts to limit drive times • Reduced instances of multiple consecutive overnight shifts • Recommended lumbar braces and pillows for this cluster • Introduced additional mandatory breaks for extended time on the road

Advanced Analytics Can Deliver Significant Results

		Business Objective	Business Impact
Accident Prevention	Accident Avoidance	• Avoid accidents before they occur • Isolate situations where focused safety training and equipment can reduce accidents • Targeted areas for wellness programs • Optimize safety resources on high risk areas • Compliance improvement	• Reduced workplace accidents and fewer injuries • Targeted safety and wellness programs • Increased productivity • Increased compliance and reduced fines
	Improved Enterprise Sustainability	• Communication of safety eminence • Wellness Program participation • Enterprise Sustainability improvements	• Competitive advantage in recruiting and employee retention • Healthier employees and reduced absenteeism • Improved employee satisfaction and morale
Injury Management	Loss Cost Reduction	• Enhanced TPA management drives performance • Segment high cost claims at intake • Optimal resource allocation, based on complexity • Real-time fraud detection triggers Special Investigation Unit (SIU) referral • Proactive and more strategic claim management • Event-based scoring triggers escalation/ review	• Decreased cycle times • Improvement in timeliness and quality of SIU referrals • Enhanced case management savings • Employees recover and get back to work sooner • Improved TPA performance
	Expense Reduction	• Diary/task prioritization focuses supervisor and examiner capacity • Improved workload distribution • Optimal resource deployment • Implement/Enhance straight through processing	• Enhanced claim handler productivity • Optimized span of control and escalation rates • Reduced claim reassignment • Reduced TPA handling costs and fees • Focused and more effective TPA oversight

Illustrative Business Benefits

Illustrative Exposure without Safety Analytics

	Incidents	Average Cost	Loss Costs ($M)
Worst 20% Clusters[1]	1,750	$12,500	$ 21.9
All other incidents	750	$ 4,167	$ 3.1
Total	**2,500**	**$10,000**	**$25.0**

Impact on Workers Comp Loss Cost

Worst 20% Clusters or Segments[1]					
3% to 5% reduction in frequency	$	0.7	to	$	1.1
2% to 3% reduction in severity	$	0.4	to	$	0.6
1% to 2% reduction in all other inci	$	0.0	to	$	0.1
Estimated Loss Cost Savings	**$**	**1.1**	**to**	**$**	**1.8**

Potential Productivity Impact

Estimated Loss Cost Savings	$	1.1	to	$	1.8
Productivitv Relativitv[2]		38%	to		66%
Potential Productivity Impact	**$**	**0.4**	**to**	**$**	**1.2**

Combined Annual Recurring Benefit Potential for Illustrative

Total Potential Impact	**$**	**1.5**	**to**	**$**	**2.9**
Total Potential Impact (% Losses) ⇨		**6.1%**	**to**		**11.8%**
Estimated Loss Cost Reduction ⇨		**4.4%**	**to**		**7.1%**
Estimated Freqency Reduction ⇨		**2.4%**	**to**		**4.1%**
Potential Productivity Impact ⇨		**3.2%**	**to**		**5.9%**

[1] Assumes worst 20% clusters or segments drive 70% of incidents, with severity 25% higher than the average

[2] Increased productivity based on finding of "Lost Productive Time and Cost due to Common Pain Conditions in the US Workforce," JAMA, Vol 290, No. 18

Why “Advanced Analytics” Makes Sense Now

The Situation

- Management of workers’ compensation exposure is becoming more important, as dampening frequency declines heighten the impact of severity trends, resulting in increased loss costs.
- Workplace injuries directly impact employee productivity and overall company profitability.
- All companies have a financial interest in preventing incidents and accidents, impacting the balance sheet and a fiduciary responsibility to pro-actively manage the injuries that do occur.
- In today’s economic times, it is more important than ever for companies to control costs and sustain productivity levels.

The Opportunity

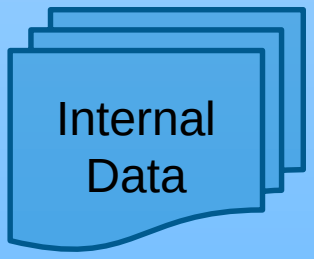
- Accident Prevention and Injury Management initiatives can be improved by utilizing a powerful asset: Operational and Workforce data.
- Advanced Analytics puts company data to work by combining traditional data sources of risk information with nontraditional data sources.

Up to 14%

Estimated Loss Cost Reduction

Future Analytics Vision

Goal = Deliver reports and tools that provide relevant, actionable information to the right people at the right time and in the right way

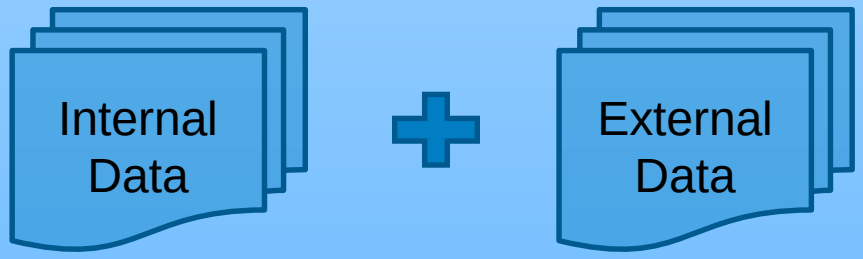


1. Expand availability of internal data to provide more insight on building locations:

    - Building operational performance metrics
    - Team supervisor characteristics
    - Safety program / observational results
    - Individual work hours
    - Employee satisfaction

Future Analytics Vision

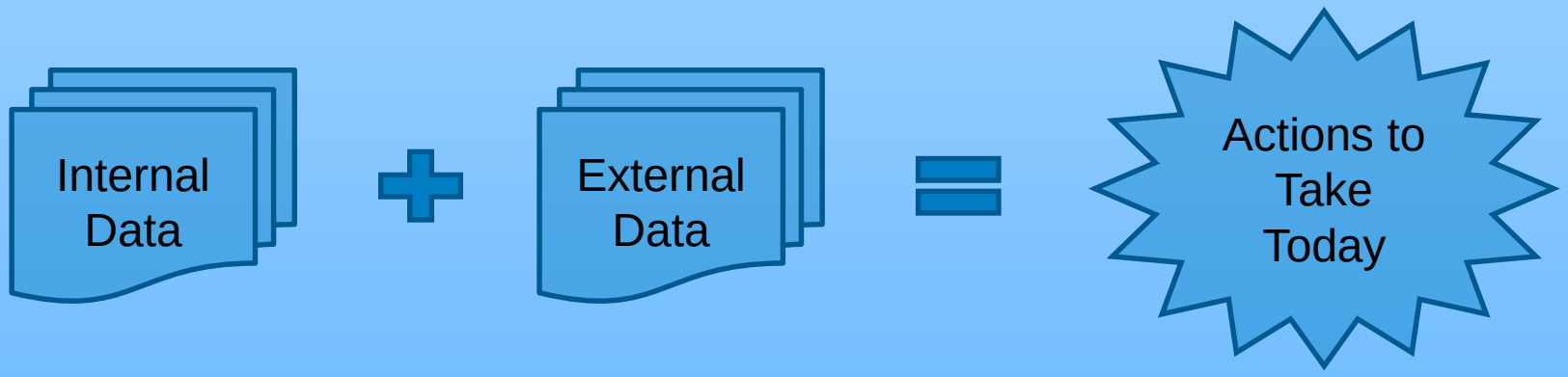
Goal = Deliver reports and tools that provide relevant, actionable information to the right people at the right time and in the right way



2. Leverage externally available data to understand additional trends:
    - Zip code demographics
    - Household lifestyle information
    - Claim history
    - Weather patterns
    - Judicial environment

Future Analytics Vision

Goal = Deliver reports and tools that provide relevant, actionable information to the right people at the right time and in the right way



3. Utilize predictive analytics results to allocate and prioritize resources:
    - Allocate team, training, and equipment resources to locations and claims where impact may be greatest
    - Provide specific actions for team members to take based on location score and specific building risk indicators

Summary & Questions

Summary

Opportunity	▪ There is a large opportunity to use data and new data in innovative ways to improve injury management and safety performance for your workplace. ▪ Emerging applications are still developing in many areas.
Solution	Use of advanced analytics makes sense where there is a clear understanding of how business actions can be impacted by the results of the analytics effort.
Benefits	▪ Savings of 7-14 % are possible on workers compensation costs ▪ Safer workplace ▪ Improved sustainability of the workforce ▪ Corporate Responsibility

Contact Information

David P. Duden
Director
Actuarial, Rewards, and Analytics
Deloitte Consulting
dduden@deloitte.com
860 725 3041