NATIONAL ERGONOMICS Conference & ErgoExpo®

# COMMUNICATING the Value of Ergonomics with Big Data

**Presented by: Kent Hatcher, CPE**
**VelocityEHS | Humantech**

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# Today's Learning Objectives

- Smarter solutions improve employee well-being and enhance business performance
- The potential benefits big data has on supporting the ergonomics process
- The value ergonomics brings to organizations
- How market and industry trends are identified


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# Data: Too Much, Too Little, or Just the Right Amount?

## Too little data is a problem when…

One is unable to determine the appropriate action (or colleague) that will get them closer to their goal.


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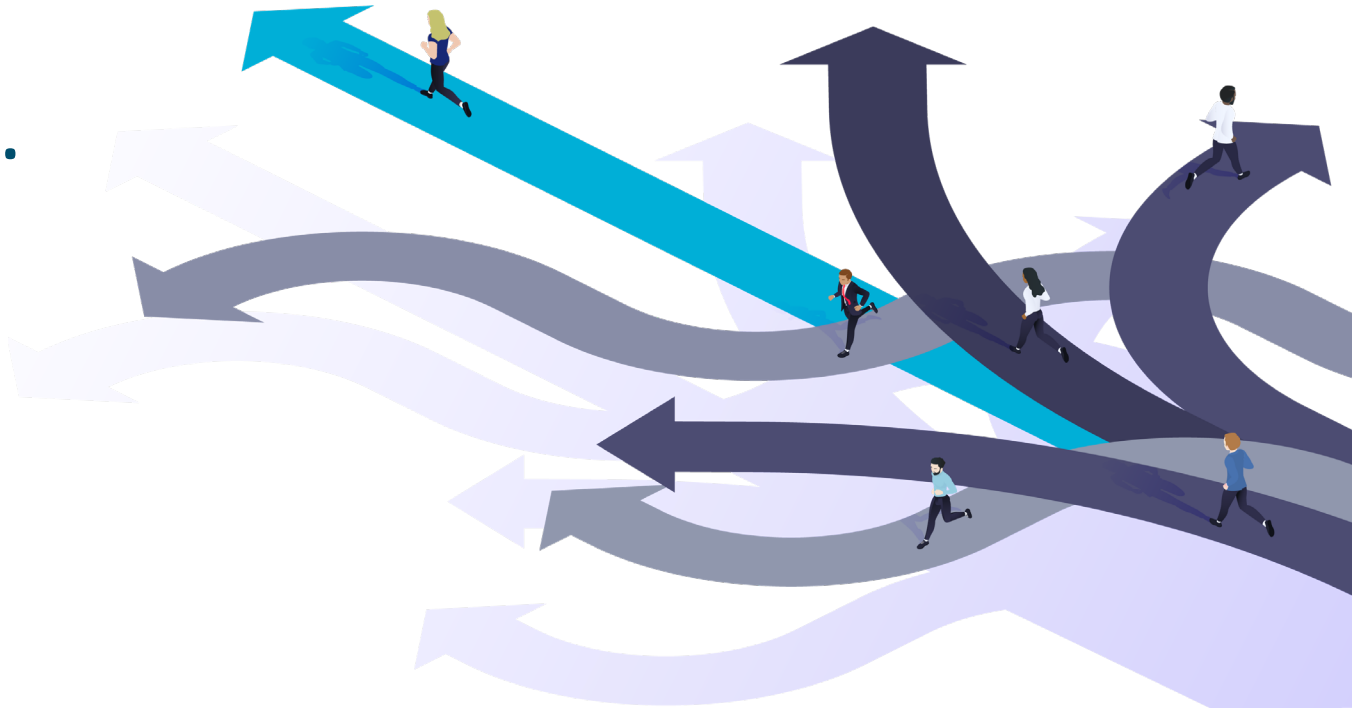
# Data: Too Much, Too Little, or Just the Right Amount?

## Too much data is a problem when…

When one is unable to determine the appropriate action (or general direction) that will get them closer to their goal.

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# Data: Too Much, Too Little, or Just the Right Amount?

## Just the right amount of data is…

When one is **able** to determine the appropriate action, direction or colleague that will get you closer to your goal.


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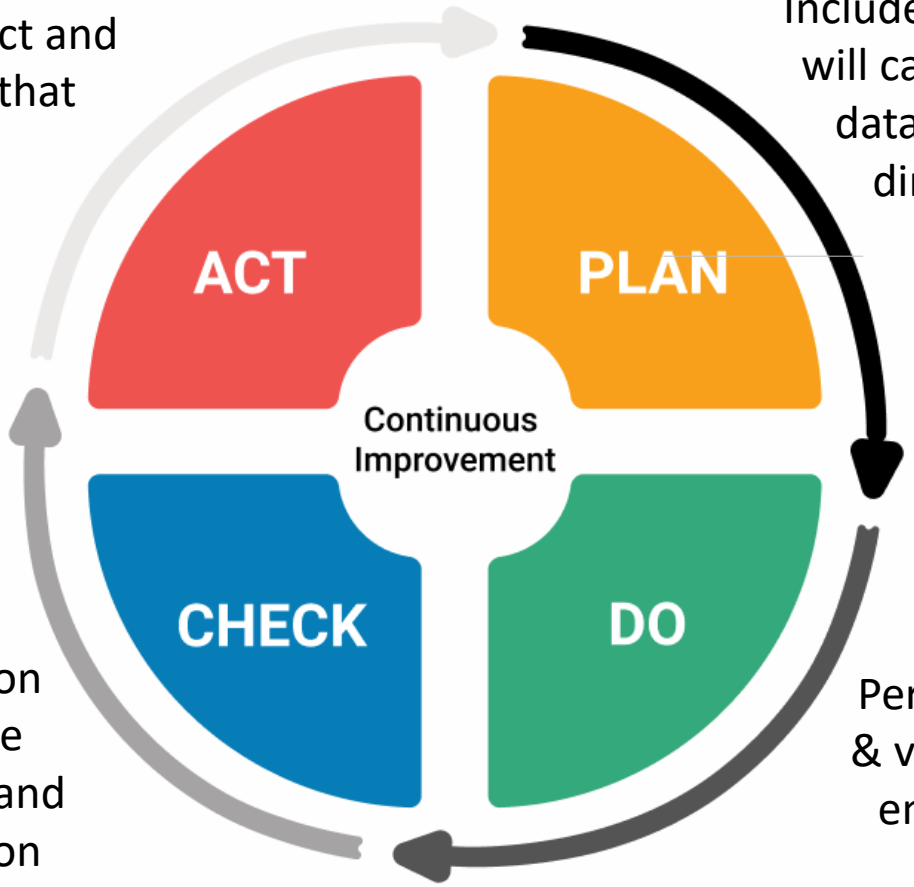
# Data: Too Much, Too Little, or Just the Right Amount?

**One way to get the right amount is…**

Implement improvements and monitor impact and cull data points that aren't used

Include objective(s) that will capture & validate data ready to drive directed action




Validate data collection outcomes to improve simplicity, correlation and increase differentiation between options

Perform data collection & validation activities to ensure outcomes will be actionable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# What benefits do we want to communicate?


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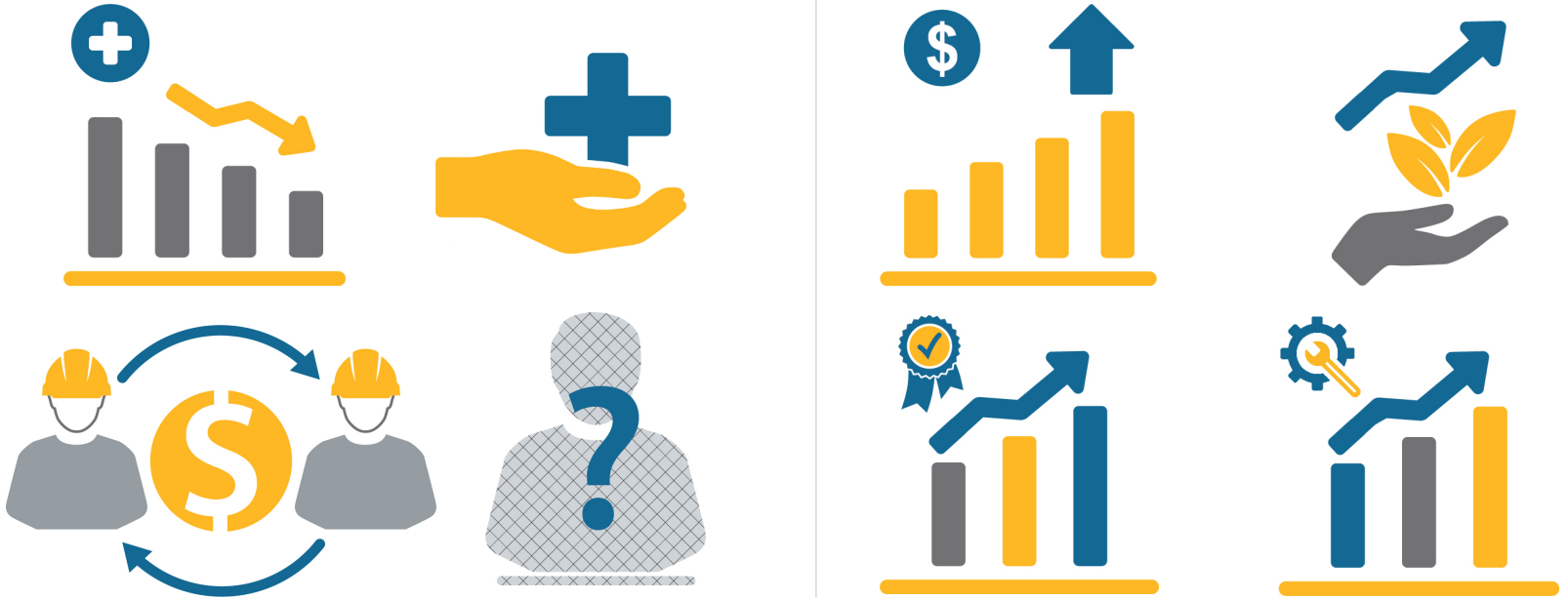
# Benefits (or Value) & Impact

| Benefit (or Value) of Ergonomics | |
|---|---|
| **Traditional - Perceived** | **Actual - Potential** |
| Well-being | Business Performance |



*Dul J, Bruder R, Buckle P, Carayon P, Falzon P, Marras WS, Wilson JR, van der Doelen B. (2012). A strategy for human factors/ergonomics: developing the discipline and profession. Ergonomics. 2012;55(4):377-95.*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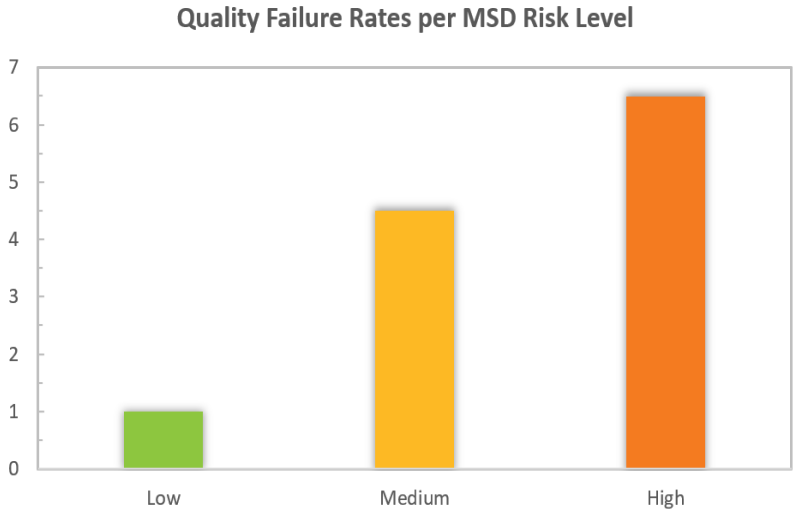
risk level

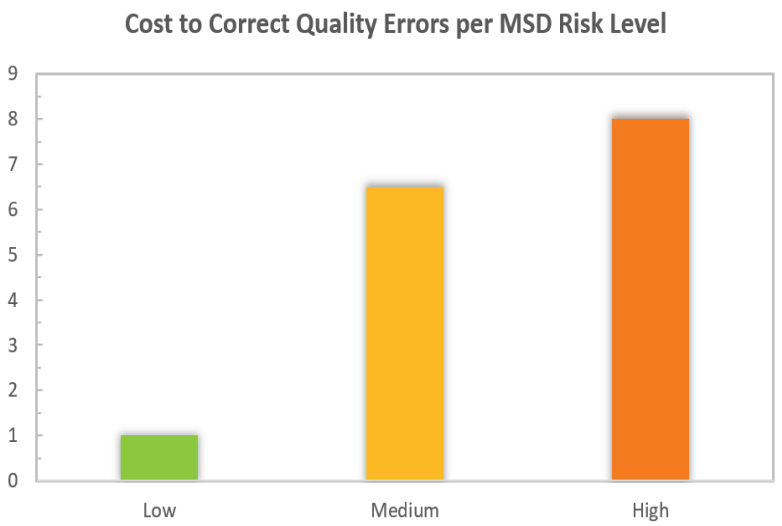
=

quality failure rates

=

cost to correct errors


*Ann-Christine Falck, Roland Örtengren and Dan Högberg. (2010). The impact of poor assembly ergonomics on product quality: A cost–benefit analysis in car manufacturing. Human Factors and Ergonomics in Manufacturing & Service Industries, Volume 20, Issue 1, pages 24–41, January/February 2010.*

*Ann-Christine Falck, Roland Örtengren, Mikael Rosenqvist. (2014). Assembly failures and action cost in relation to complexity level and assembly ergonomics in manual assembly (part 2). International Journal of Industrial Ergonomics 44 (2014) 455-459.*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# Big Data


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# 2.5 quintillion

bytes of data

are created each day


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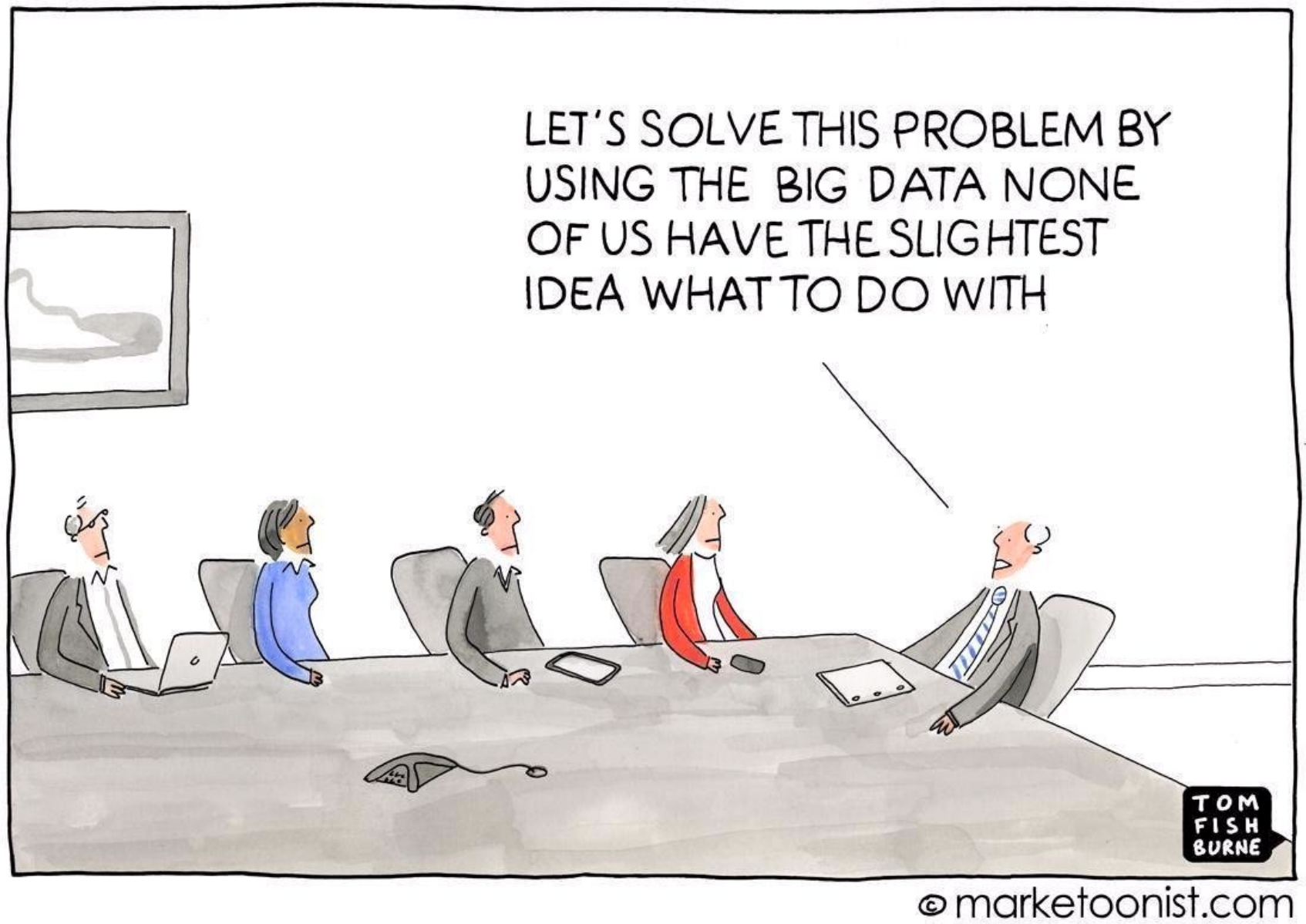



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# The 4 V's of Big Data

## Volume

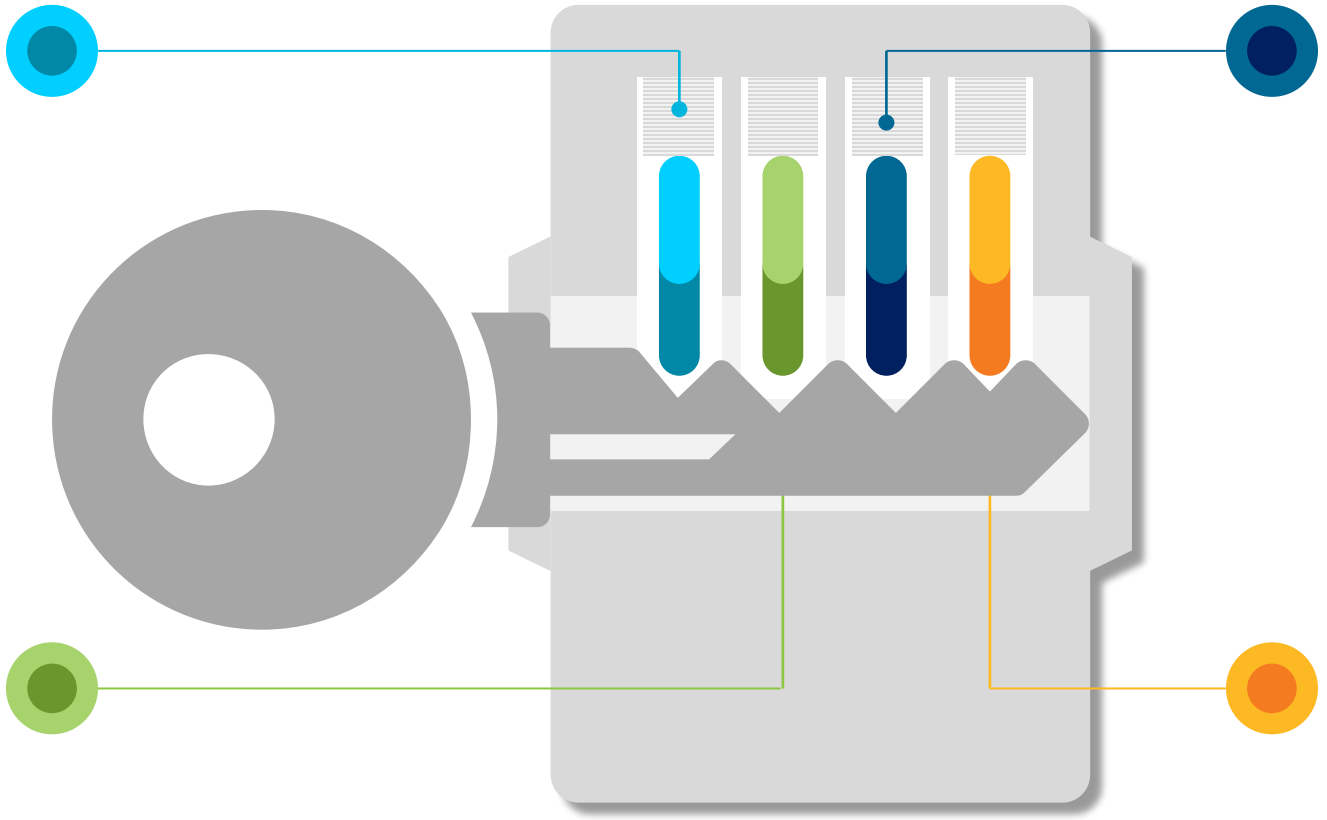
**Scale of data**

90% of today's data has been created in the last 2 years

## Velocity

**Speed of data**

Streaming and analysis of data is key to big data



## Variety

**Diversity of data**

80% of data growth is video, images, and documents

## Veracity

**Certainty of data**

1 in 3 business leaders don't trust the information they use decisions

*Sources: IBM, McKinsey Global Institute, Cisco, Gartner, SAS*



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# 1. Volume of data


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# Volume of data

- Large data sets are not readily available for Ergonomics Research
- Recent “large” research projects:
  - **Hands/Wrists and Carpal Tunnel Syndrome**
    54 location, 3,010 assessments
    *Bao, SS. et al. (2015)*
  - **Upper Extremities and Lateral Epicondylitis**
    10 locations, 516 assessments
    *Garg, A. et al. (2014)*
  - **Lower Back Pain**
    30 locations, 258 assessments
    *Garg, A. et al. (2014)*


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# Sources of data

- Rely on gathering data from your organization or your industry
  - Department → Location → Division/Business Unit → Region → Enterprise

- Sample data at 1 organization:
  - 4,900+ Assessments
  - 1,800+ Users
  - 350+ Locations
  - 14,000+ Logins
  - 2,700+ Improvements

- Big data at Humantech:
  - 200,000+ Assessments
  - 39,000+ Users
  - 3,700+ Locations
  - 160+ Clients
  - 65,000+ Improvements


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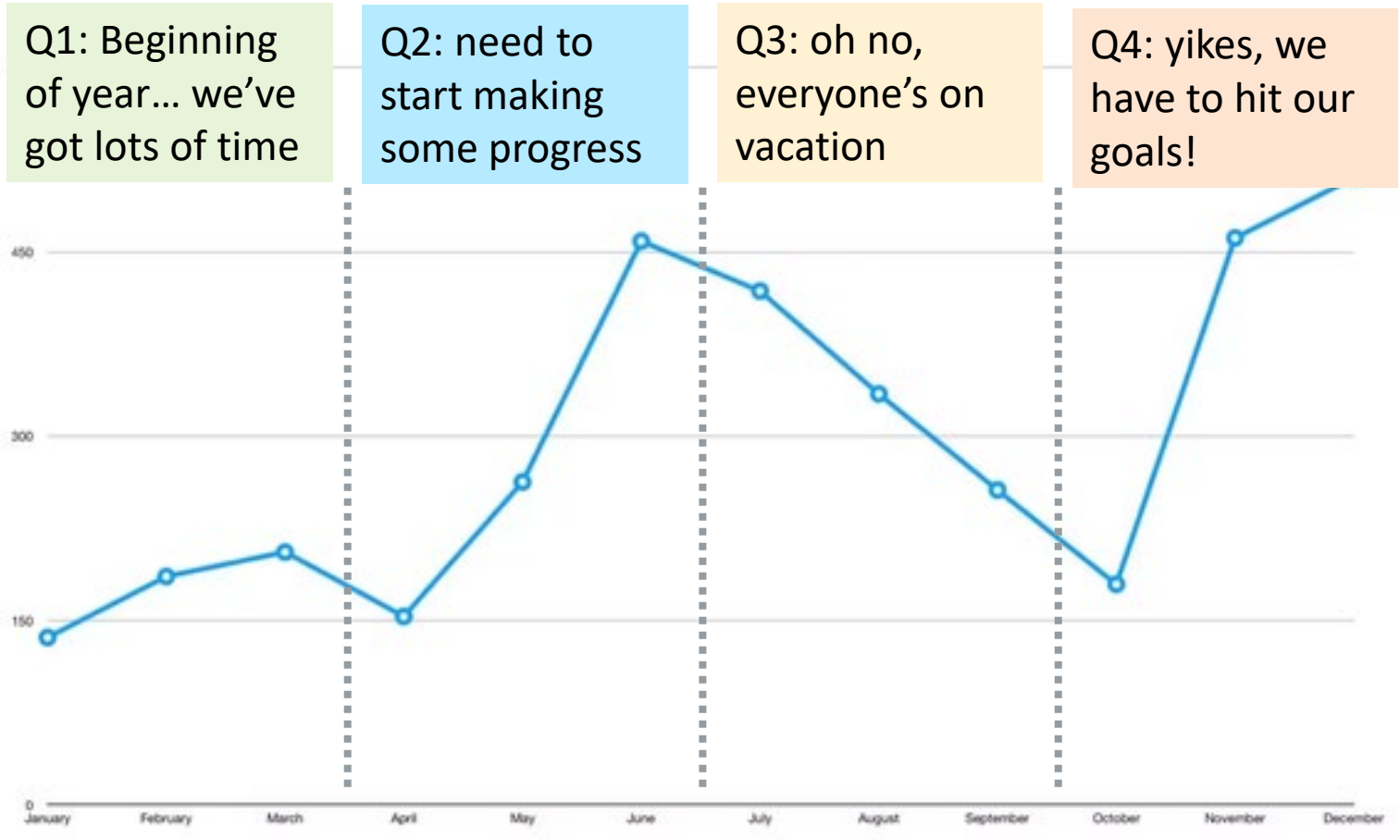
# Understanding volume – seasonality?





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# Questions for volume of data

- **Are you gathering enough data to make meaningful decisions?**
  - Expand data gathering to your entire organization (not just one location)
  - Look to compare to your industry peers and beyond

- **Are you gathering consistent data across large groups?**
  - Need reliable assessment tools and repeatable data collection methods

- **Are your volumes of data readily accessible?**
  - Cloud-based storage of aggregated data (~~paper or messy spreadsheets~~!)


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# 2. Variety of data


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# Variety of data

- In ergonomics, variety of data isn't an issue:
  - Injuries/Incidents
  - Body parts
  - Risk factors
  - Exposure data
  - Quality data
  - …

- *Paralysis by analysis* is a real problem – select data that matters


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# Data important to the Ergonomics Process


All employees should be provided basic awareness training on ergonomics; ergo teams and SME's should be provided skills training

Understanding where your risks are will help you proactively address job design issues, versus waiting for an injury to occur

Direct causes help you pinpoint what is causing the risk factor(s) and will lead you to effectively resolve issues

Employees are the "experts"; engage them in the improvement process

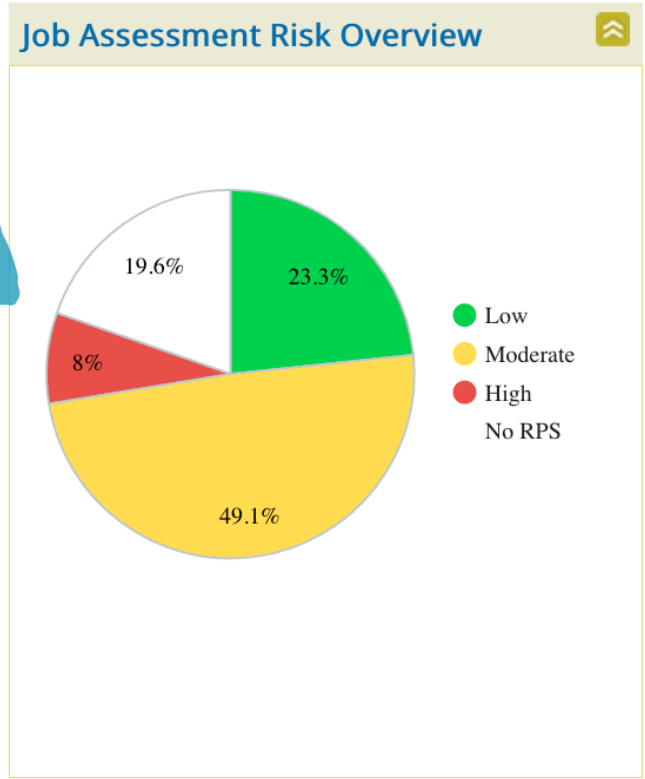
Risk reduction goals drives teams to implement countermeasures that are effective and sustainable

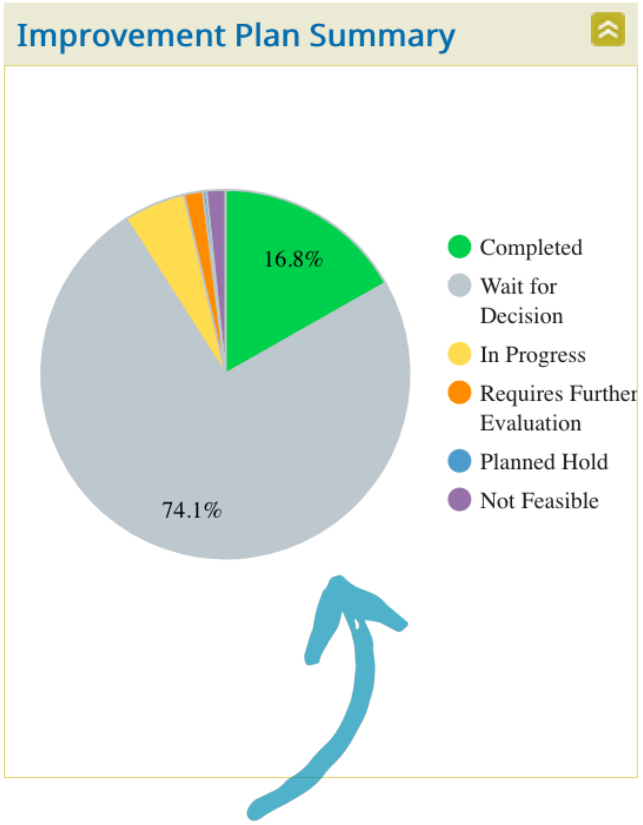
Calculating return on investment is the only way to get management support and demonstrate progress on your initiative

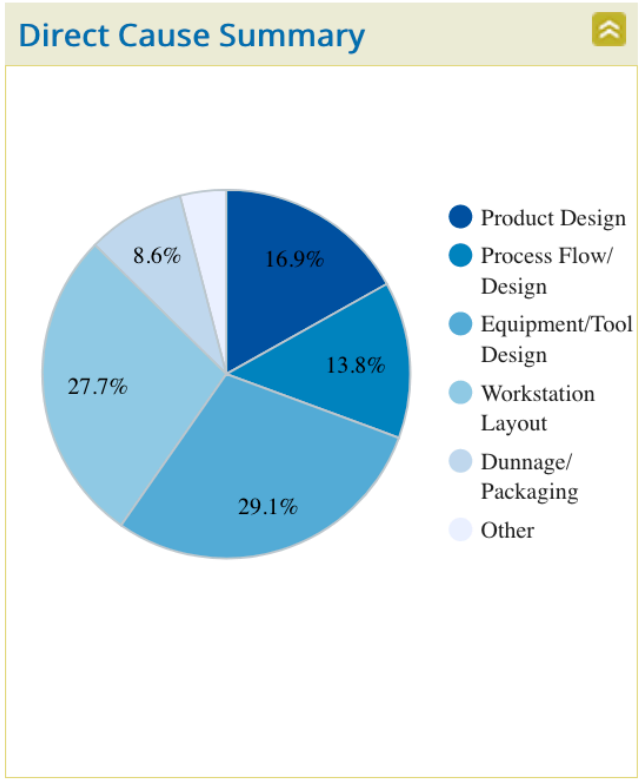
# Interpreting varieties of data

How can this data help you plan?

How could you use this data with an engineering executive?




What would you do if you saw this?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# Questions for variety of data

- **Are you gathering enough kinds of data to understand issues?**
  - Activity Metrics → Leading Indicators → Lagging Indicators
- **What data is important?**
  - Governance of data associated with goals will ensure progress
- **Are people collecting data consistently?**
  - Reliable tools/methods/process create quality comparisons


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# 3. Velocity of data


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# Velocity of data

- Must be able to access and analyze data quickly and efficiently:
  - Cloud-based data enables real-time reporting
  - Click-through reporting to enable you to dig in
  - Visual representation to communicate (dashboards)


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# Taking Appropriate Action quickly

- For example:
  - You task your ergo team with doing wall-to-wall assessment of your facility (250 jobs)
  - They're given one week per month
  - After the first week, 8 of the 25 jobs are identified as high risk
- What do you do?

| | | | |
|---|---|---|---|
| Quebec > Large Site | Job 2862 | 2862 | 31.0 |
| | Job 3062 | 3062 | 30.0 |
| | Job 3078 | 3078 | 30.0 |
| | Job 3079 | 3079 | 30.0 |
| Durango > Durango | Packing 1234 | | 30.0 |
| Manitoba > Small Site | Oil Pan Packer - 11/06/2018 | | 30.0 |
| | Test | | 30.0 |
| Quebec > Large Site | Job 2814 | 2814 | 30.0 |
| | Job 3250 | 3250 | 29.6 |
| Ontario > Medium Site | Job 3315 | 3315 | 29.6 |
| Quebec > Large Site | Job 3043 | 3043 | 29.0 |
| Manitoba > Small Site | Job 3218 | 3218 | 29.0 |
| Quebec > Large Site | Job 3342 | 3342 | 29.0 |
| Michigan > Detroit | Job 3343 | 3343 | 29.0 |
| Quebec > Large Site | Job 2654 | 2654 | 29.0 |
| | Job 2783 | 2783 | 29.0 |
| Ontario > Medium Site | Job 2918 | 2918 | 28.8 |
| Manitoba > Small Site | Job 3210 | 3210 | 28.8 |
| | Job 3219 | 3219 | 28.8 |
| | Job 3221 | 3221 | 28.8 |
| Quebec > Large Site | Job 3038 | 3038 | 28.0 |
| Ontario > Medium Site | Job 3186 | 3186 | 28.0 |
| | Job 3189 | 3189 | 28.0 |


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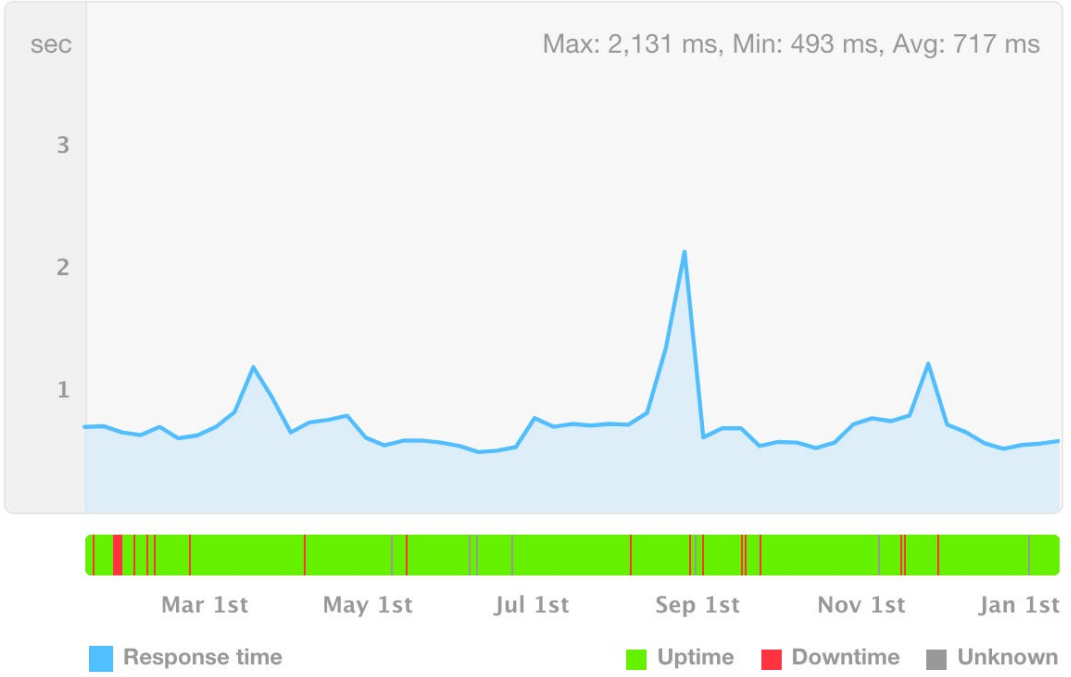
# Questions for velocity of data

- IT Infrastructure Matters:
  - Responsive
    - Load and response times < 3.0 seconds is industry standard (< 2.0 for e-commerce)
  - Stable
    - Availability and back-up through redundant systems and disaster recovery processes
  - Secure
    - SOC2, SOC3
  - Compliant with Privacy Laws
    - GDPR, Privacy Shield





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# 4. Veracity of data


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# Veracity of data

- The degree to which data is accurate, precise and trusted
- Influencers on data quality:
  - Human error
  - User subjectivity
  - Data biases
  - Duplication
  - Information security
  - Falsification
  - Uncertainty
  - Out of date


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# Questions for Veracity of data

- **Are your employees trained and skilled in data collection?**
  - Quantitative data is far superior to qualitative data
- **What measures do you have in place to ensure accuracy?**
  - Review process for data and support from higher level experts
- **Is your data up to date?**
  - Have your manufacturing processes/products changed?


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# Unlocking the 5th "V"


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# 4 v's of big data paints a Picture

Volume

Velocity

VALUE

Variety

Veracity


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# Value of Big Data

- Provides scope and scale of issues
- Helps draw conclusions
- Enables better decision making


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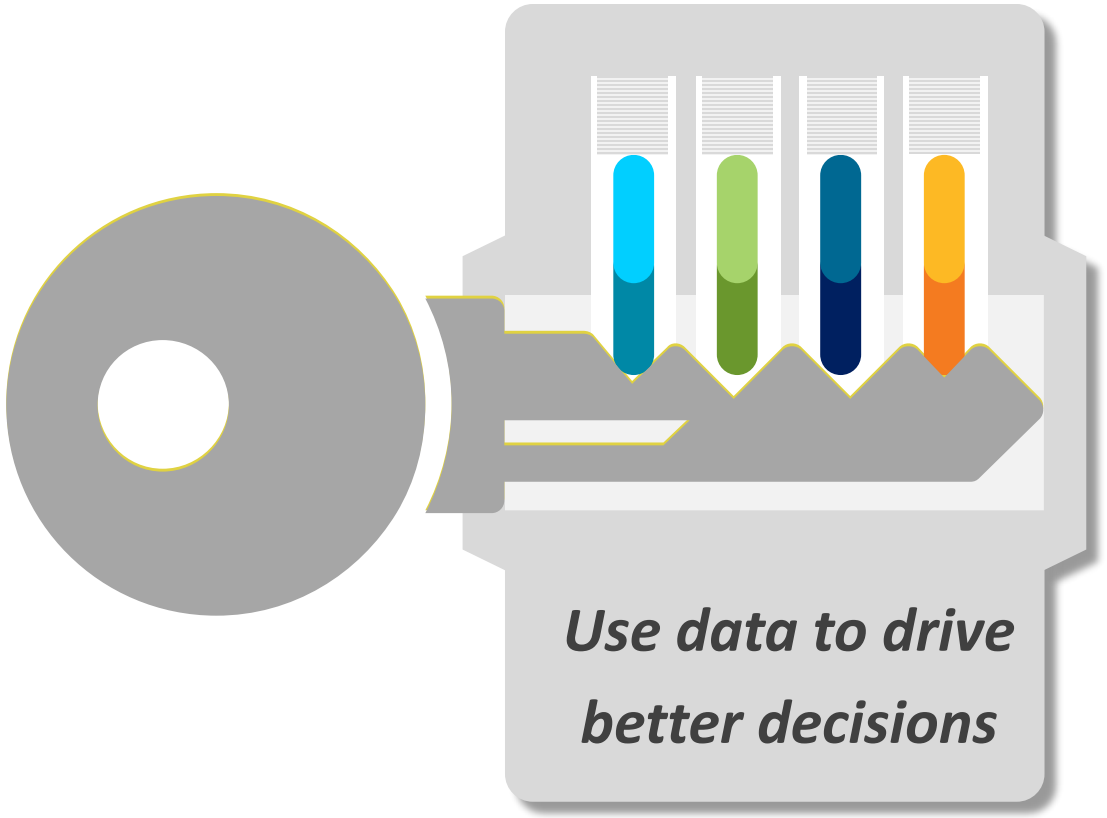
# Unlocking the 5th “V”




## Value

The ability to achieve greater **value** through insights from superior analytics.

*Source: IBM*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# AUTOMOTIVE Industry benchmarking

## SEGMENT OVERVIEW

**1,720**
Locations

**30,464**
Jobs assessed

**56.8%**
Average reduction in risk at follow-up

## IMPROVEMENT OVERVIEW

**6,045** Total improvements completed

**4,231** High impact, low cost improvements

**$ 1,800** Median cost per improvement

**15** Median number of days to implement improvements

## DIRECT CAUSE OVERVIEW

**Top 3 Direct Causes Per Company**

1. Equipment/Tool Design
2. Workstation Layout
3. Product Design

## TYPES OF IMPROVEMENTS

**Of 1,555 classified improvements**

- **918** Equipment changes
- **121** Work instruction & coaching
- **93** Job rotation & scheduling
- **303** Elimination of risk factors


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# PHARMACEUTICAL Industry benchmarking

## SEGMENT OVERVIEW

**1,011**
Locations

**4,797**
Jobs assessed

**51.2%**
Average reduction in risk at follow-up

## IMPROVEMENT OVERVIEW

**1,938** Total improvements completed

**1,366** High impact, low cost improvements

**$ 395** Median cost per improvement

**34** Median number of days to implement improvements

## DIRECT CAUSE OVERVIEW

**Top 3 Direct Causes Per Company**

1. Equipment/Tool Design
2. Workstation Layout
3. Product Design

## TYPES OF IMPROVEMENTS

**Of 436 classified improvements**

- **220** Equipment changes
- **99** Work instruction & coaching
- **47** Job rotation & scheduling
- **43** Elimination of risk factors


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# FOOD & BEVERAGE Industry benchmarking

## SEGMENT OVERVIEW

**1704**
Locations

**8,884**
Jobs assessed

**56.8%**
Average reduction in risk at follow-up

## IMPROVEMENT OVERVIEW

**5,104** Total improvements completed

**3,419** High impact, low cost improvements

**$ 700** Median cost per improvement

**12** Median number of days to implement improvements

## DIRECT CAUSE OVERVIEW

**Top 3 Direct Causes Per Company**

1. Equipment/Tool Design
2. Workstation Layout
3. Product Design

## TYPES OF IMPROVEMENTS

**Of 942 classified improvements**

- **532** Equipment changes
- **137** Work instruction & coaching
- **83** Job rotation & scheduling
- **151** Elimination of risk factors


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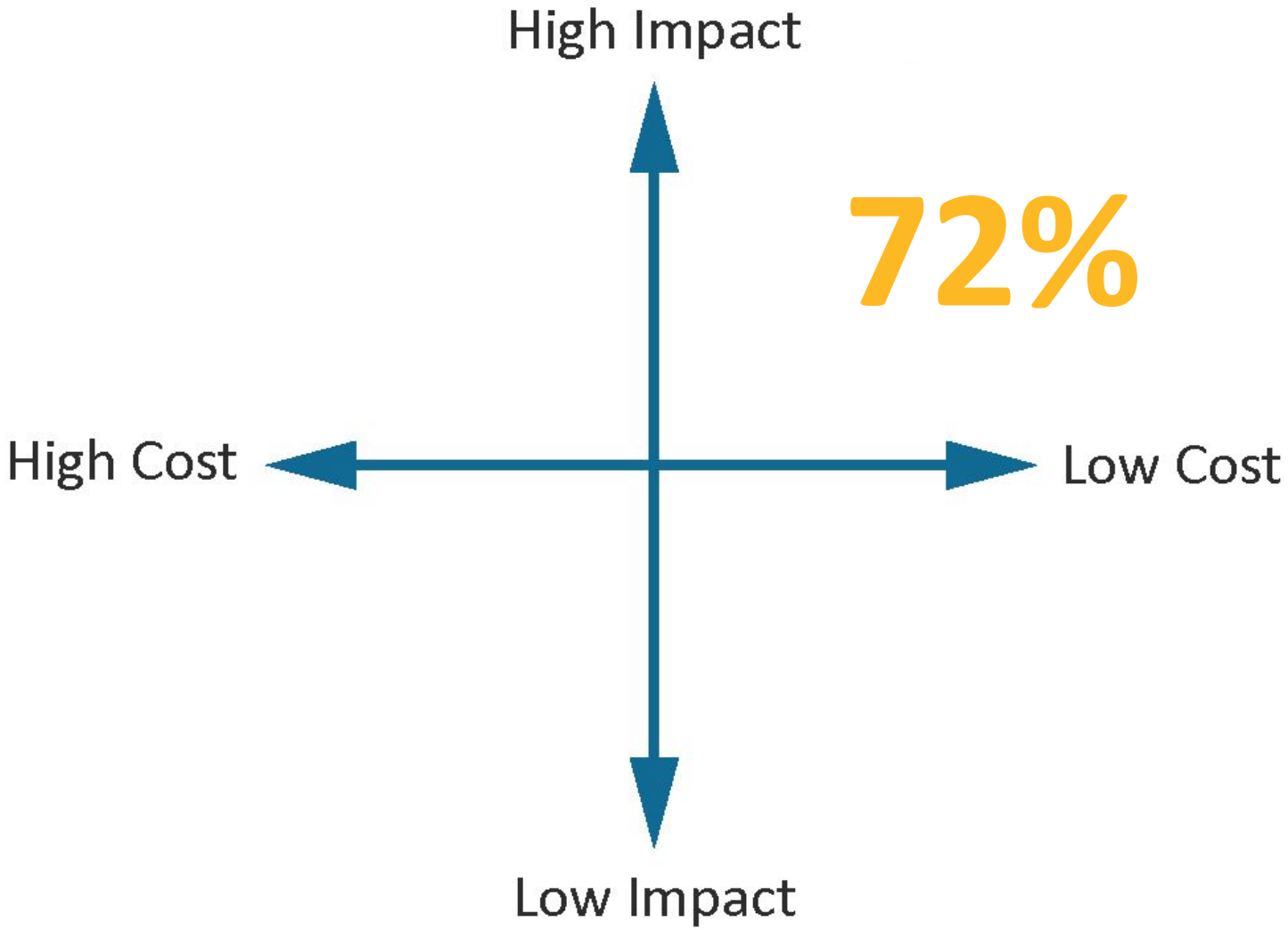
# HIGH-IMPACT, LoW-COST Solutions





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# Value of Ergonomics Process

**The ergonomic condition of the workplace reflects stakeholder's respect for employees.**

- To engage employees, business leaders need to simply connect one-on-one with them to establish a foundation of trust and respect.

- If the workplace is designed to meet people's needs, it demonstrates the employer's commitment and enables employees to be fully engaged in the workplace.


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# Today's Learning Objectives

- ✓Smarter solutions improve employee well-being and enhance business performance
- ✓The potential benefits big data has on supporting the ergonomics process
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- ✓How market and industry trends are identified


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