



established in
1976
SAS was







14,000
employees

58
countries

40
years of growth



used by **91** of top **100**
Fortune Global 500 companies

in **148** countries

at **80,000** sites





"Jim Goodnight is one of the great technology entrepreneurs of the past fifty years."

Forbes, May 2014

"SAS continues to be the company to beat."

Information Week, February 2016

"(SAS) is a company with a rich history, an amazing staff and customer focus, and the safe bet that it can do whatever you can dream up."

iTWire, April 2016

Every day, businesses makes **thousands** of decisions.

Every business is always-on.

Every decision has a reputational impact.

How good are they?

A woman with dark hair, wearing a white short-sleeved shirt, is sitting at a desk in an office. She is looking down at a document on the desk. There are two computer monitors, a water bottle, and some cables on the desk. The background shows a window with a view of a building.

Can you use the latest information?

A man with glasses, wearing a dark suit and tie, is leaning on a metal railing. He is looking towards the camera with a slight smile. The background is a modern office with large windows and a staircase.

Can you make them quickly?

A woman with dark hair, wearing a dark blazer, is standing with her arms crossed. She is looking towards the camera. The background is a blurred office environment.

Do you have access to the deepest insights?

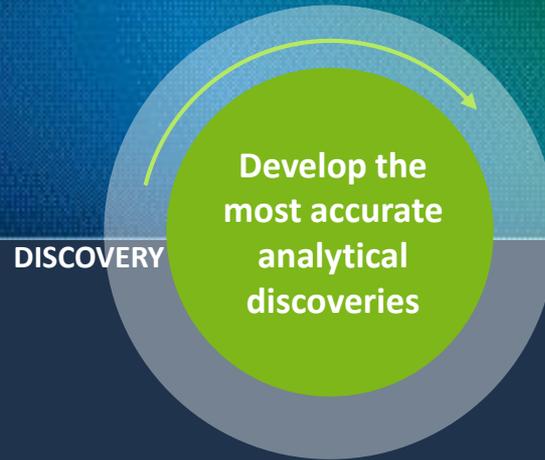
Two women are sitting at a desk in an office. They are looking at a laptop screen. One woman is wearing a pink blazer and glasses, and the other is wearing a light-colored cardigan. There are two computer monitors and a water bottle on the desk.

Are they consistent decisions?

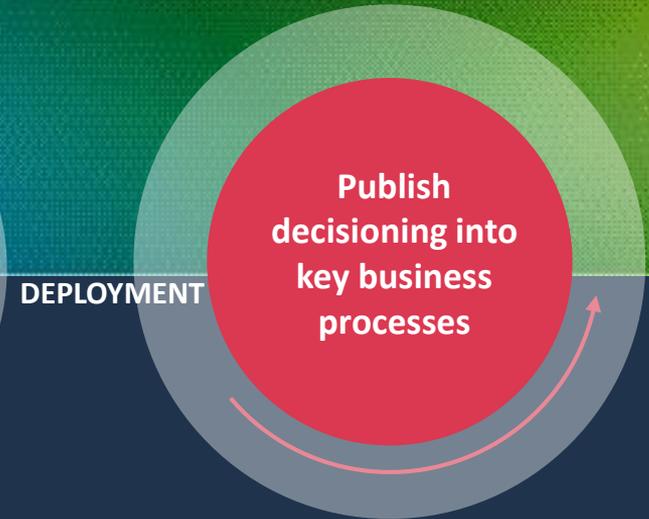
3 Key Capabilities for Decisioning



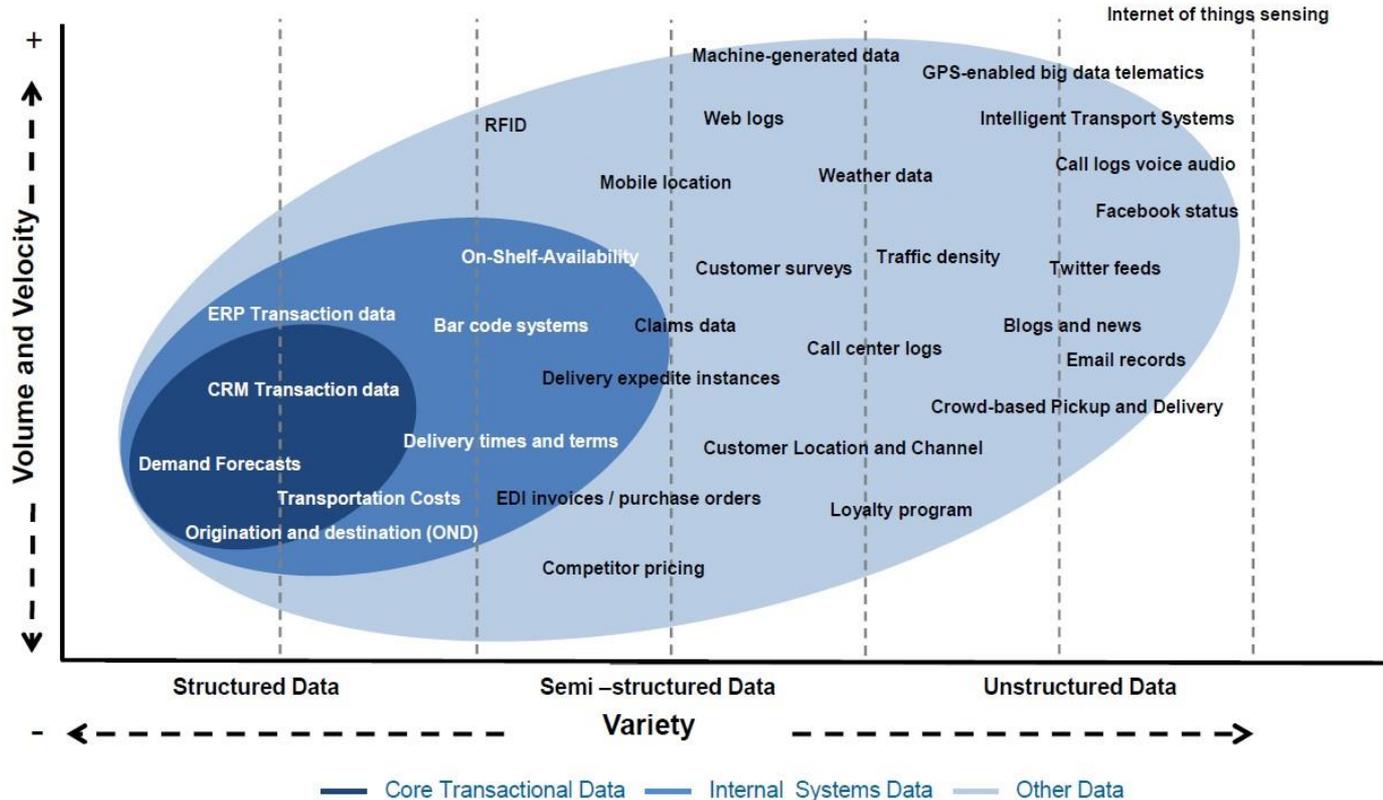
Sense



Understand



Act



“Data preparation is one of most difficult and time-consuming challenges facing business users of BI and data discovery tools, as well as advanced analytics platforms”

Rita Sallam, Research VP at Gartner, Copyrighted by Gartner - January 2015



TOO MUCH DATA
in too many places

POOR QUALITY
that cannot be trusted

INCONSISTENT DATA
across multiple sources

LIMITED DATA ACCESS
and lack of self-service

NOT THE RIGHT TOOLS
for end users to prep data

A proper data preparation tool is critical to fully realize the benefits of data visualization.

SAS Analytics in Action

- Access to all **DATA** is vital
- Fast analytical **DISCOVERY** is the key to progress
- **DEPLOYMENT** is the driving force of action



We have four decades of experience of **Analytics in Action.**

4 Levels of Analytics Maturity

1. Descriptive Analytics

Hindsight (What happened?)

2. Diagnostic Analytics

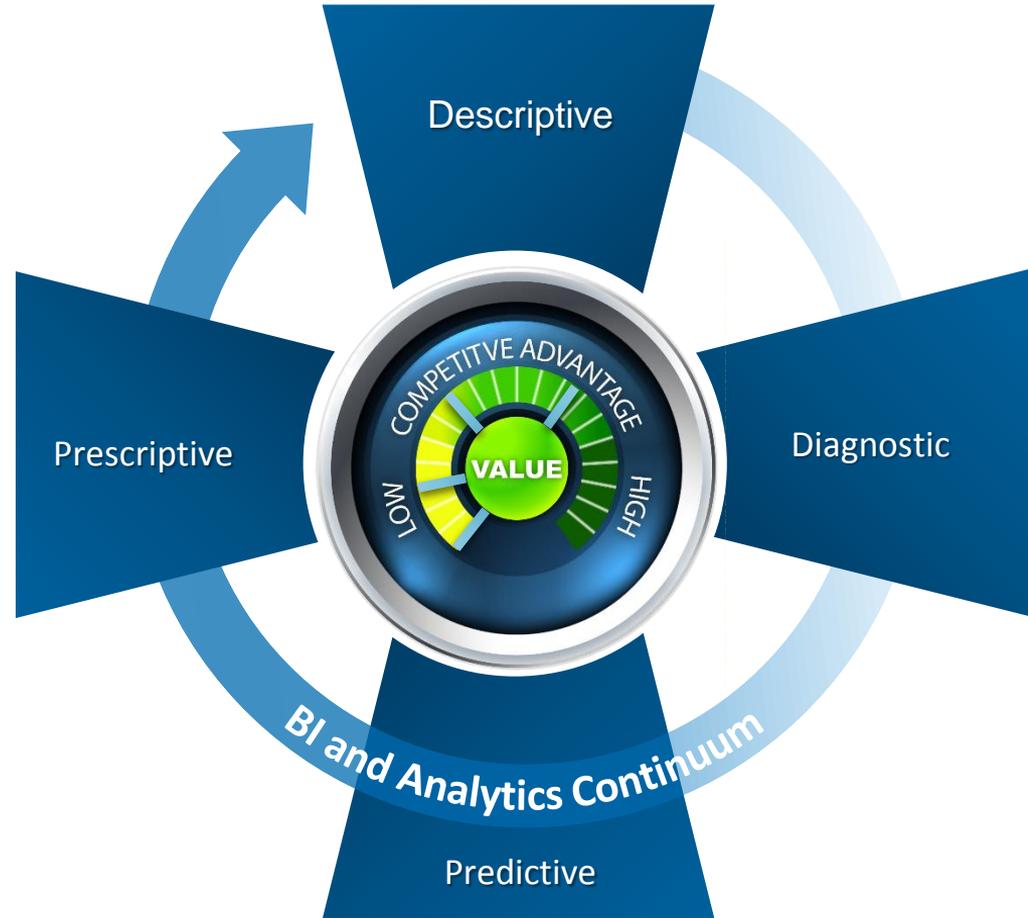
Oversight (real-time / What is happening? Why did it happen?)

3. Predictive Analytics

Foresight (What will happen?)

4. Prescriptive Analytics

Insight (How can we optimize what happens?)



5 Levels of Analytics Maturity

1.

Hinds

2.

Overs

3.

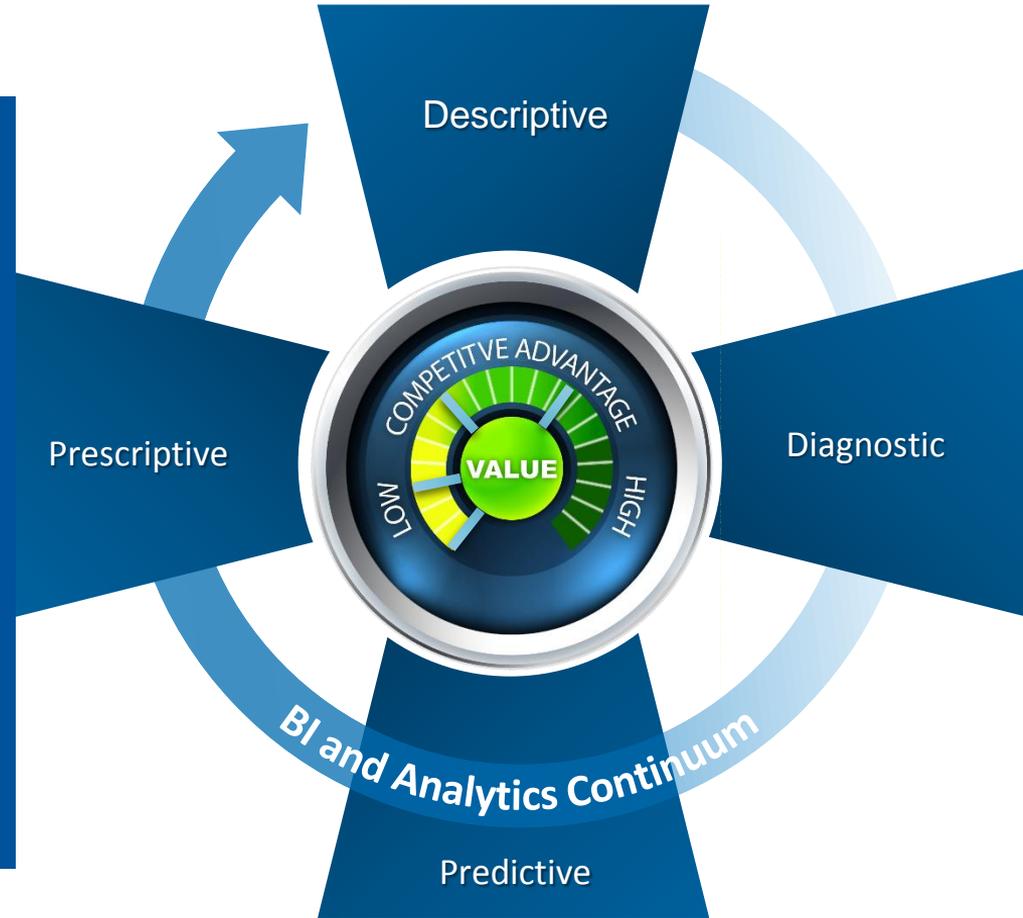
Foresi

4.

Insigh

5. Cognitive Analytics

- **Right Sight** (the 360 view , **what is the right question to ask for this set of data in this context** = Game of Jeopardy)
- Finds the right insight, the right action, the right decision,... right now!
- Moves beyond simply providing answers, to generating new questions and new hypotheses, for your **“next-best move”**



SAS Analytics in Action



Increasing Pressure on Operations

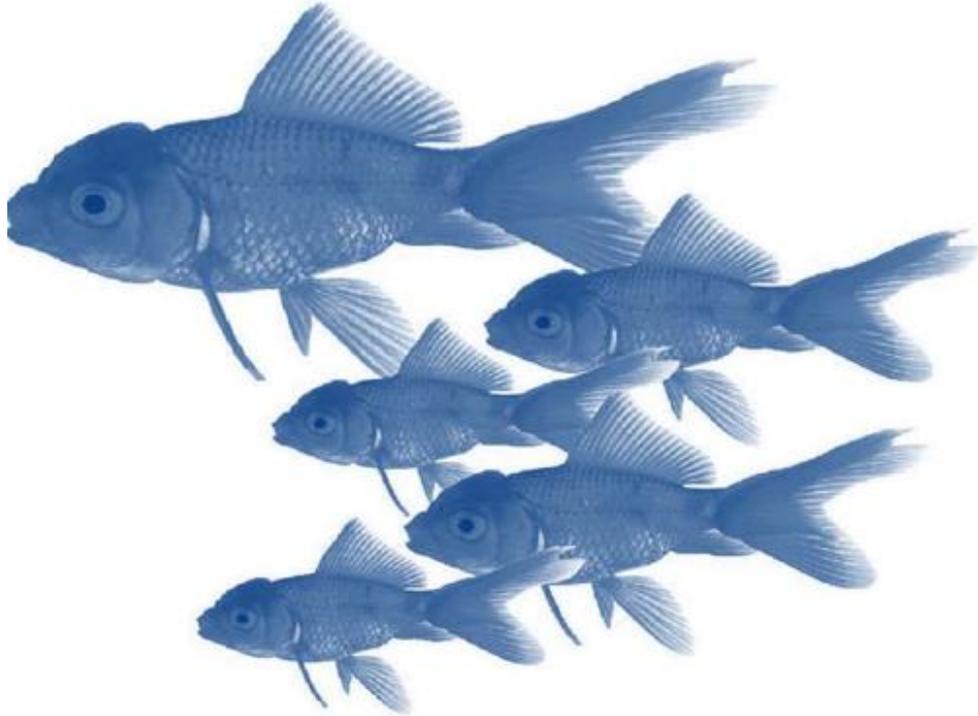
Since 2000, 52 percent of the companies in the Fortune 500 have either gone bankrupt, been acquired, ceased to exist, or dropped out of the Fortune 500.

Gartner predicts

Over the next 10 years, the financial performance of 25% of enterprises will be weakened because of competition that does not exist today.

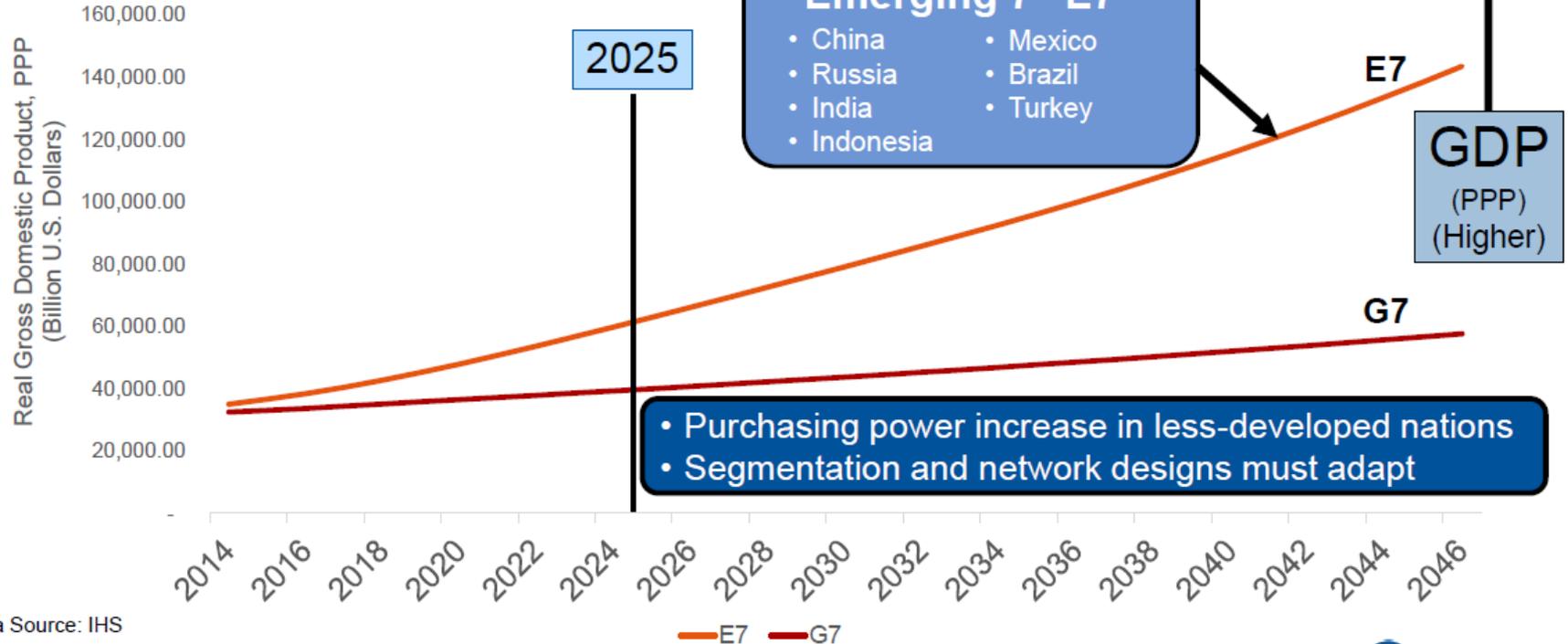
it's now or never

In three years' time four out of 10 CEOs expect to be running significantly transformed companies



Global Landscape: The "Emerging 7" Economies Will Have a Larger Influence on Future Demand

E7 and G7 growth paths in GDP at PPP terms



Data Source: IHS

CEO concerns

The loyalty of our customers



90%

How the wants and needs of millennials will change the business

86%

The relevance of our products / services three years from now

78%

Keeping pace with customer' needs and expectations

53%





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CEO Outlook 2016

June 28, 2016



Two-thirds of CEOs believe that the next three years will be more critical for their industry than the previous 50 years.



The ability to know how their products are used and where their services are needed at a very granular level is already transforming many business processes and in some cases, the entire make-up of the organization. **Four out of ten CEOs (39%) believe that their organizations are likely to be transformed into significantly different entities.**



Customer loyalty is a concern for 90 percent of CEOs. Just over half believe they are not keeping pace with customer expectations.



Two-thirds of CEOs are concerned that their organizations are not disrupting business models.



CEOs believe that technological change will be one of the biggest factors impacting growth over the next three years, second only to economic factors.



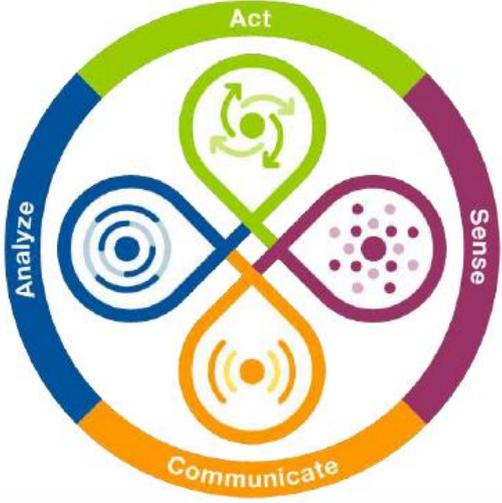
CEOs named cybersecurity as their top risk, followed closely by regulatory risk—evidence that a more connected, always-on operating model is shifting the risk landscape.



More “Things” Are Getting Connected Every Day



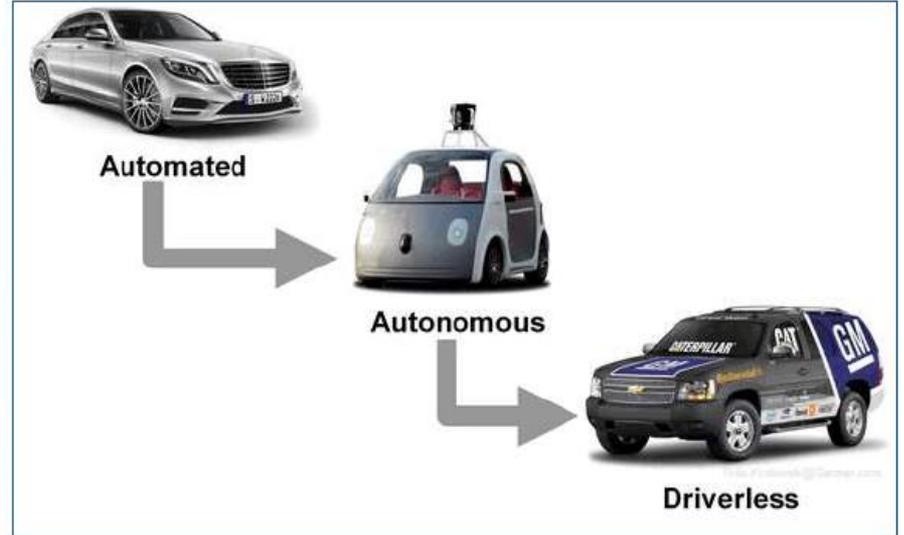
The Internet of Things



50 Billion Connected Things by 2025



Humans and Smart Machines Are Starting to Coexist



Generation Pi and Robots Will Take on More Work

Estimated Worldwide Annual Supply of Industrial Robots, 2004–2014



Source: International Federation for Robotics, World Robotics 2015.



Unimate Robot
General Motors, 1961

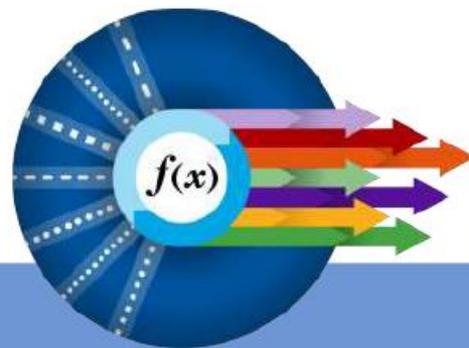


Boston Dynamics
2016

Algorithmic Business: A Future Where a Supply Chain Acts, Heals and Negotiates on Its Own



The **Internet of Things** creates a digital version of physical world devices



Digital business creates new business designs through merging the physical with the digital



Algorithmic business applies the knowledge encapsulated in algorithms to stream data at speed and scale



Business leaders who harness trends will be the big winners

The background features a vibrant, radial gradient of blue and white. The center is a bright, almost white point from which numerous thin, elongated rays of light radiate outwards, creating a starburst or sunburst effect. The colors transition from a pale, ethereal blue near the center to a deeper, more saturated blue towards the edges, with some rays appearing as bright white streaks.

What if?

Manufacturing's future

"The factory of the future will have only two employees, a man and a dog.

The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment."

— Warren Bennis

Autonomic **EIGHT CRUCIAL ELEMENTS IN AN AUTONOMIC SYSTEM:**

- it must maintain comprehensive and specific knowledge about all its components;
- it must have the ability to self-configure to suit varying and possibly unpredictable conditions;
- it must constantly monitor itself for optimal functioning;
- it must be [self-healing](#) and able to find alternate ways to function when it encounters problems;
- it must be able to detect threats and protect itself from them;
- it must be able to adapt to environmental conditions;
- it must be based on open standards rather than proprietary technologies; and it must anticipate demand while remaining transparent to the user





Richer Insights =
Better Decisions



CEOs named data and analytics as a top three investment priority for the next three years.

CEOs plan to dive into ever-expanding data resources to develop new products and services as well as drive efficiencies and strategy.

SUPPLY CHAIN

Gartner Announces Its Rankings of the 2016 Supply Chain Top 25



“Another trend at leading supply chains is the use of [advanced analytics](#) to aid in running multiple parts of their operations, spanning the entire end-to-end supply chain.” Source:

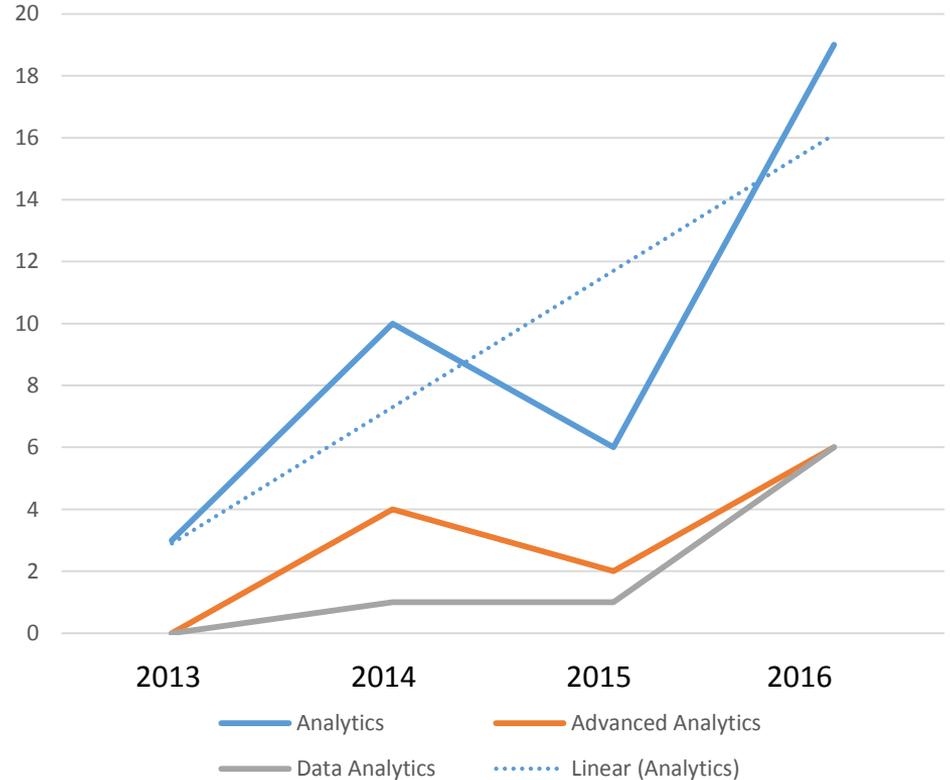
[Supply Chain 247](#)

Top 25 Supply Chains

THE RISE OF ANALYTICS IN GARTNER TOP 25 SC

- Mentions of keyword “Analytics” have grown **5X** over 4 years
- Among top 3 recommendations in 2016: **“Invest in advanced analytics capabilities to make step-function improvements in performance within and across supply chain functions.”***

2016 is the first year Gartner has recommended investment in advanced analytics



*Source: The Gartner Top 25 Supply Chains for 2016, published May 18th, 2016

Top 25 Supply Chains

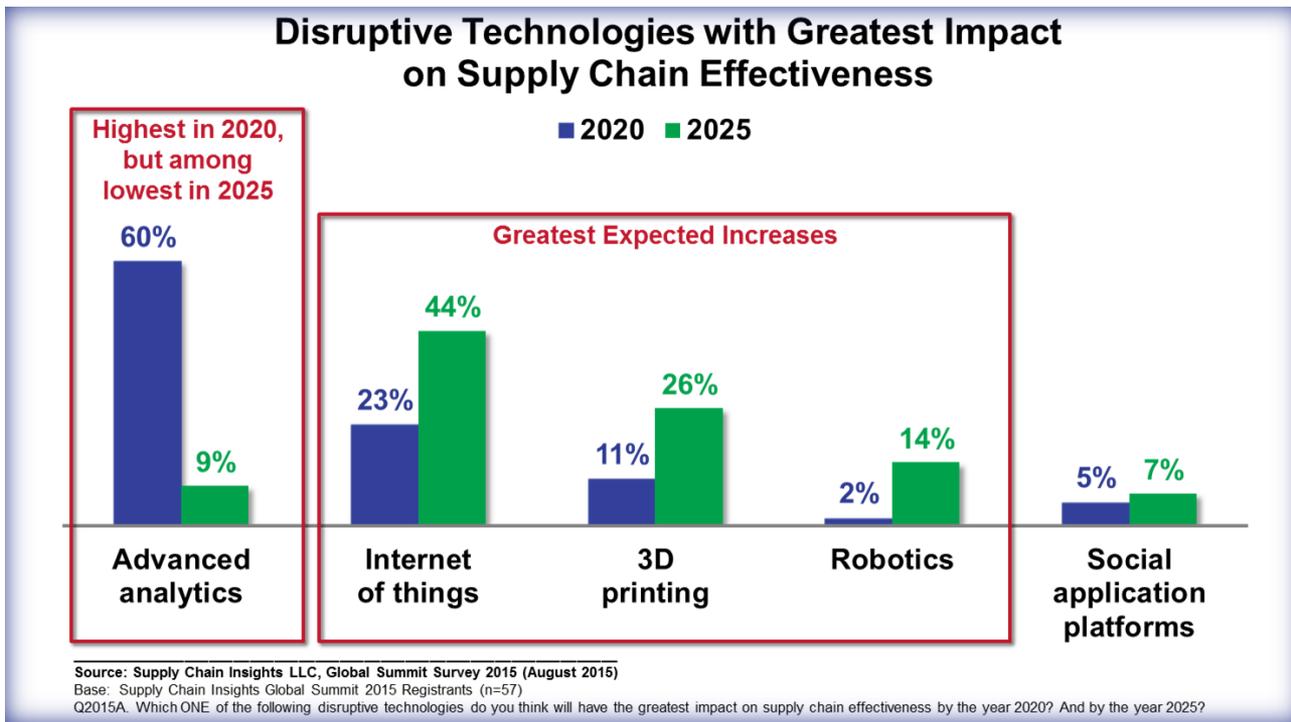
BENEFITS OF ADOPTING ADVANCED ANALYTICS*

- Generate better demand forecasts
- Inform the design of new products
- Identify quality problems sooner
- Provide a holistic view of product quality
- Generate prescriptive recommendations
- Convert disparate data points into operational insights
- Drive toward autonomous supply chain functions

*Source: The Gartner Top 25 Supply Chains for 2016, published May 18th, 2016



Confluence of Technologies



Only 31 percent feel their organizations are leaders in data and analytics usage. One out of ten CEOs actively distrusts their organization's use of data and analytics.



SUPPLY CHAIN INSIGHTS

SUPPLY CHAIN EXCELLENCE AS THE ABILITY TO IMPROVE CUSTOMER SERVICE LEVELS, OPERATING MARGINS, AND INVENTORY LEVELS WHILE ALSO GROWING REVENUE.

Figure 5: Industry Snapshot (2006-2015): Technology Value Networks

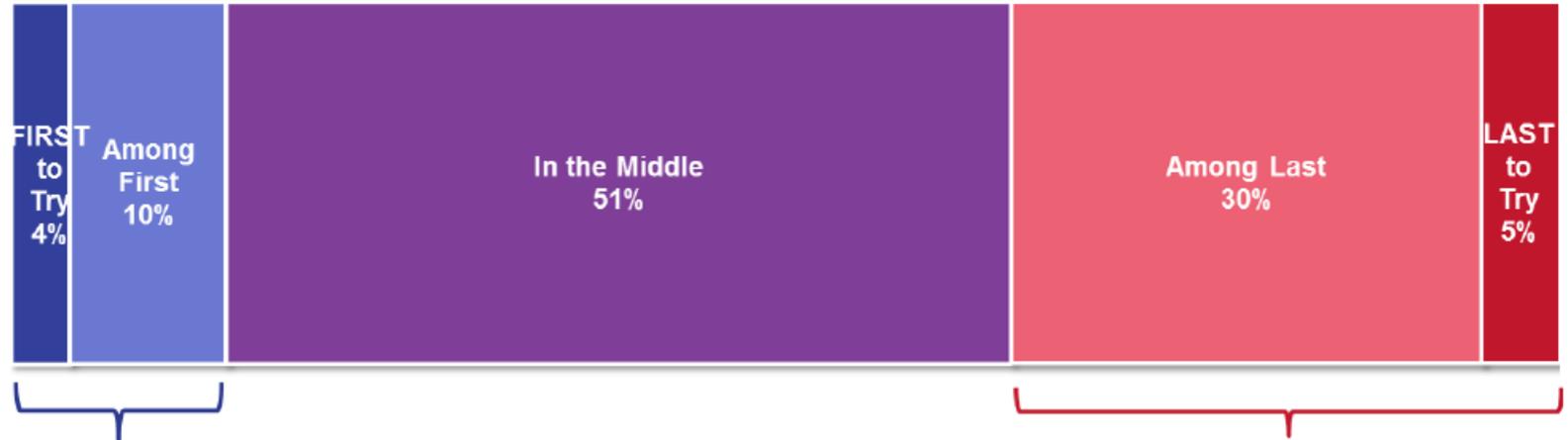
Industry	Year-over-Year Revenue Growth	Operating Margin	Inventory Turns	Cash-to-Cash	Return on Invested Capital (ROIC)	Revenue per Employee (K\$)	SG&A Ratio
Consumer Electronics	04% ↓10%	0.07 ↓03%	5.59 ↓149%	59 ↑18%	07% ↓11%	247 ↓75%	20 ↑03%
B2B Technology	06% N/C	0.09 ↑01%	7.01 ↑31%	64 ↑22%	08% ↑02%	580 ↑06%	15% N/C
Semiconductor	04% ↓09%	0.12 ↑0.03	4.51 ↑64%	54 ↑15%	05% ↓03%	334 ↑80%	16% N/C
Chemical	04% ↓17%	0.09 N/C	5.17 ↓102%	09 ↓01%	09% ↓01%	574 ↑75%	16% ↓01%
Contract Manufacturers	03% ↓08%	0.00 N/C	7.19 ↑12%	07 ↓10%	02% ↑06%	187 ↓23%	39 ↓02%

Source: Supply Chain Insights 2016. Derived from Ycharts

Based on analysis of balance sheet patterns for more than 2,000 public companies in 35 industries from 2006 to 2015, nine out of 10 companies are stuck when it comes to supply chain improvement.

RISK PROFILE OF COMPANIES ADOPTING ANALYTICS

Company's Approach to Trying New Technologies Relative to Other Companies



**14% Are First or
Among the First
to Try a New
Technology**

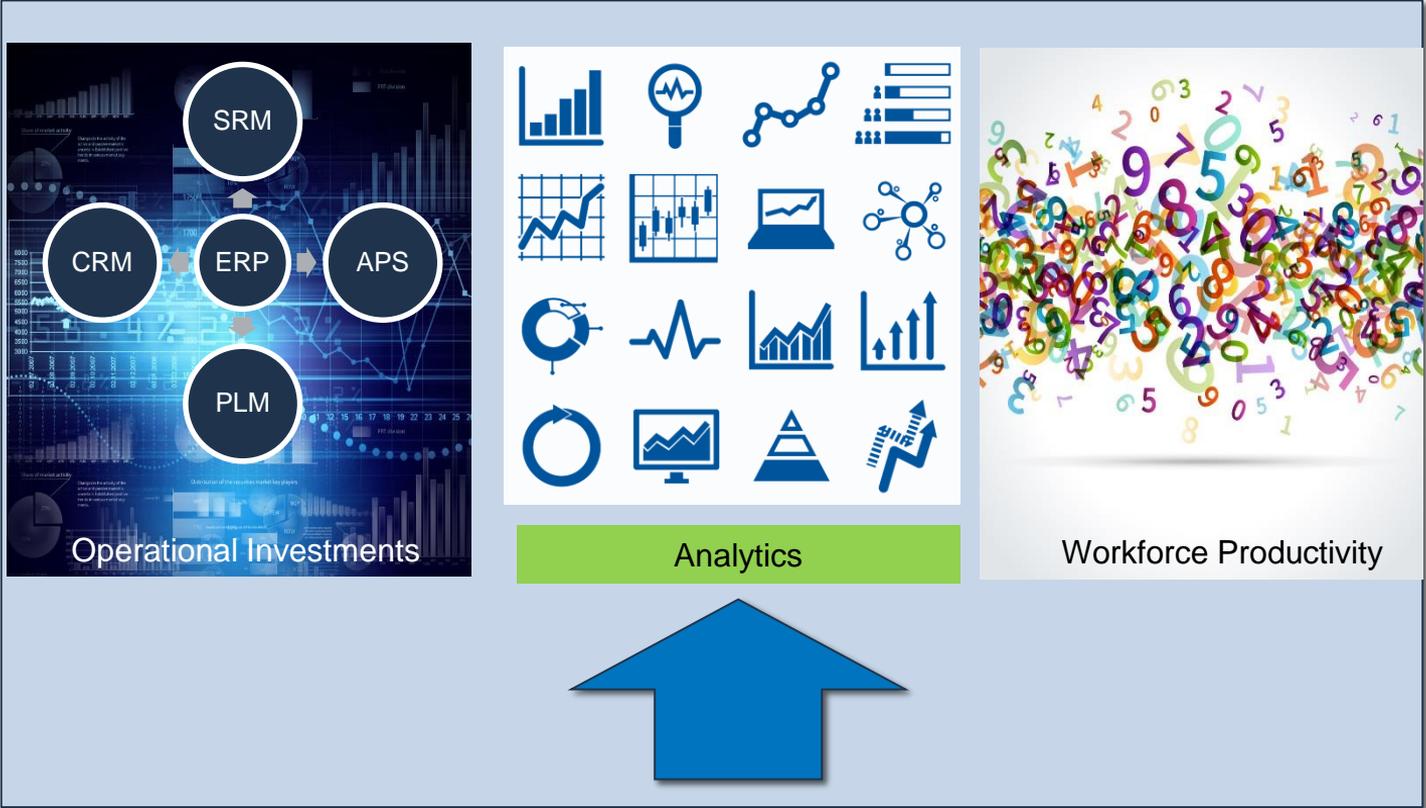
**35% Are Last or Among the Last
to Try a New Technology**

Source: Supply Chain Insights LLC, S&OP and Demand Management Study (Feb-May, 2016)

Base: Manufacturers, Distributors, Retailers familiar with S&OP and/or Demand Management (n=79)

Q31. Which of the following best describes your company's approach to trying new technologies, in general?

Technology Evolution



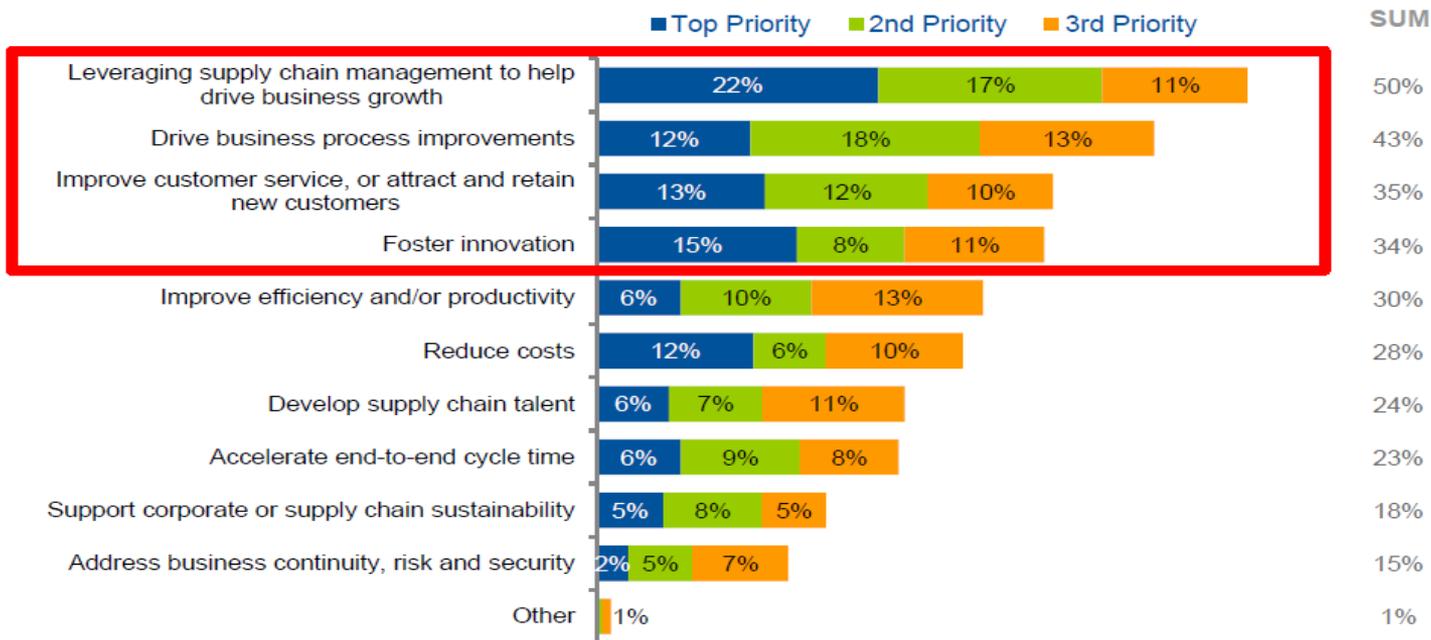


Evolution of Analytics

Comparison		
	Current State	Evolving Technologies
Data	Structured	Structured and unstructured
Rules	Simple rules: single ifs to single thens	Adaptive rules: multiple ifs to multiple thens through cognitive learning
Engines	Optimization based on a “known” function or mathematical outcome	Concurrent optimization, cognitive learning and combinatorial math to drive discovery and new insights
Deployment	Within the organization	Cloud-based to synchronize inter- and intra-enterprise flows
Process Flows	Inside-out with a focus on the efficient response	Outside-in with a focus on sensing and adaption
Database Structures	Relational	Relational and non-relational to mine data in lakes, streams and clouds
Visualization	Rows, columns and graphs	Simulation and digital representation of outcomes



It's not just about removing cost, it's about removing latency from the way you react to changing market conditions and not tying up capital in places that could slow your response.



N = 449

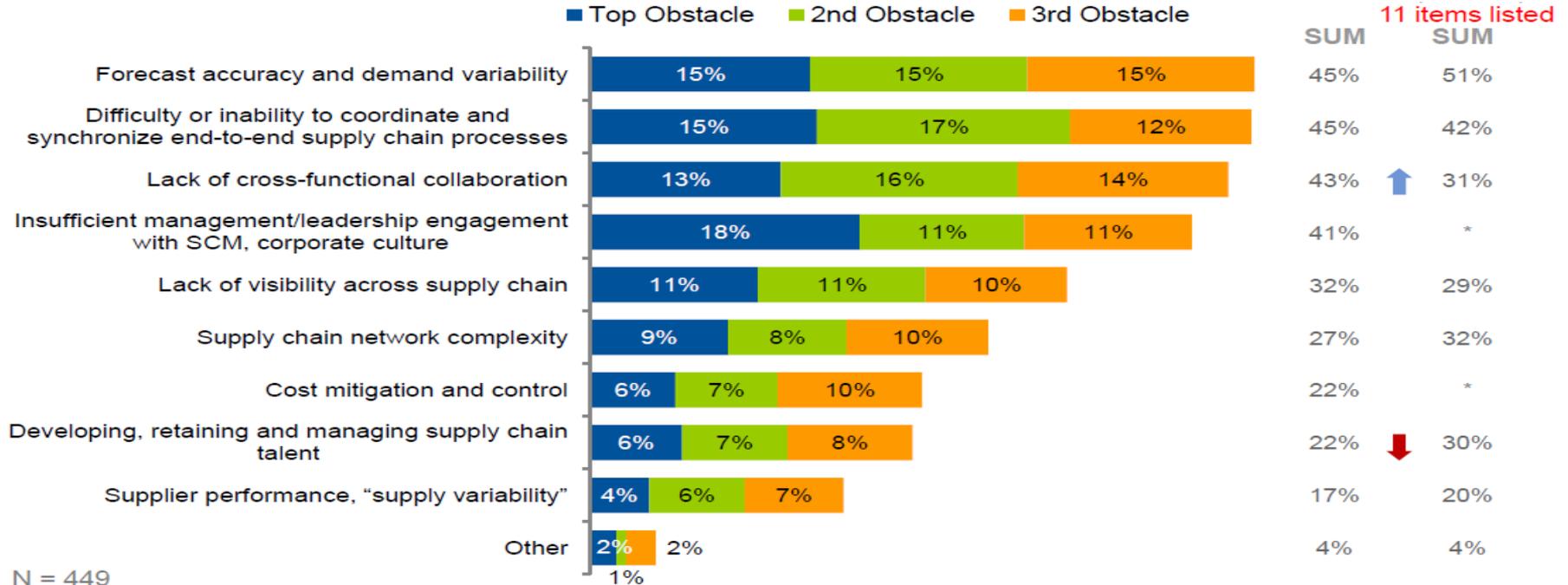
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SUPPLY CHAIN

RIGHT PRODUCT, RIGHT PLACE, AND THE RIGHT TIME



WHAT'S STOPPING THE SUPPLY CHAIN ACHIEVING THESE GOALS...



N = 449

*Response not provided in 2012 survey.

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Where Does It Hurt?



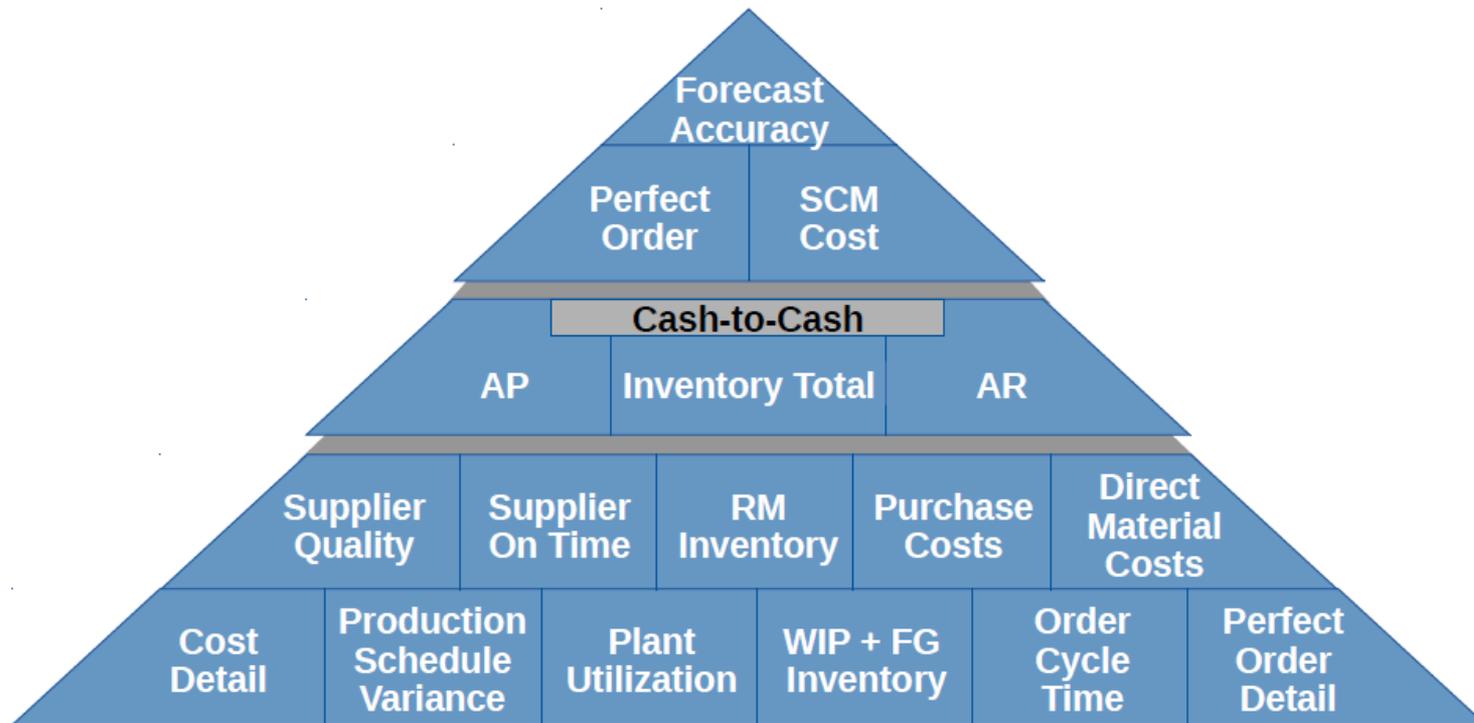
TOP
5
VOLATILITY
ALIGNMENT
VISIBILITY
DATA
TALENT

Top Five Elements of Business Pain in Supply Chain

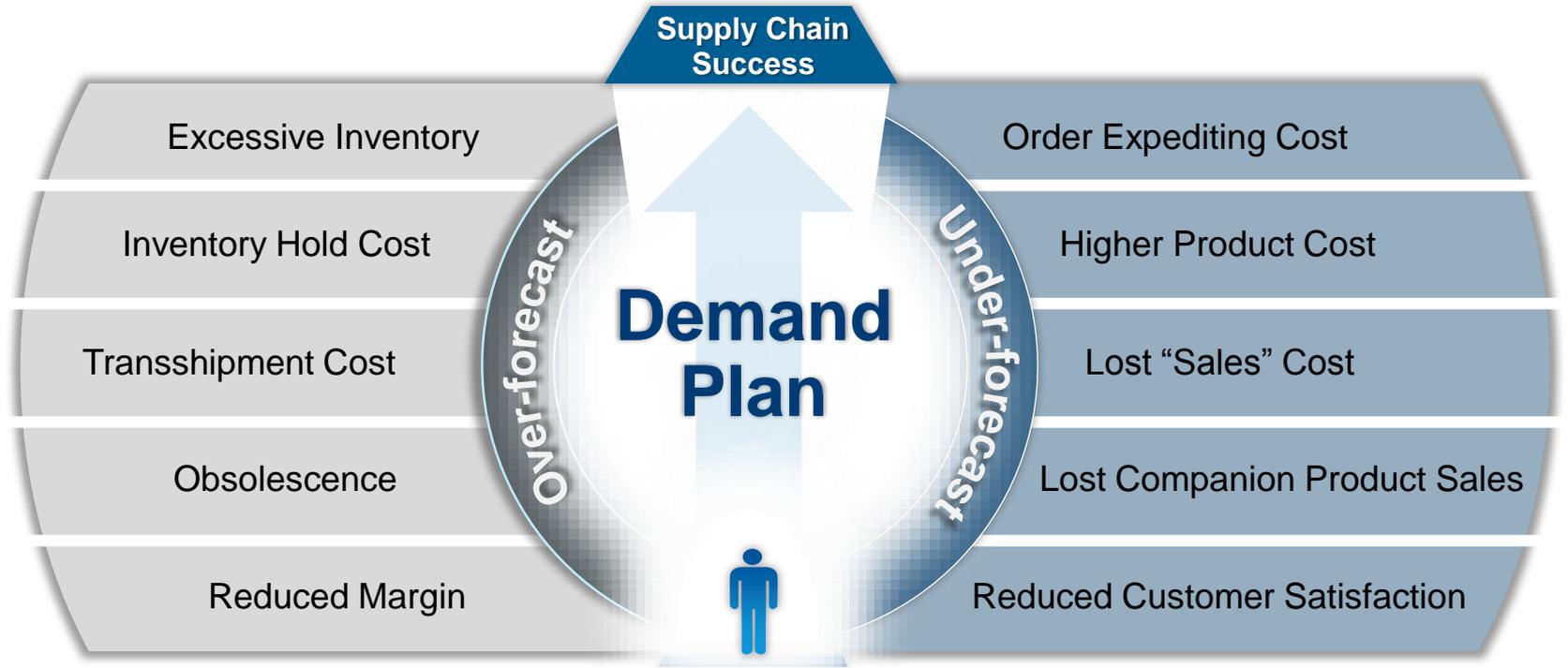


Check Out the Full Report, "In Search of Supply Chain Excellence"
(based on research by Supply Chain Insights LLC, 2012-2015);
www.supplychaininsights.com/in-search-of-supply-chain-excellence
www.SupplyChainInsights.com

GARTNER THE HIERARCHY OF SUPPLY CHAIN METRICS



THE IMPACT OF STARTING WITH THE 'WRONG' NUMBER



STRONG EXECUTION STARTS WITH AN ACCURATE DEMAND PLAN



Current Forecasting Methods are Inaccurate

Do you see these any of these in your company?

Limited Methods

50% of time spent
managing data

Highly Variable Demand

Giant spreadsheets

Forecast
Accuracy 30-70%

Forecast Accuracy



Customer Service



Inventory Write-offs



Supply Chain Complexity





Current Forecasting Methods are Inaccurate

Do you see these any of these in your company?

Poor forecasts from ERP
and SCM systems

Not leveraging causal
data

Gut instinct; no forecast
value-add

Forecast by exception!

Forecast
Accuracy 30-70%

Forecast Accuracy



Customer Service



Inventory Write-offs



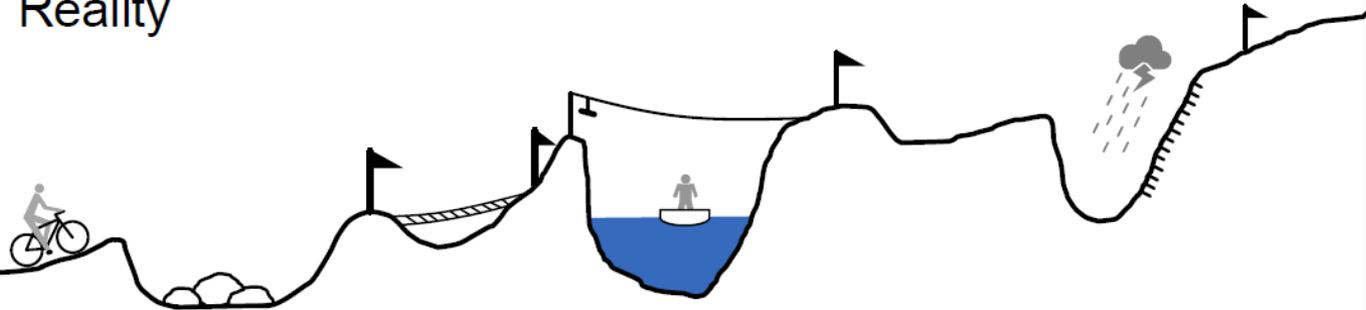
Supply Chain Complexity



Your Plan



Reality



DEMAND BEHAVIOR VARIES ACROSS PRODUCT

New Products

High Value/Low Forecastability

- **Revolutionary**
 - No history
- **Evolutionary**
 - Surrogate “like’ Products
 - Short Lifecycle
 - Planned “mix%”

- **Sporadic demand**
- **Some evidence of trend**
- **Very little seasonality**
- **Event-driven demand**

Exclusive/Niche Products

Low Value/Low Forecastability

Value-Competitive

High Value/High Forecastability

- **Seasonal fluctuations**
- **Heavy use of promotions**
- **Intensive marketing**
- **Competitive influences**

- **Highly seasonal**
- **Trend**
- **Cyclical**
 - **Light use of promotions**

Core Assortment

Low Value/High Forecastability

DEMAND BEHAVIOR VARIES ACROSS PRODUCT

New Products
High Value/Low Forecastability

Surrogate History Modeling

Parental "Curve" Modeling

User Judgment / Domain Expertise

Dynamic Regression

Unobserved Components Model

Multiple Regression

ARIMAX (ARIMA + Regressors)

Value-Competitive
High Value/High Forecastability

Structured Judgment

- *Domain Expertise*
- *Time Series*
- *Causal*

Intermittent Demand Model

Winter's ARIMA (Box-Jenkins)

Simple Moving Average

Decomposition

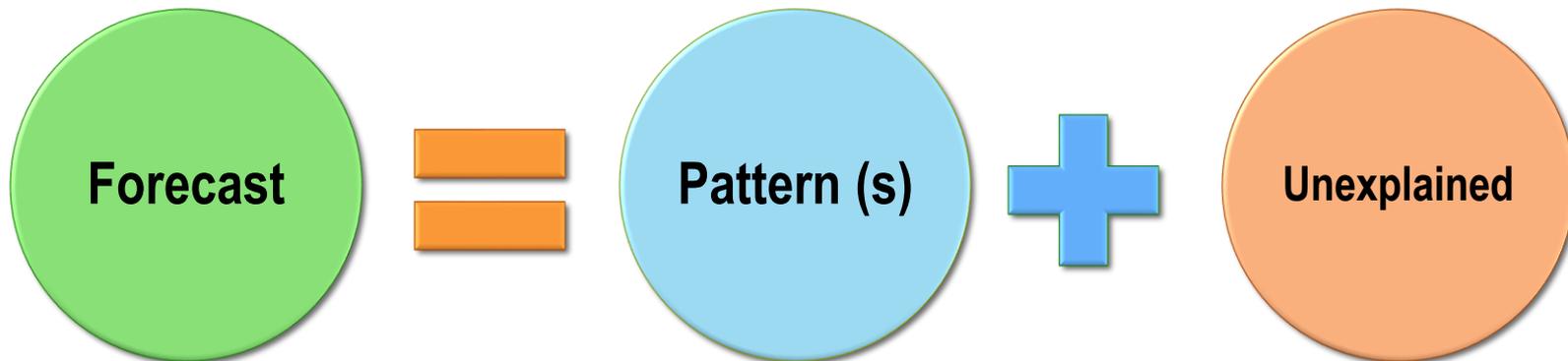
Holt's Double-Exponential Smoothing

Exclusive/Niche Products
Low Value/Low Forecastability

Core Assortment
Low Value/High Forecastability



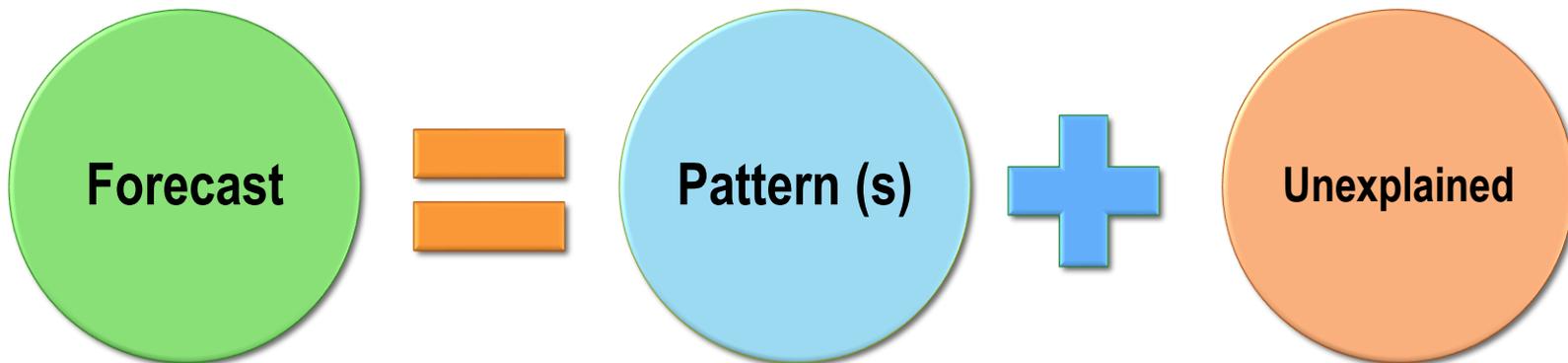
The Generalized Forecasting Problem:



WHY ADVANCED FORECASTING

The conventional forecasting approach:

- Exponential Smoothing (e.g. Winter's)

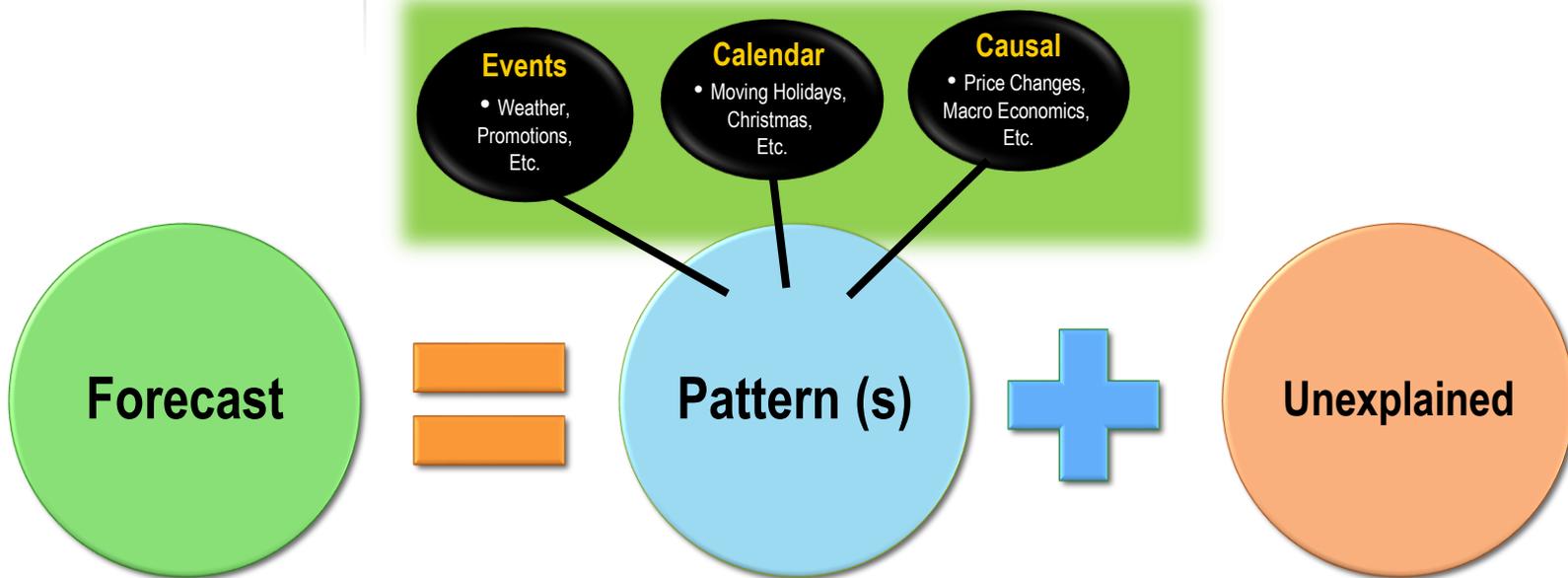


According to AMR Research this only accounts for approximately 50% of accuracy



WHY ADVANCED FORECASTING

★ This is the “game changer”



According to AMR Research this only accounts for approximately 50% of accuracy





- *SAS invests over 24% of its revenues to R&D (almost 2X our closest competitor) and is the clear leader in analytics as noted by Gartner. SAS has over 8000 forecasting licenses internationally, almost double our closest competitor in terms of clients and revenues derived from analytics.*
- *These unique analytical tools (forecasting, predictive, optimization) more accurately predict product/parts usage. Many analytical/forecasting capabilities are unique to SAS and have patents or patents pending.*



UNIQUE SAS CAPABILITIES

Feature

Problem

Value

Large Scale Automatic Forecasting and Model Generation Leveraging Events and Causal Variables

Unable to sense demand creating poor forecast accuracy due to inability to leverage causal and event data streams

Improved Forecast accuracy leveraging 'big data' including internal, operational, and external.

Forecast Calendar/Event Definitions and Modeling.

Treating demand spikes and anomalies as outliers skews the forecast and does not accurately explain operational or calendar events.

Ability to explain & model events such weather, OOS, plant shutdowns, calendar etc., creating more accurate predictions for future events.

Hierarchical Forecast Reconciliation

One model for entire forecast hierarchy creates inaccurate forecasts

Model development for each Forecasting Hierarchy with proportional reconciliation creates a more accurate forecast

Multi Tiered Causal Analysis

Inaccurate shipment forecasts due to the inability to integrate downstream forecasts such as POS, etc.

More accurate shipment forecast using the two step process of integrating downstream and upstream forecasts.

Planning/Forecast Value Added (FVA)

Limited support for "consensus" forecasting. Manual. Causes data management concerns.

Capture domain knowledge through Collaborative Planning using embedded workflow to capture and audit forecast input.

Scenario Analysis

Inability to sense, evaluate and 'shape' future demand' to seek goals.

Relevant causal, event variables can be modified in a 'sandbox' to determine predicted outcomes These scenarios can be compared and utilized in downstream inventory and planning systems

New Product Forecasting

Unable to accurately predict new product launch volumes.

Improved new product forecast accuracy using patent pending "Structured Judgment" process combining data mining, clustering and statistical forecasting with domain knowledge in a structured process

Single, dual and multi-echelon inventory optimization

Low customer service levels, high inventory costs, waste and working capital

Calculates optimized inventory and order quantities using multi-echelon inventory optimization for finished goods inventory distribution systems

The
Best
Forecasters
Gain...



15% Less Inventory

Reduce working capital and cost



17% Stronger Order
Fulfillment

Improve revenue and market share



35% shorter Cash-to-Cash
Cycle Times

Increase efficiency

Customer Driven Quality

Quality Imperative



**Voice of the
Process**



**Voice of the
Product**



**Voice of the
Customer**

• Voice of Quality

How do you
prepare for the
connected factory



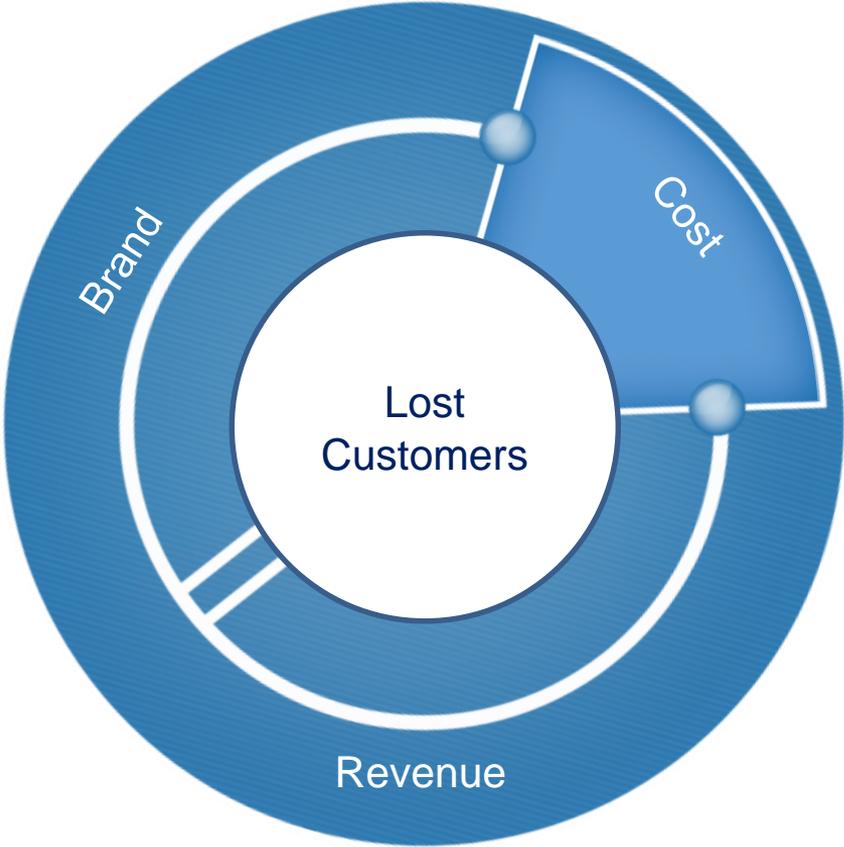


How do you identify hidden patterns that predict production failures, improving yield and product quality?

How can you avoid
unplanned
downtime?



QUALITY | **WHY**



THE CASE FOR QUALITY

COSTS OF POOR QUALITY

For Manufacturers, Success means creating a product that:

- Meets Market Needs
- Reliable
- Profitable



Costs for Poor Quality for an average company is ~20 percent of sales.



Business Goal

- Need to improve profitability by reducing scrap and yield.

Results

- Identified top 10 individual drivers of quality
- Pressure variation within the curing cavity turned out to be a major driver
- Understanding that variation alone improved yield from 91.6% to 94.5%.



Business Challenge

- Issue identification cycle time was lengthy
- Manually processed each text based service order.
- Multiple tools for root cause analysis

Results

- Automated text coding, reduced errors and freed up resources.
- 4-5 month reduction in issue resolution time.
- 14% reduction in Service Incident Rates during 1st year; 50% over 5 years
- No. 1 or 2 in JD Power – 5 years running
- GWSCA Award for Excellence in Warranty



Business Goal

- Downtimes caused by defect assets on its oil drilling platforms in the North Sea caused hundreds of thousands \$ in lost revenue
- Maintenance costs were far too high

Results

- Reduced unplanned shutdowns by 80%
- Increased production by 2-5%, Increased productivity by 20%, Reduced Operating Costs by 5-10%
- \$700 million operational savings within the first 4 years

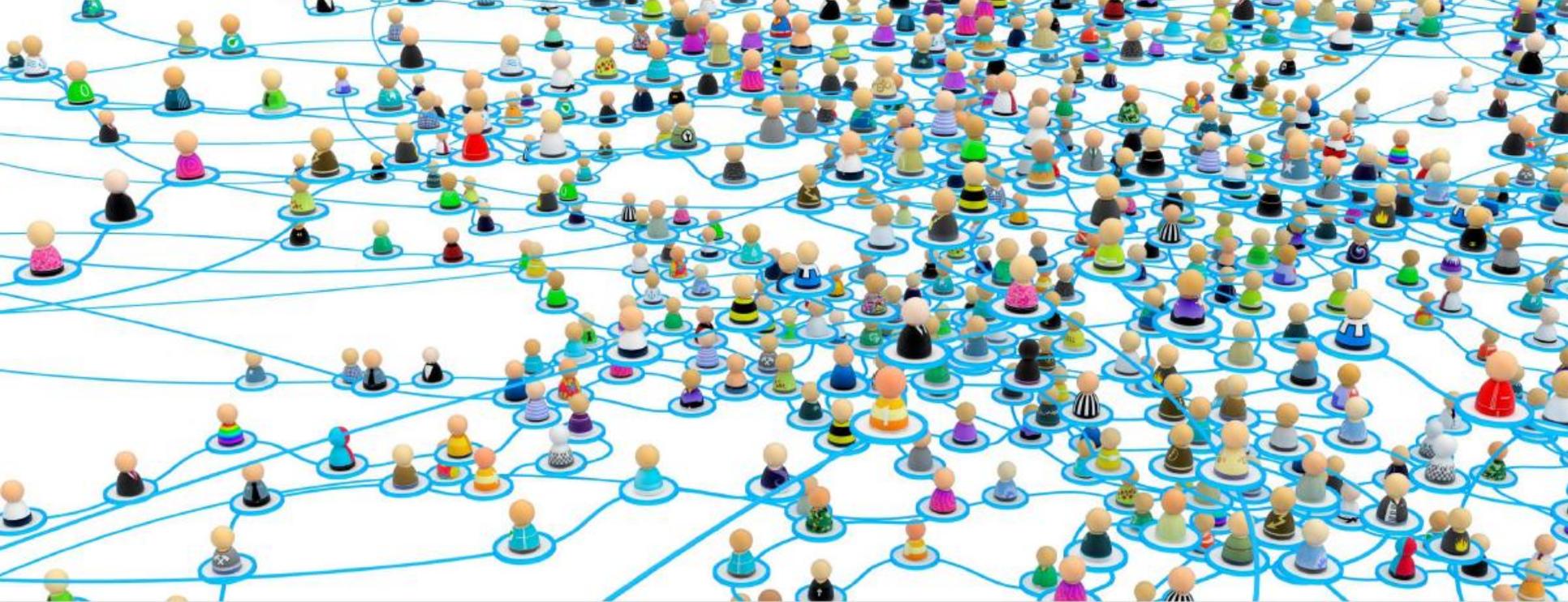


Business Challenge

- Enhance customer experience and maintain market leadership
- Synchronize and mine product reviews, call center free text, warranty claims, social media, manufacturing notes and other data to detect pervasive quality issues sooner.

Results

- 50-66% reduction in issue detection time
- 10-15% reduction in warranty cost from out of norm defects
- 30-50% reduction in calls for general information



Quality Is an Ecosystem





Data analytics enable speed, agility, nimbleness, innovation and flexibility – what every supply chain wants.

TRANSFORMATION JOURNEY TO A HIGHER MATURITY LEVEL

Applying analytics and getting control of data offers organizations a map, a compass, and binoculars to look down the road to see what's coming and work to understand it.





***"I never think of the future ...
... it comes soon enough."***

— Albert Einstein

***"The future depends on
what you do today."***

— Mahatma Gandhi



Thank You