

BusinessConnect and SolutionsConnect

It's time to make bold moves.

Predicting Success:

Driving improved business outcomes in
key business areas with advanced analytics

Colin Shearer

Global Executive, Advanced Analytic Solutions



Opportunities in the world of Big Data

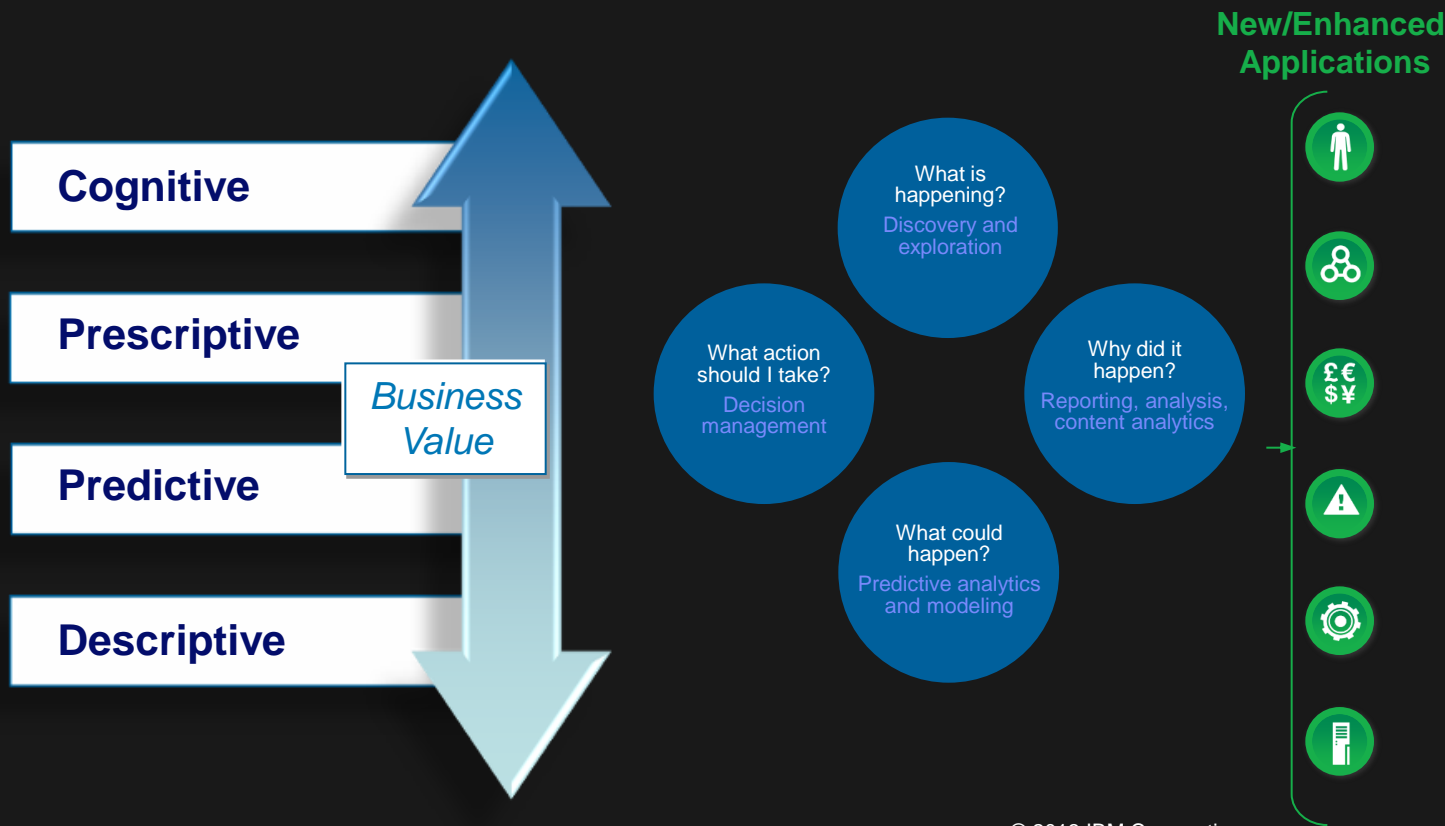
Infuse analytics into key business processes



Every Industry can Leverage Big Data and Analytics

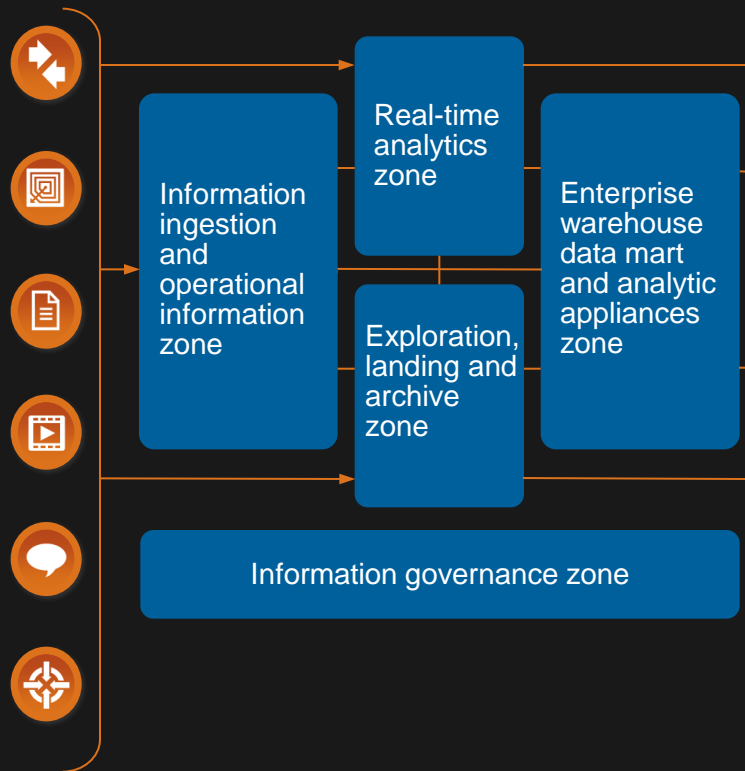
 <p>Banking</p> <ul style="list-style-type: none"> • Optimizing Offers and Cross-sell • Customer Service and Call Center Efficiency 	 <p>Insurance</p> <ul style="list-style-type: none"> • 360° View of Domain or Subject • Catastrophe Modeling • Fraud & Abuse 	 <p>Telco</p> <ul style="list-style-type: none"> • Pro-active Call Center • Network Analytics • Location Based Services 	 <p>Energy & Utilities</p> <ul style="list-style-type: none"> • Smart Meter Analytics • Distribution Load Forecast/Scheduling • Condition Based Maintenance 	 <p>Media & Entertainment</p> <ul style="list-style-type: none"> • Business process transformation • Audience & Marketing Optimization
 <p>Retail</p> <ul style="list-style-type: none"> • Actionable Customer Insight • Merchandise Optimization • Dynamic Pricing 	 <p>Travel & Transport</p> <ul style="list-style-type: none"> • Customer Analytics & Loyalty Marketing • Predictive Maintenance Analytics 	 <p>Consumer Products</p> <ul style="list-style-type: none"> • Shelf Availability • Promotional Spend Optimization • Merchandising Compliance 	 <p>Government</p> <ul style="list-style-type: none"> • Civilian Services • Defense & Intelligence • Tax & Treasury Services 	 <p>Healthcare</p> <ul style="list-style-type: none"> • Measure & Act on Population Health Outcomes • Engage Consumers in their Healthcare
 <p>Automotive</p> <ul style="list-style-type: none"> • Advanced Condition Monitoring • Data Warehouse Optimization 	 <p>Chemical & Petroleum</p> <ul style="list-style-type: none"> • Operational Surveillance, Analysis & Optimization • Data Warehouse Consolidation, Integration & Augmentation 	 <p>Aerospace & Defense</p> <ul style="list-style-type: none"> • Uniform Information Access Platform • Data Warehouse Optimization 	 <p>Electronics</p> <ul style="list-style-type: none"> • Customer/Channel Analytics • Advanced Condition Monitoring 	 <p>Life Sciences</p> <ul style="list-style-type: none"> • Increase visibility into drug safety and effectiveness

Realize It. The spectrum of Analytics is expanding



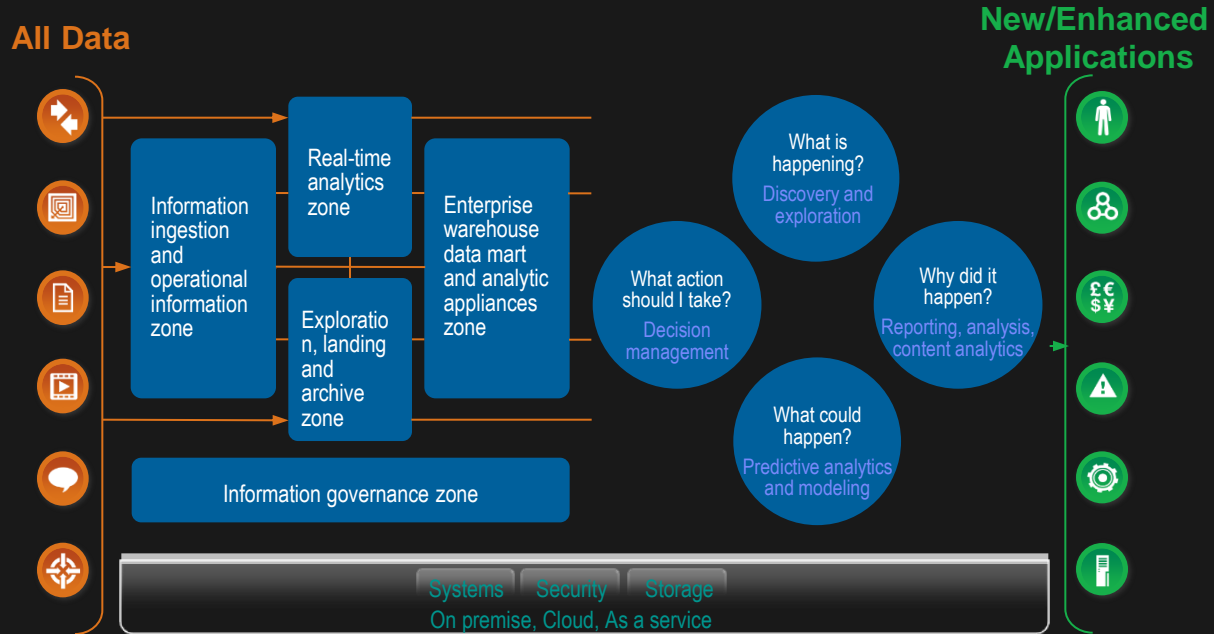
Realize It. A new architecture to leverage all Data has emerged

All Data



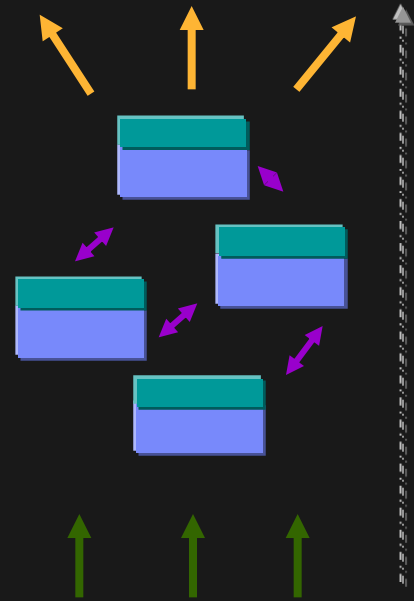
**Harness
All Data
& All
Paradigms**

Realize It. IBM Big Data & Analytics



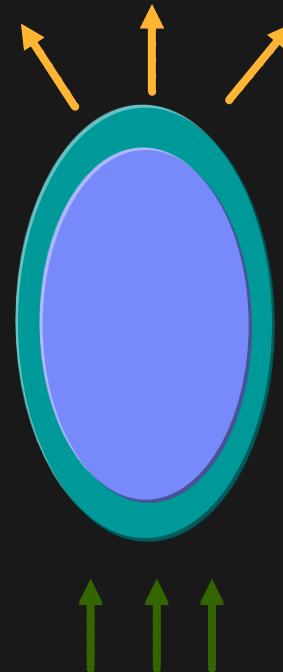
IBM Big Data & Analytics Infrastructure

Applying Analytics: Traditional approach



1. Get tools
2. Integrate
3. Connect to data
4. Apply to business problem
5. Deliver results
6. Automate

Applying Analytics: Solution approach

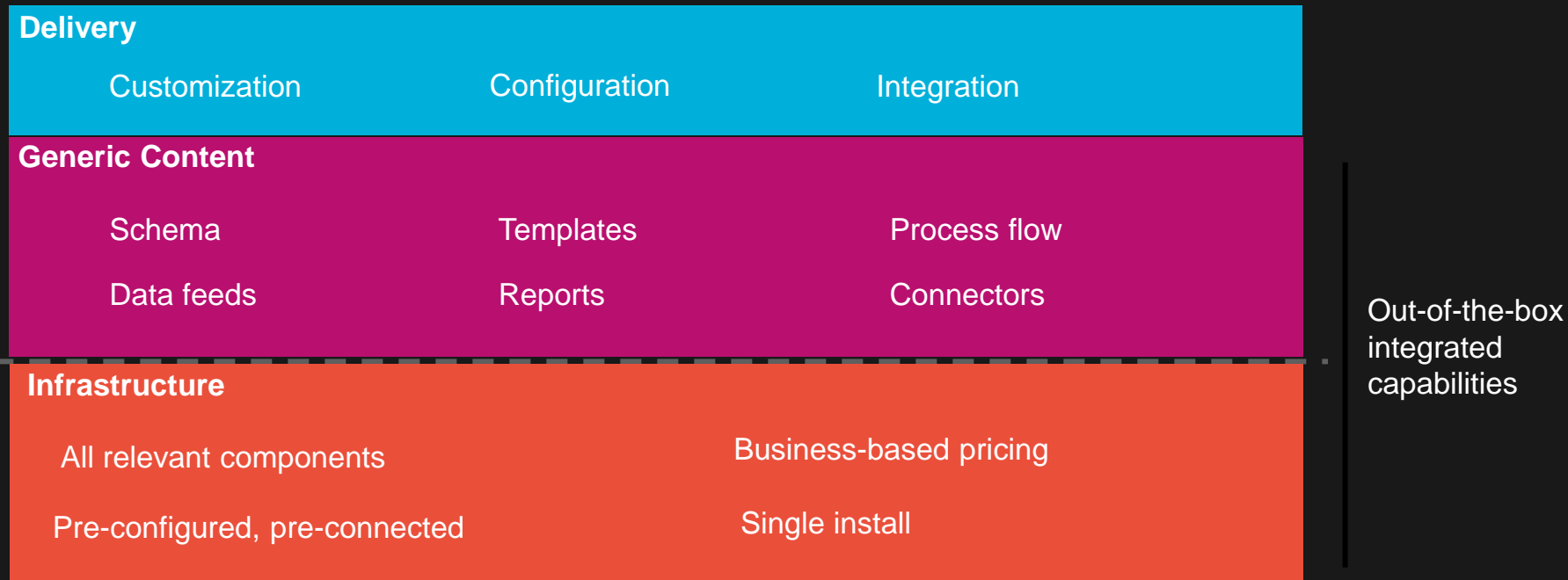


1. Acquire Solution
2. Configure for data
3. Tailor analytics
4. Connect to business processes

IBM Analytic Solutions

- Address key areas where we've seen frequent success with our technologies and tools
 - Able to leverage experience and expertise
- Repeatable
- Pre-configured
- Focus is on business problems/value
- Simple to acquire – single product
- Priced by business metrics

IBM Analytic Solutions



IBM Predictive Maintenance & Quality (PMQ)

IBM Advanced Analytics: A long history of predictive maintenance applications



Today, opportunities exist to dramatically improve the bottom line

Interconnected growth, lower data-capture cost



1 trillion, USD0.03

Number of sensors by 2015¹

Estimated price of average passive sensor by 2021, representing a 66 percent decrease in eight years²

Risk of asset failure



#1

Failure of critical assets was the top risk stated by executives as having the biggest impact on operations³

Focus on operational processes



99%

Percent of CIOs with mandates to transform the business who are looking to simplify key internal processes⁴

¹Making Markets:Smarter Planet. IBM Investor Briefing, 2012

²Big Data-Startups, "The Great Sensor-Era: Brontobytes Will Change Society," April 16, 2013.

³Aberdeen Group, *Asset Management: Using Analytics to Drive Predictive Maintenance*, March 19, 2013.

⁴IBM, *The Essential CIO: Insights from the Global Chief Information Officer Study*, May 2011.

Predictive maintenance drives significant tangible value for industrial companies in all industries

Prevent unplanned outages

- 5-7% forced outages due to unexpected failures of upstream petroleum production equipment @ 1 million barrels/ day production is \$1.8B annually
- Mechanical unavailability represents ~6% of oil refining capacity. 350 global refineries @ 250KBD with marginal production valued @\$1/b = \$1.9B/yr
- Haul Trucks (mining) value up to \$1.8 M / day
- For Giant Excavators (mining) value up to \$5 M / day
- For a 10million tons steel producer caster downtime up to \$7.3m / day
- In Semiconductor, 1% downtime across the 50 most critical tools in a fab plant is \$100m

Reduced Scrap & mfg Defects

- Semiconductor lot values can range from \$100K to >\$1M
- Reduced defects and scrap in automotive mfg

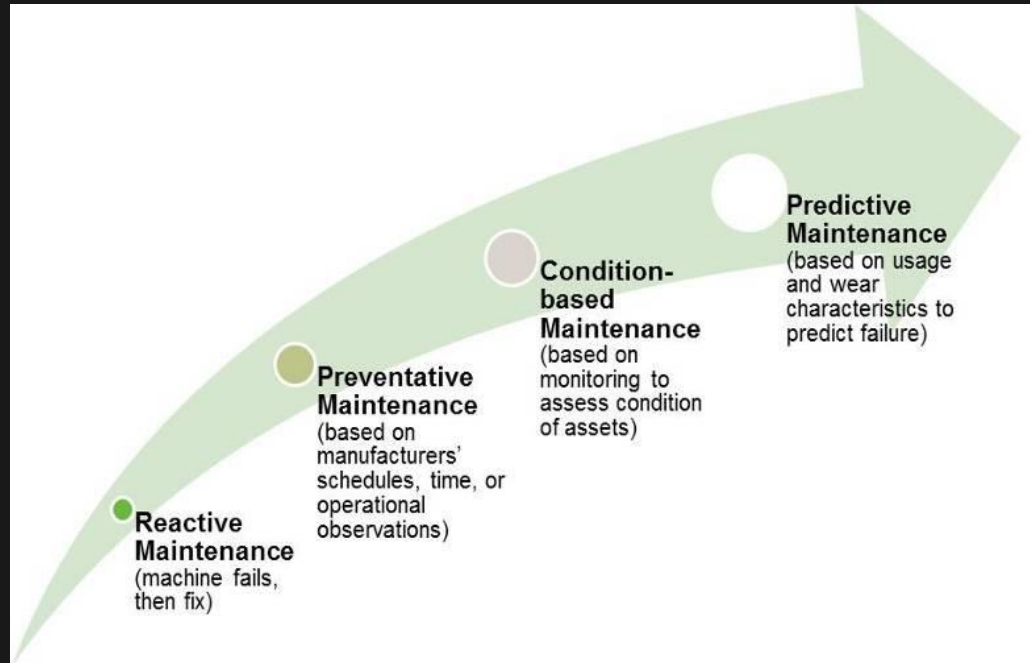
Reduced planned maintenance

- 13% of oil drilling time is spent waiting on maintenance activities @ avg. ~\$100k/d/rig that's \$4.7B.
- Maintenance represent 20% of cash opex for oil production license (PL) companies. For 10 largest NA PL co's. 5% improvement yields \$1.6B annually.
- Cost of maintenance (from time-based repair to actual equipment condition) can improve up to 15% in mining and metals
- Reduced short-interval maintenance drives savings of upwards of \$50-100m in parts and lost production time in Semiconductor.

Expanded revenue opportunities through new business in equipment servicing

- Aircraft and Engines; Mining , Farm, and Construction Equipment; Commercial Trucks and Automobiles
- Improved customer satisfaction

IBM Predictive Maintenance and Quality uses analysis to model foreseeable evolutions of the characteristics of individual assets



Source:
Gartner

SPC can't provide useful early detection of subtle problems



IBM Predictive Maintenance and Quality offers business value for organizations

BUSINESS USE CASES

Predict asset failure

- Assess failure based on usage and wear characteristics
- Use individual-component information, environmental information or both
- Help identify conditions that can lead to high failure

Improve part/component quality

- Help detect anomalies within processes
- Compare parts against a master
- Conduct in-depth, root-cause analysis

BUSINESS VALUE

Estimate and extend component life

Increase return on assets

Improve maintenance, inventory and resource schedules

Improve quality and reduce recalls

Reduce time to identify issues

Improve customer service

Israel Electric increases grid reliability

20% cost reduction

by avoiding the expensive process of reinitiating a power station after an outage

USD80,000 savings

on petrol combustion costs by avoiding the malfunction of a turbine component

Increased efficiency

of preventive maintenance schedules, costs and resources, resulting in fewer outages and higher customer satisfaction



Business problem: The company's research institute is charged with improving the safety and reliability of power generation and transmission while fueling innovation. That includes planning for disruptive events such as solar storms, making improvements in transmission efficiency, incorporating new sources of renewable energy into the grid and analyzing growing volumes of data from an increasingly smart grid.

Solution: This energy provider uses powerful predictive analysis to understand when and why outages occur so it can take steps to prevent them.



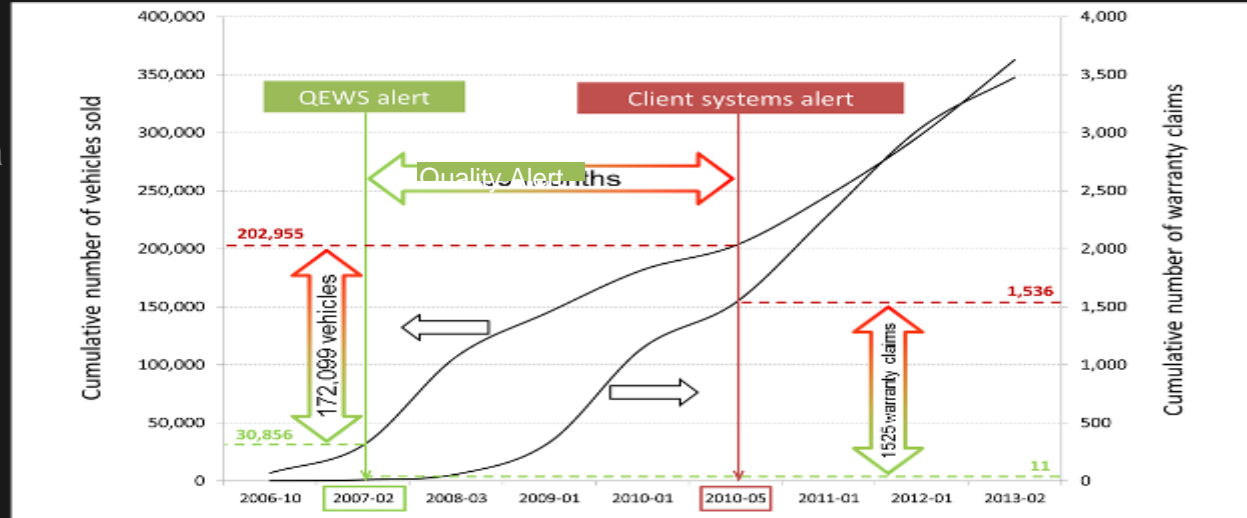
Predictive Quality: Analytics is used in the automobile powertrain production process to better understand and eliminate problems quickly.

Reduced defect rate by 50% in 16 weeks, Cylinder heads



Predicting quality issues

- Has anything changed enough to require action?
- The algorithm detected a problem in warranty claims data 39 months earlier than the clients' existing systems
- By the time the clients' systems detected a problem, an additional 172k vehicles had been sold and an additional 1.5k warranty claims had been made



Japanese Vehicle Manufacturer – Production line faults

- 164 out of 180 of the faults were predicted in advance** by PMQ model, 92 predicted > 2 hours in advance
- These faults accounted for **143 hours of down time** – (approx. 1.5 hour/fault)

Honda R&D Co., Ltd., uses predictive analytics to improve the performance and safety of its electric vehicle batteries

50% reduction

in carbon dioxide emissions by commercializing EV technology

Boosts confidence

and customer satisfaction with EVs by improving performance

Improves design

by analyzing massive amounts of operating data



Business challenge: Because all-electric vehicles (EVs) do not use gasoline as do traditional or hybrid cars, they rely entirely on their batteries for power. Honda R&D Co., Ltd., a division of Honda Motor Co., Ltd., wanted to better understand what factors had the greatest effect on battery performance and longevity.

The smarter solution: Honda R&D can now gather and analyze near-real-time battery data from Fit EVs on the road in Japan and the United States. Analysis can identify which operating factors, such as road conditions, charging patterns and trip length, have the greatest effect on battery life. Further analysis can help the automaker predict when batteries need to be replaced so it can alert owners in advance.

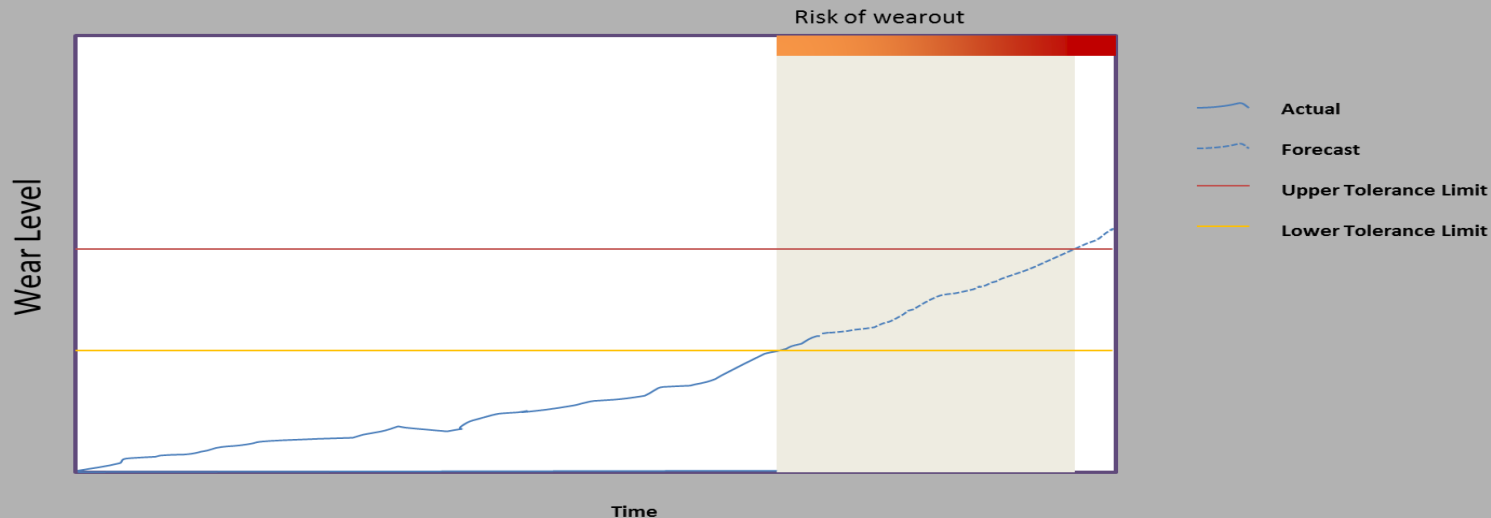
"Data gathered from the real-world operation of our vehicles is critical to predict the longevity of current batteries and greatly influences future product design."

—Senior chief engineer, Automobile R&D Center

Predicting asset failure

Airline Engine Manufacturer

- 95% Ability to **predict In-Flight shutdowns** within a year
- 97% Ability to **predict on-ground major incidents** within 12 weeks



Monitor wear levels by direct measurement or inference (e.g. vibration levels)

Understand wear rate and risk factors for wear

Forecast wear

Calculate probability of wearout using wear rate and tolerances

IBM Bromont: using sophisticated data-mining techniques to identify electronic faults without costly lab-work

97%

97% fault recognition for one specific operation potentially avoids hundreds of thousands of dollars in total costs.

150%

150% ROI expected from fault pattern recognition analytics.

160%

160% ROI expected from improving product quality by controlling humidity

Challenges

When quality control systems on the production line detect problems, does it just mean **that the specific items that failed the test are faulty, or could there be a problem with the whole batch?** Commissioning lab tests to answer this question can be time-consuming and expensive

Solution Approach:

IBM Bromont is using **analytics to identify fault patterns and predict outcomes** – saving inspection costs and getting production back online again much more quickly.

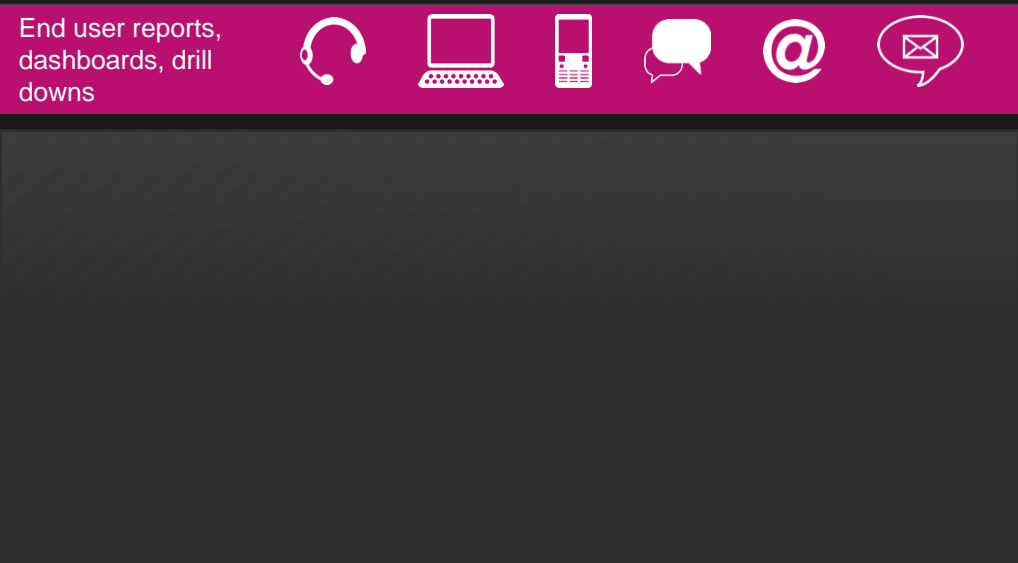
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Predictive Maintenance and Quality analyzes data from multiple sources and provides recommended actions, enabling informed decisions



A proven architecture is based on various data sources



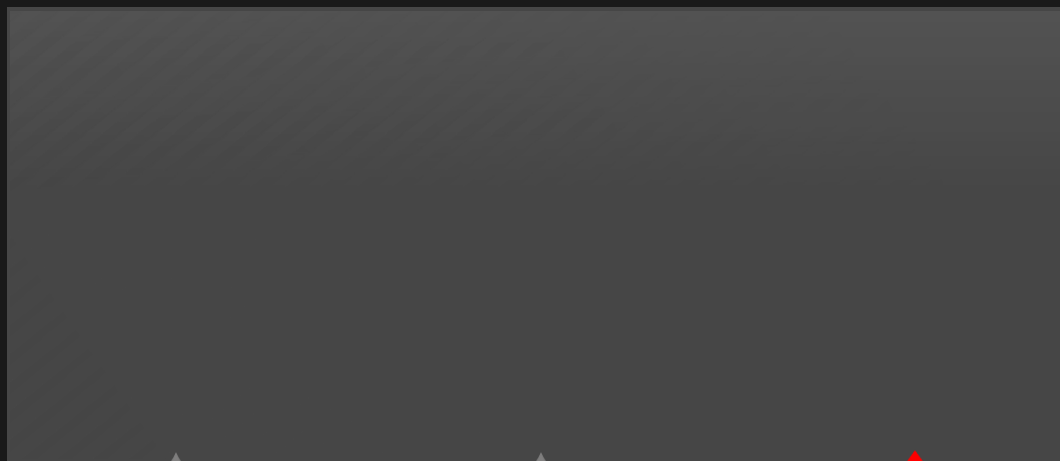
Telematics,
manufacturing
execution systems,
existing databases,
distributed control
systems

High-volume
streaming data

Enterprise asset
management
systems

With various outputs

End user reports,
dashboards, drill
downs



Telematics,
manufacturing
execution systems,
existing databases,
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High-volume
streaming data

Enterprise asset
management systems

Predictive Maintenance & Quality: from raw data to action

End user reports,
dashboards, drill
downs



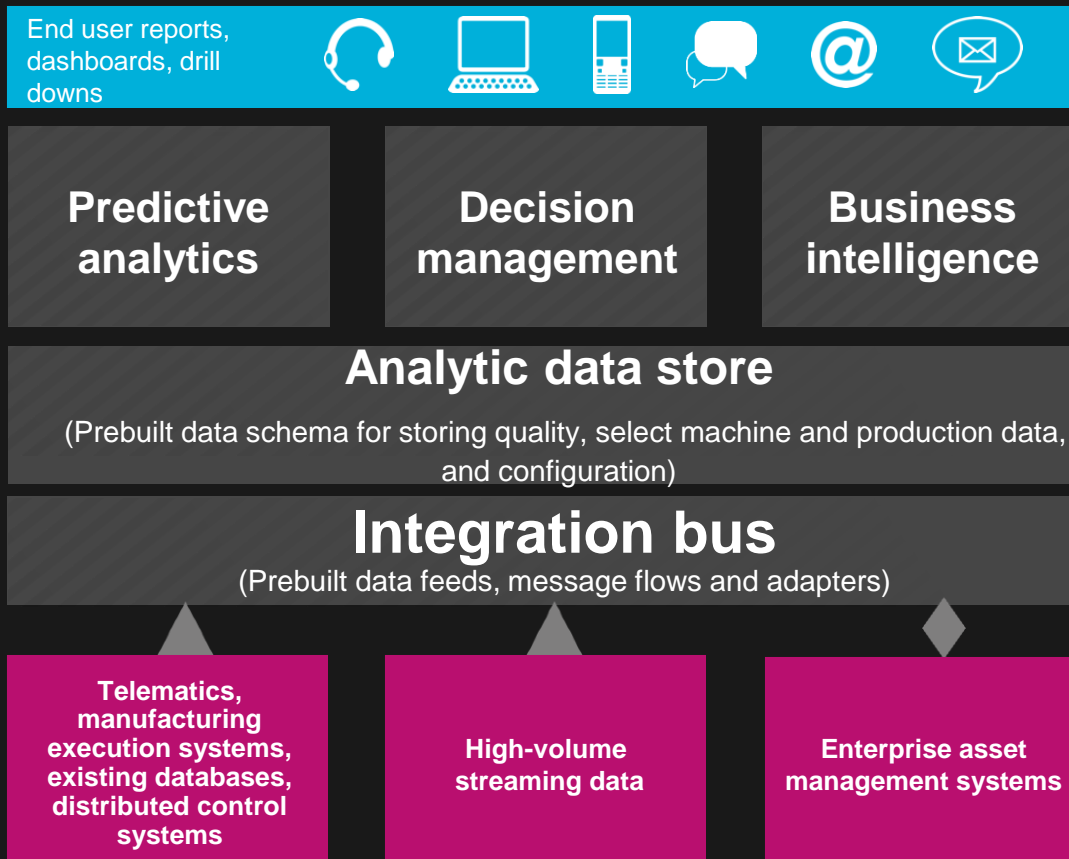
IBM Predictive Maintenance and Quality

Telematics,
manufacturing
execution systems,
existing databases,
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systems

High-volume
streaming data

Enterprise asset
management systems

With a proven architecture



End user reports, dashboards, drill downs



Predictive analytics

Decision management

Business intelligence

Analytic data store

(Prebuilt data schema for storing quality, select machine and production data, and configuration)

Integration bus

(Prebuilt data feeds, message flows and adapters)

Telematics, manufacturing execution systems, existing databases, distributed control systems

High-volume streaming data

Enterprise asset management systems

- Advanced analytics powered by IBM SPSS and Cognos software
- Data integration provided by IBM WebSphere® Message Broker and IBM InfoSphere® Master Data Management Collaborative Edition software, which feeds a prebuilt, data schema based on IBM DB2® software
- Process integration with automatic work-order generation from Maximo software
- Data models, message flows, reports, dashboards, business rules, adapters and key performance indicators

Predictive Maintenance and Quality converges enterprise asset management and analytics capabilities



- Asset maintenance history
- Condition monitoring and historical meter readings
- Inventory and purchasing transactions
- Labor, craft, skills, certifications and calendars
- Safety and regulatory requirements



- Better maintenance windows to reduce operating expense
- More efficient assignment of labor resources
- Enhanced capital forecasting plans
- Enhanced spare parts inventory
- Automated analytical techniques, including anomaly detection for assets and sensors
- Improved reliability and uptime of assets

Predictive Maintenance and Quality: key features



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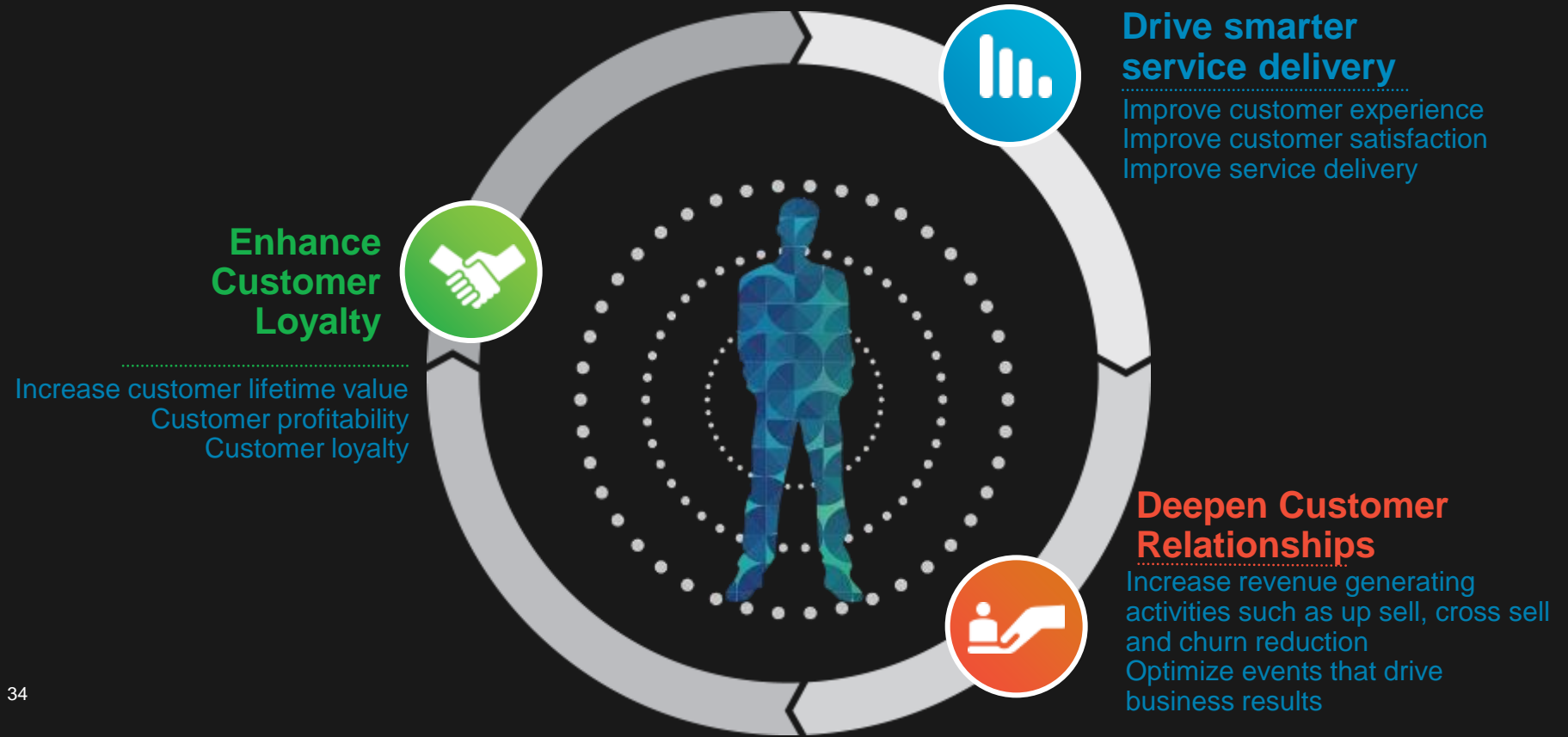


IBM Predictive Customer Intelligence (PCI)

80% of CEOs believe they deliver a superior customer experience

but only

80% of their customers agree



Organizations using predictive analytics see results

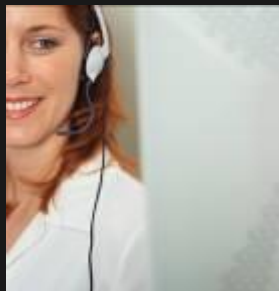


- Improved customer retention rate at over twice the rate of those that do not use predictive analytics and reported a 5.8% year-over-year growth in operating profit, compared with 3.7% for non-users.”¹
- Enjoyed a 75% higher click through rate and a 73% higher sales lift than companies that did not use predictive analytics”²

¹Maximizing Customer Lifetime Value with Predictive Analytics for Marketing (pg 1), Aberdeen, February 2013.

²Divide & Conquer: Using Predictive Analytics to Segment, Target & Optimize Marketing (pg. 1), Aberdeen, February 2012.

IBM Predictive Customer Intelligence in action



Telco

When a high-value, long-tenure customer calls in with a bill query within 6 months of the end of his contract, offer him a complimentary handset upgrade if he renews in advance

Customer repeatedly called tech support with mobile internet

issues comes to the website to check process to transfer her number. Initiate a chat, check problems are now resolved, refund two months data charges by way of apology, and offer discount on a new handset

IBM Predictive Customer Intelligence in action



Retail

- Customer is in high valued customer segment with a high CLV based history with store. Customer not buying latest products at VT Living for the last 12 months (decreasing CLV trend)
- VT Living notices customer spent a lot of time on VTLiving.com and mobile app browsing the hottest new products, but does not make purchase.
- Customer receives email regarding recent products with aggressive deals, including warranty, and where required, aggressive installation costs.
- The product affinity and existing products/services customer has from VT Living requires an outbound call with a unique offer to up-sell customer on a new buy-back program for 'tech mavens' such as himself

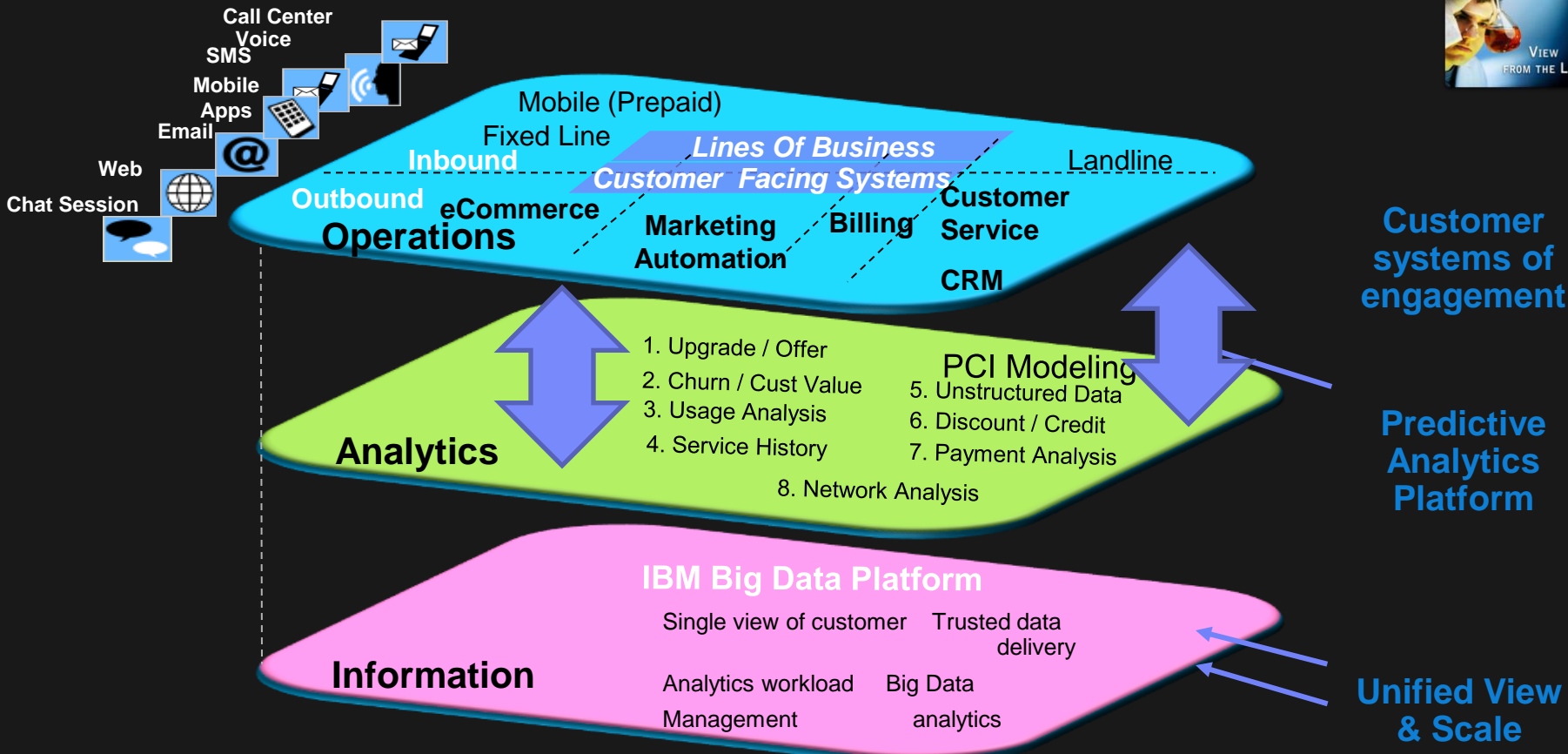
IBM Predictive Customer Intelligence in action



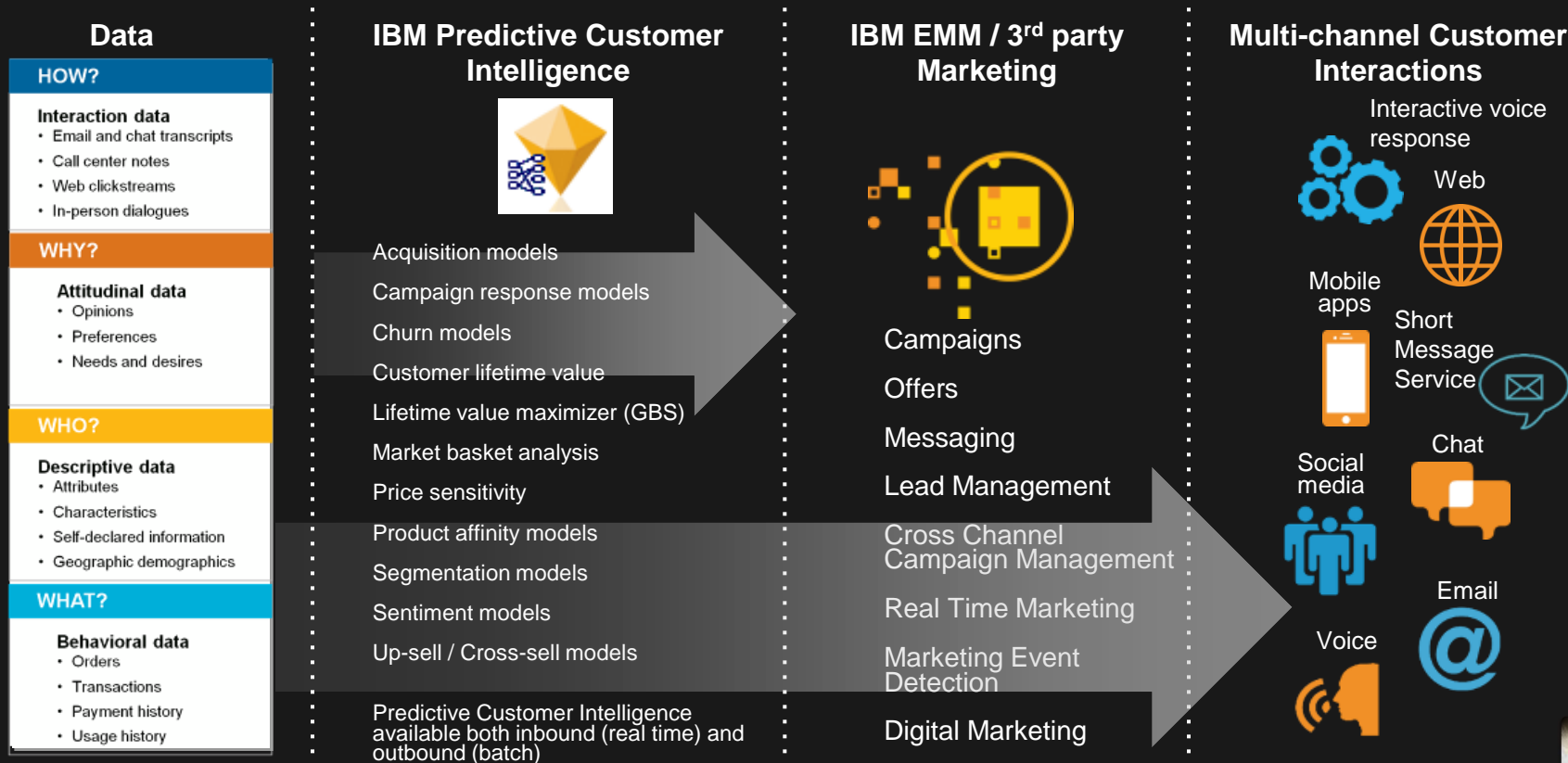
Banking

- Customer calls for password reminder on “self-trade” account. Pattern of usage shows limited activity and low returns; offer upgrade to managed investment offering
- Customer’s transactions show multiple trips to Asia; offer international emergency cover, and provide information on commission-free ATM withdrawals from our regional partner

PCI: Solution Architecture



PCI delivers intelligence to marketing and operational systems



Thank you

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