Analytics Across the Enterprise:
How IBM is Realizing Business Value from Big Data and Analytics

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Maureen Norton
Steven Bayline
Analytics Across the Enterprise –
How IBM Realizes Business Value from Big Data and Analytics

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Dr. Emily Plachy
“We believe that analytics is no longer an emerging field; today’s businesses will thrive only if they master the application of analytics to all forms of data. Whether your office is a scientific lab, a manufacturing company, a government agency, or a professional sports stadium, there is no industry left where an analytics-trained professional cannot make a positive impact.”

~ Brenda Dietrich, IBM Fellow and Vice President, Emerging Technologies, IBM Watson
## Analytics Across the Enterprise – Covers 31 real-world IBM case studies

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Several themes have emerged from our analytics projects

- Relationships inferred from data today may not be present in data collected tomorrow.
- You don’t have to understand analytics technology to derive value from it.
- Fast, cheap processors and cheap storage make analysis on big data possible.
- Doing things fast is almost always better than doing things perfectly.
- Using analytics leads to better auditability and accountability.
Nine levers: Capabilities that enable and enhance big data & analytics value creation

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<th>Drive</th>
<th>Amplify</th>
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<td>Source of Value</td>
<td>Culture</td>
<td>Sponsorship</td>
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<td>Actions and decisions that generate value</td>
<td>Availability and use of data and analytics</td>
<td>Executive support and involvement</td>
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<td>Measurement</td>
<td>Data</td>
<td>Funding</td>
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<tr>
<td>Evaluating impact on business outcomes</td>
<td>Data management practices</td>
<td>Financial rigor in analytics funding process</td>
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<tr>
<td>Platform</td>
<td>Trust</td>
<td>Expertise</td>
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<tr>
<td>Integrated capabilities delivered by hardware and software</td>
<td></td>
<td>Development and access to skills and capabilities</td>
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Source: “Analytics: A blueprint for value – Converting big data and analytics into results,” IBM Institute for Business Value © 2013 IBM
Human capital is leading cited source of sustained economic value in global study of CEOs.¹

**Definition from Gartner:**

Workforce analytics – an advanced set of data analysis tools and metrics for comprehensive workforce performance measurement and improvement.

**All aspects of workforce life cycle:** hiring, training and development, retention, assignment, and compensation and benefits.

¹Source: “Leading Through Connections – Insights from the Global Chief Executive Officer Study,” IBM Institute for Business Value © 2012 IBM
With analytics we can improve employee and business performance through fact-based decisions.
Employees who are engaged are more productive and easier to retain.

Systems of Record
- Structured: Relational
- Process-centric
- Traditional Business Analytics

Systems of Engagement
- Unstructured: Content, Networks
- People-centric
- New types of Analytics
Tailored analytics driven recommendations reduces attrition of high-value employees

$85M
Estimated net benefit through reduced attrition in IBM's growth market employee population

325% ROI
For 2012-2013 investment

Business problem: Employee attrition increases recruitment and training costs and decreases productivity while new employees ramp up. IBM needs a way to identify employees at-risk of leaving in order to optimally direct resources in an effort to retain them.

Solution: Use advanced predictive models to identify employees most at-risk of leaving and identify the characteristics that put them at risk. Align workforce policies to focus resources on high-value at-risk employees.

Solution components:
- IBM® SPSS Modeler
- IBM® Cognos BI

Leverage Cognos to provide HR leaders an aggregate view of which populations are at risk and what factors are increasing attrition rates. Provide managers risk levels of their respective employees along with employee-specific prescriptive recommendations to decrease probability of attrition.
Social Pulse facilitates the understanding employee feedback from social media to improve organizational performance.

Solution components:
- IBM Social Media Analytics SMA sentiment analysis engine
- Customized Lucene indexing technology
- D3-dojo and jQuery visualization libraries

Business problem:
- IBM has significant social media footprint.
- What are employees saying about our programs, policies and services?
- What is the sentiment of the content?

Solution:
- Privacy aware analytics and visualization solution.
- Combines internal and external *public* social media data with HR data to show topics, trends and sentiment.
- Supports search and data segmentation.
Creating a Smarter Workforce: Lessons learned

- Measure to gauge success.
- The accuracy of sentiment analysis has to be continuous refined according to human language nuances.
- The value is the actions taken, not the insight.
- Relationships inferred from data today may not be present in data collected tomorrow.
- Fast, cheap processors and cheap storage make analysis on big data possible.
- You don’t have to understand analytics technology to derive value from it.
- Doing things fast is better than doing things perfectly.
- It’s important to leverage the levers.
Analytics and customers are on the mind of many CIOs.¹

83% of CIOs said they had plans that include business intelligence and analytics to increase competitiveness; 95% of CIOs said they had plans to lead or support efforts to take advantage of analytics to drive better real-time decisions.¹

The IT organization has two roles with big data and analytics:
1. Consumer of big data and analytics in support of the IT function
2. Enabler of the transformation of an organization to leverage big data and analytics.

¹Source: “The Essential CIO: Insights from the Global Chief Information Officer Study,” IBM Institute for Business Value © 2011 IBM
Using analytics to predict when to modernize servers

Benefits

- Improved availability
- Identify “at risk” application environments

Solution:

PASIR has been deployed for over 20 clients globally.

Business problem: Deciding when to modernize the hardware and software of servers if often done manually based on experience or simple business rules, such as “upgrade every four years.” A solution that upgrades near, but before, the time of failure would lower cost and improve service.

Solution: Predictive Analytics for Server Incident Reduction (PASIR) was developed which combines server data (purpose, age, OS-level), utilization data (CPU, disk, memory) and incident records (type severity, duration). PASIR used text mining and multivariate statistical analysis to identify problem servers; forecasts expected improvements from range of up-grade scenarios.
The CIO is in a good position to enable the transformation of big data and analytics across an organization.

- Develop and deliver applications
- Develop an information agenda
- Provide a shared infrastructure
- Form business partnerships

Organization-wide big data and analytics
Developing organization-wide big data and analytics applications enables the transformation of an organization.

- **Faces**: Fast, friendly, forgiving people lookup application. Stores user context to provide good results fast.

- **Watson Sales Assistant**: Using cognitive computing technology, provide answers to questions that sellers have about more than 2,000 software and hardware products and thousands more service offerings. Uses context about the seller, the products and services, and the client to determine answers.
IBM started by having the business functions drive the information agenda.

In 2011 the CIO organization began inventorying IBM’s existing structured data sources.

IBM feeds five types of trusted data sources from approximately 200 Master Data Stores.
Enabling Analytics Through IT: Lessons Learned

- You don’t have to understand analytics technology to derive value from it.
- Fast, cheap processors and cheap storage make analysis on big data possible.
- It’s important to leverage the levers.
Analytics in Finance: Finding Hidden Value

2
Maureen Norton
What if your Finance didn't add up?

IBM knows what that's like.
In the early 1990s, IBM Finance was in disarray. The organization was decentralized and dependent on a maze of unique systems with inconsistent data elements. Even with twice as many finance employees as the competition, IBM Finance could only provide the most basic information needed to report on the business.
## The Transformation of IBM Finance

<table>
<thead>
<tr>
<th>Category</th>
<th>Then</th>
<th>Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance E/R</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Days to close the books</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Time spent on high-value activities</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Finance staff in Centers of Excellence</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Ledgers</td>
<td>60+</td>
<td>1</td>
</tr>
<tr>
<td>Chart(s) of Account</td>
<td>60+</td>
<td>1</td>
</tr>
</tbody>
</table>
The next evolution of IBM’s transformation – Smarter Enterprise

Business Analytics

- Manage risk
- Operational efficiency
- Business insight

- Spot and analyze trends and anomalies
- Predict potential threats and opportunities
- Compare “what-if” scenarios
- Assess and manage risk
- Turn insight into action, optimizing results
- Plan, budget and forecast resources
- Align strategic and operational decisions
- Understand customer sentiment and behavior
- Measure and monitor behavior
- Assemble and interact with relevant information
This requires new skills, new knowledge and new decision making

**Know your customers**
Providing the business a universal view of each customer to help grow our customer base, provide an excellent personalized experience, & increase customer satisfaction.

**Manage financial performance**
Transforming our financial processes to gain more visibility, insight and control over performance throughout the organization faster.

**Manage Risk**
Gain a holistic view of risk, fraud and compliance information across the organization.

**Operational Efficiency**
Providing the insight needed to anticipate and respond to changes, better align operations with demand, and take advantage of emerging opportunities.
The Finance Leadership Advocacy Group (FLAG)

**FLAG MISSION**

- Lead the adoption of Analytics across Finance
- Drive culture change - educate & drive awareness of the power of Analytics
- Set the agenda & prioritize investments on Analytics (ACE: Analytics Center of Excellence Framework – Strategy/Value, People/Process & Technology)
- Ensure optimal leverage of resources, tools and strategy in satisfying financial systems requirements for our Global Finance customers
- Analyze and manage portfolio, drive common systems and standards, optimize time to value, leverage reuse
Smarter Facts:

- Increased visibility across geos & brands allow cost control
- Reduced cube load times by 80%
- Reduced calculation times - 45 minutes to near real time
- Common set of skills required to use and maintain

Analytics Approach:

- IBM Cognos TM1

BENEFITS

- Increased visibility across geographies and brands allowed for cost control optimizations
  - Common processes increase career options of financial analysts across IBM
  - Single application to support common set of skills required to use and maintain
  - Reduced cube load times by 80%
  - Reduced calculation times from 45 minutes to near real time
  - Lower third party licensing costs

CHALLENGE

- Different geographies and brands used their own data sources and processes supporting expense management
- No standards meant systems were not tied to key CHQ management system (WWIE)
- Delays in accessing information due to long load times of Cubes

SOLUTION

- Implemented consistent data and metadata standards
  Developed a flexible / modern SOA architecture allowing for easy expansion across geographies
  - Single worldwide application for Spend Analytics and tracking on one TM1 Cube across all geographies with 3,000+ current users, 500+ concurrent active system users
Accelerated External Reporting Solution (AERS)

Smarter Facts:
• Automates existing process and provides end to end external reporting solutions and reduces errors
• Improved linages between Stat and Tax

Challenge:
• After source systems are ‘closed’, production of external reports is operationally inefficient. External reports include:
  • Financial Statements – (both public filings and statutory reports) includes preparation of disclosures
  • Other external reports – tax, regulatory, etc.

Analytics Approach:
• IBM Cognos TM1 and Disclosure Management

Solution:
Accelerating External Reporting ("AER") provides efficient, sustainable and technology-enabled processes to optimize external reporting and overcome operational inefficiencies
• AER automates existing processes, providing end to end external reporting solutions
• AER Solution integrates the strength of TM1 and CDM

Benefits:
• Replace manual efforts with automated solutions
• Provide consolidation functionality
• Automate IFRS based on US GAAP data (starting point)
• Use consistent reporting and disclosure – one version
• Improved linkage between Stat and Tax
• More robust audit trail
• More efficient use of internal resources
• Provide business intelligence and increased Analytics Quotient
• Increased control posture

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IBM Country Financial Risk Scorecard

**Analytics Approach:**
- IBM Cognos Business Intelligence
- IBM SPSS Predictive Analytics
- IBM DB2

**Smarter Facts:**
- Near Real-time Integrated Risk Management
- Automated information integration/financial risk monitoring
- KRI – Business insights into risk exposures
- Risk-based predictive analytics

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**CHALLENGE**
- Vast amounts, but fragmented data provides little opportunity for consistent analysis and proactive identification of financial country risks
- Lack of automated solution requires manual aggregation and analysis
- Limited visibility to external risk creates a blind spot to emerging risks

**SOLUTION**
- Created Scorecard that automated information integration and financial risk monitoring KRI
  - Enables business insights into risk exposures using over 100 external and internal inputs
  - Dashboard with risk-based predictive analytics for over 160 countries in which IBM operates

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**BENEFITS**
- Enable agile decision making to seize opportunities and mitigate impact of unfavorable risk events.
- Centralized, consistent, and automated approach to measure and monitor financial risks
- Empowering chief financial officers (CFOs) to be value integrators
- Increase productivity of finance leaders across the enterprise, encourage broader global collaboration, and elevate skill levels.
- Reduce time to gather and analyze data from weeks to hours
80+ Acquisitions
benefited from headlights into execution risks to affect both deal pricing and integration plan

End-to-End Risk Management across the acquisition portfolio
Streamlined tracking and reporting to identify systemic risk and address challenges

Solution components:
- IBM® SPSS Modeler, Statistics
- IBM® Cognos BI
- IBM® WebSphere

Business problem: Acquisitions ‘synergies’ are challenging to quantify and realize. Systemic and contextual risks can significantly alter performance & financial expectations.

Generally, corporate development business cases and executed contracts don’t capture the majority of operational risks such as employee retention, system integration, sales execution & pipeline management.

Solution: Used rich acquisition data (structured and unstructured) and advanced analytics models to create tailored risk profiles for each contemplated deal and properly address throughout the acquisition lifecycle. Affects pricing discussions, terms and condition, and post acquisition resource deployment and management focus.

Note: Similar solution could potentially be applied to Vendor selection assessment and or ongoing reviews of risk exposure
Optimizing the Supply Chain with Analytics

3
Steven Bayline
The ISC is undergoing an analytics led, technology-enabled supply chain transformation.

**Globally Integrated Enterprise**
- Enterprise efficiencies
- Streamlined Global processes
- Information sharing

**Smarter Supply Chain**
- Advanced Analytics, Optimization, Big Data Management
- Supply Chain Transparancy
- Multi-enterprise supply chain transformation

**New Era Supply Chain Reinvention**
- Watson Enabled analytics
- Individual Enterprise
- Agile / Resilient
- Radical Transparency
- Data Driven /Digitally Executed

Evolving Supply Chain Management from cost center to value center...

- **Business Impact**
  - 2013 Cash Collected : $99B
  - 2013 Managed Client Spend : $20B
  - >20K Employees in 70 countries
  - >$7B in procurement saving annually
  - 18K+ suppliers connected online
  - >96% of invoices are electronic
  - 32 Smarter Analytics projects
  - Over 3.9M visits to eTools
IBM supply chain is broader than the traditional SCOR model
We have built over 30 value-adding supply chain analytics solutions

Supply Chain Business Process Framework

Quote to Cash

1. Request for Quote
2. Manage Opportunity
3. Design Solution
4. Develop Proposal
5. Develop Contract
6. Manage Contract
7. Manage Order
8. Plan Demand Supply
9. Manufacture
10. Deliver
11. Invoice & Accounts Receivable
12. Post Sales Support

Source to Pay

13. Source
14. Manage Suppliers Commodities
15. Manage Execution
16. Procurement Engineering
17. Manufacture Engineering
18. Governance & Risk

IBM Price Analysis Tool
Proposal Professor
Shipped but uninstalled
Transaction Center Optimization
Global client dashboard
AR Optimization (NBA)
AR Optimization (DM7)
IBM Buy Analysis Tool
Forecast Accuracy Initiative
New Product Planning
Supply Capability Engine

Critical Parts Mgmt Tool
Smarter Demand Shaping
Inventory Optimization
Transparent Supply Chain
Quality Quasar
Fuel Sur-charge Hedge
Global Logistics L&D
Client Value Assessment Tool
Supply Risk Management Tool
Advanced Airline Analytics
Catalog Data Optimization

Pipeline Yield Assessment
Quality Early Warning System
Asset Re-utilization
Assignment Analytics
Environmental reporting tool
Global Logistics Carbon Mgmt
Green Sigma
Proposal Text Analytics
Risk Rover
CSP Propensity to Buy

Key
 Implemented or extending
 Development
Get in touch with reality, a single source of the truth, visibility

Predictive
Understand the most likely future scenario, and its business implications

Prescriptive
Collaborate for maximum business value, informed by advanced analytics

Cognitive
Highly automated optimization solutions that get smarter over time

Where is next step-change in Optimization?

What should we do about it?

What will happen?

What happened?

Descriptive
Get in touch with reality, a single source of the truth, visibility

Variety (many forms of data)

Veracity (data in doubt)

Volume (data at rest)

Velocity (data in motion)

Big Data = All Data

ISC Analytics +

ISC Analytics

© 20
We harness advanced analytics to generate sustained value for IBM and our clients

**Supply Chain Case Studies**

- Quality Early Warning System
  - Predictive quality management
  - Cost savings, brand protection
  - Embed analytics in the process

- IBM Buy Analysis Tool
  - Collaboration platform with analytics
  - Right product, right place
  - Predictive and prescriptive analytics

- Accounts Receivable Optimization
  - Recommend Next Best Action
  - Extend knowledge of collectors
  - Multiple solutions based on data maturity

- Social Listening
  - Use of unstructured data
  - Risk Mitigation
  - Social analytics

**Early Detection**

- Reduce Inventory

**Improve Productivity**

**Deeper Insight**
QEWS identifies trends before traditional Statistical Process Control

The Solution
Software system using proprietary IBM technology to **detect & prioritize quality problems** earlier with fewer false alarms, coupled with push alert functionality for IBM & suppliers to **proactively detect & manage quality issues at any stage of the lifecycle**

Key Benefits
- **Cost savings** – $50M (2015 IBM Financial Roadmap period), approximately $10M per year hard warranty savings, additional soft savings and benefits in other areas
- **Proactive quality mgt** – identify & resolve issues before they become problems, weeks or even months earlier than traditional SPC. Improved quality mgt processes overall
- **Improved brand value** – preserves customer satisfaction through maintenance of high quality standards, protects high-stakes product launches, protects brand image

Industry Recognition
- Recognized by the Publication ‘Information Week’ as leading innovator for 2012 in the Electronics Industry

Commercialization
- QEWS in Predictive Quality & Maintenance (PMQ) SWG product, client engagement underway
QEWS demonstration results: earlier detection

This chart shows SPC analysis results for a set of yield data. SPC alerts when a point falls outside the control limits (at the extreme right-hand side of the chart.)

This chart shows PMQ/QEWS analysis results for the same set of data as above. The x-axis is aligned in time to the chart above. PMQ/QEWS alerts when the cumulative evidence crosses above the horizontal threshold line (in black.)

In this case, PMQ/QEWS alerted 8 weeks earlier than SPC.
■ **Quality problems are identified more effectively:**
  - earlier
  - more definitively
  - visibly

■ **Engineering productivity is higher:**
  - much less time is spent determining where the problems are
  - more time is spent working proactively on issues which could become problems
  - all engineers are empowered with expert-level analytical judgment

■ **Brand image and brand value are protected**, despite cost pressures, manpower constraints, and dependencies on suppliers
IBM struggled to manage its channel demand planning and inventory planning to control channel stock-outs and overages.

**Case Background: IBM Systems and Technology Group**

- **Manufacturing**
  - Industrial OEM
  - Contract Manufacturer

- **Channels**
  - Tier 1 Distribution
  - Tier 2 Distribution
  - Value Added Reseller (VAR)

- **End Customers**
  - Sales out

**Challenges**

- Lack of channel demand visibility
- Not optimized channel inventory

Lack of visibility to demand factors and sales-out by partners inhibited IBM from making accurate buy recommendations to the channels.

IBM inventory was not optimized in the channel leading to overages (with price protection exposure) and underages (with lost sales and customer service issues).
IBM Buy Analysis Tool (IBAT) is a visibility and analytical platform to enable better channel management

The Solution
Channel collaboration solution with advanced analytical modeling of daily demand signals to supply pipeline. Optimized replenishment decisions under price protection constraints.

Key Benefits (accrue to both IBM & channel)
- Price protection expense reduce by 80%
- Inventory reduced by 30%, aged inventory by 25%
- Returns reduced by over 50%
- Serviceability increase by 10%
- Significant enhancement of visibility to channel inventory, sales, other metrics → optimization opportunity

Scope of IBAT
- Predictive analytics
- Collaboration platform & data model
- Channel collaboration & support processes
- Incentive alignment

iBAT enabled System X recognized by multiple awards
- Tech Data 2010 Inventory Optimization Partner of the year
- CRN Channel Champion award
- IBM Research “Outstanding Accomplishment” 2011
Accounts Receivable Collection Optimization uses advanced analytics to optimize collection of revenues

**The Solution**
Uses advanced analytics on historical payment data to develop customer segmentation model and predict client responses to various A/R treatments. Then uses optimization logic and business rules to recommend Next Best Action to resolve outstanding invoices. Supports processes that are rich in transactional data including history of actions/results and processes where only historical transactional data exists.

**Key Benefits**
- **Improves team productivity & efficiency** by making better utilization of A/R resources
- **Improves cash collection performance** (timing & amount) without increasing resources
- Application of targeted collection methods in a **globally consistent** manner
- **Provides detailed data** about our customers’ purchasing and payment behavior

**Leverages leading Analytics**
- Applies **Next Best Action** advanced analytics methodology
- Leverages leading SWG products: **SPSS** (data analysis), **DM7** (rules engine)
Analytics & business process combine to optimize collection of revenues

- **Unique Characteristics of A/R Optimization solution**
  - **Adaptive**: automatic discovery of segments/stages (via analytics), application of business rules during optimization, recommendation of next best actions
  - **Optimal**: advanced analytics produce prescriptive guidance on next best action for optimal cash collection
  - **Flexible**: Advanced version of tool applicable where there is historical payment and action date, light version of solution available for growth markets. Can adjust constraints and business rules during deployment
  - **Visualization**: solutions leverages advanced visualization technologies to manage complex data (esp around segmentation and recommended actions)
  - **Continuous model improvement**: continual monitoring of results used to improve models
Supply Chain Social Listening Project

Business Value:
• Global events and supplier issues are creating increased risk to global supply chains
• Social media has become an omnipresent, real time event information source.
• IBM Integrated Supply Chain saw value in using social media to provide headlights and better understand events in real time.

Solution:
• The project pairs human listening with the IBM Social Media Analytics (SMA) tool.
• The SMA Tool is an advanced analytics solution for discovering business intelligence from a massive amount of online sources.
• By combining IBM tools and existing business intelligence, the team transformed “Big Data” into targeted information.
Social Listening – Key Findings

“Social Listening provides value and increased value and additional opportunity expected through continued use.”

- **Flexibility**: Flexibility to change/adjust search on-demand, and quickly search for time sensitive topics. Turn around time approximately a few hours in urgent situations. The timeliness of information is very valuable asset.

- **Sentiment Analysis**: understand the tone of large volumes of social media content in a very crowded space. Use it as additional filtering mechanisms and thus improve efficiency.

- **Targeted Search**: Iterative query building and keyword analysis enables to conduct targeted search and capture maximum buzz while keeping the irrelevant results out

- **Data Analytics**: translate large volumes of posts into different sets of metrics by which we can measure and evaluate trends, anomalies, and unusual correlations, and use this information to make business decisions.

Provides supplemental information and has been integrated into current MI process. Collaboration of Sharing Social Listening Intelligence with the greater ISC Community

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How to establish momentum & success with analytics

- Start with a **business pain point**
- Have a **visualization** and **user interface strategy**
- As critical as the math and **analytics expertise** are, **transformation leadership** and **execution/operations expertise** is even more important (**3-in-the-box management system**)

- It is OK to start small and build towards major impact
- **Iterative approach** allows you to improve your capabilities along the way and build progressively stronger stakeholder support
- Incorporate **cycles of learning** into the analytics solution

- Design **Compelling business benefits** for each supply chain participant (win/win/win)
- Reflect benefits in **terms and conditions**
- Encourage utilization with **PBCs**
IBM supply chain network – Future vision

- Attain Supply Chain Transparency
- Leverage Big Data & Advanced Analytics
- Extend Multi-enterprise Supply Chain Transformation End-to-End
- Mega trends in Computing
- Critical Future SC Capability
Questions & answers… and thank you