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Relevance of Big Data – Business Analytics for Reporting and Controlling

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Karlsruhe Service Research Institute
www.ksri.kit.edu

Agenda

Today‘s CFOs and their teams face various challenges

Changing Environment

- Market volatility
- Globalization and demographic shifts
- Social networks, mobile usage
- Big data

New Technologies

- New capabilities of hard- and software products support big data, drive speed, and allow real business and financial insights
- Business Analytics Tools

Analytics meets Finance

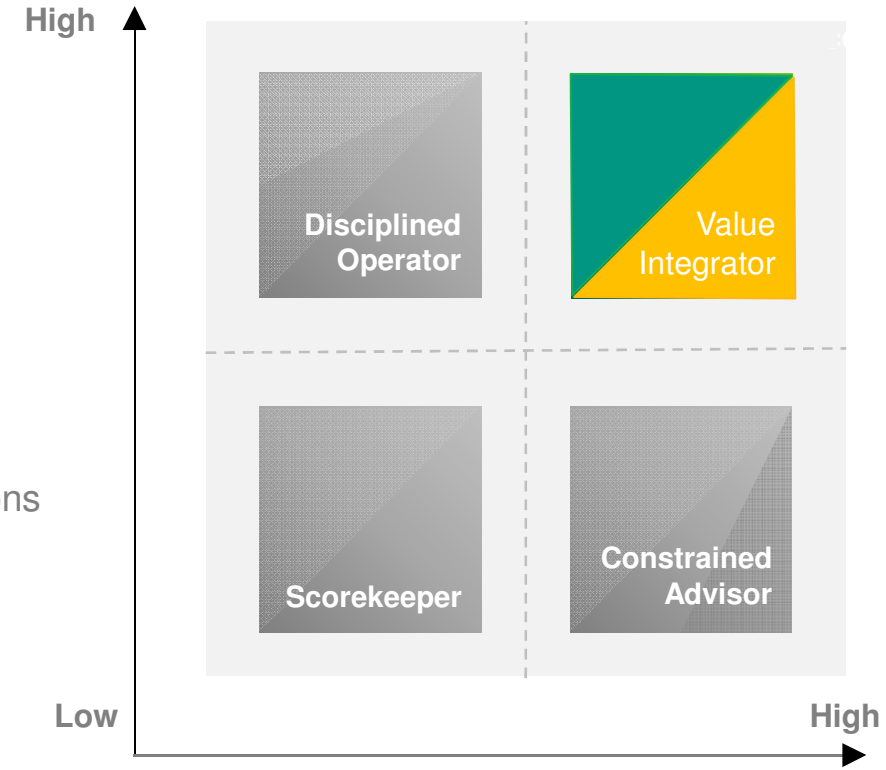
Evolving CFO Role

- Act as trusted business advisor and leverage skills and capabilities globally
- Drive enterprise agility and integration and faster decision making
- Anticipate the future
- Lead business model innovation

Leading finance organizations drive both efficiency and insight

Finance Efficiency

- Enterprise-wide information standards
- Standard financial chart of accounts
- Common finance data definitions and data governance
- Standard/common finance processes



Business Insight

- Operational planning /forecasting capability
- Finance talent development
- Common planning platform

Source: IBM CFO-CIO Leadership Exchange Survey, May 2013

Agenda

1 Challenges for Finance Organizations

2 Analytics and the „Big Data Hype“

3 Analytics Applications in Finance and Controlling

4 What‘s next ?

While Analytics has been around for decades, it is now getting a completely new spin

(Business) Analytics - Phases

Analytics =
the use of data and data analysis to drive business decisions

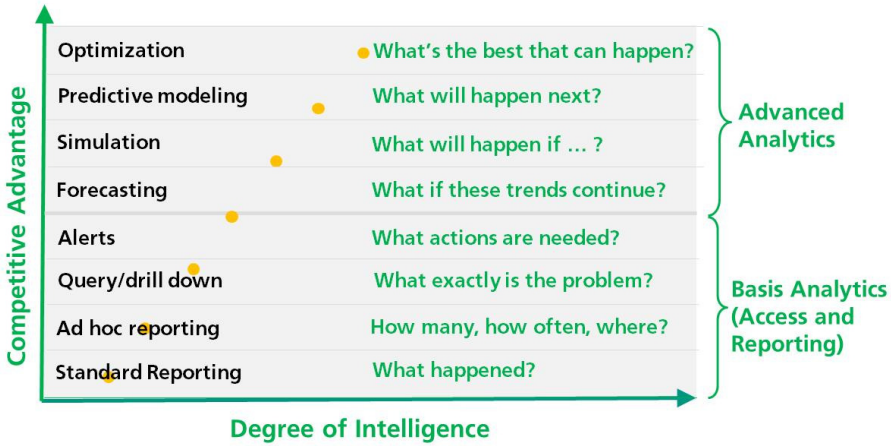
Analytics 1.0 - Traditional business intelligence

Analytics 2.0 - Big data

Analytics 3.0 - Data-enhanced customer offerings

Based on: Davenport (2013), HBR, 12, p. 64-73

(Business) Analytics - Methods

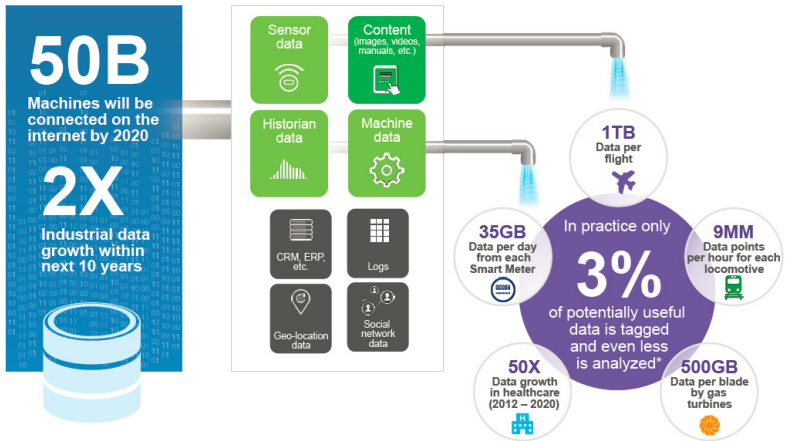


Based on: Davenport/Harris (2007), Competing on Analytics

Current Drivers

1. Availability of "Big Data" ← Sensors, social media
2. Availability of support and enablement ← Methods and software tools
3. Availability of capabilities ← "Data science" education
4. Availability of complementary technologies ← Cloud, mobile, social computing
5. Focus on organization-spanning views ← Service systems

“Industrie 4.0“ and Big Data pose challenges and open up opportunities for finance/controlling



Source: GE (2014)

“Industrie 4.0”

Big Data

contribute to

New Insights

enable

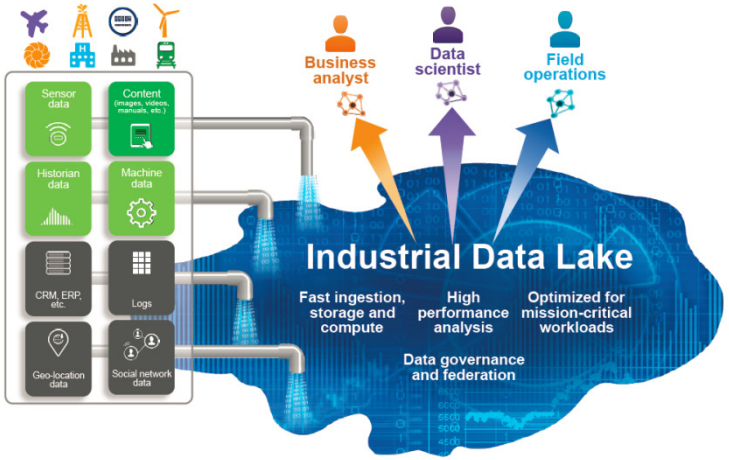
Offerings / Business Models

pose new **challenges** and require transformation

provide **opportunities** for finance transformation

Finance / Controlling

Observation 1: Exploitation of Big Data will occur at different levels ...



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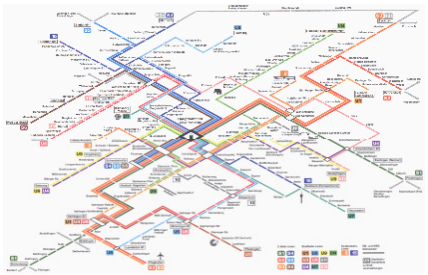
Centralized (central data model and intelligence)



Autonomous (decentralized intelligence)

Source: GE (2014), Lenze SE (2015); viastore (2014)

Observation 2: Big data will be monetized via smart services and new business models

Source: Kagermann et al. (2015) :"Smart Service Welt – Final Report"

„Once they have left the factory, **smart products are connected via the internet.** They exchange ever-larger volumes of data during use. It could be argued that these mountains of data (big data) actually constitute the most important raw material of the 21st century. The big data is analysed, interpreted, correlated and supplemented in order to **refine it into smart data**. This smart data can then be used to control, maintain and enhance smart products and services. Smart data can generate knowledge that forms the basis of new business models. In other words, big data is refined into smart data, which is then **monetised through new, individually combinable smart services**" (p. 4).

BigDieMo

Business Models 4.0 -

Developement of a systematic toolbox in order to design Big Data services

Source: http://bigdiemo.ksri.kit.edu/?page_id=390

BMBF: „Development of methods and tools to systematically conceive and implement data-driven business models"

Observation 3: Analytical insights will be needed to drive the shift towards (service) business models

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Products

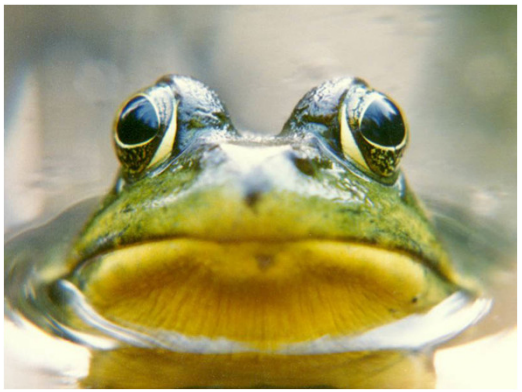
Outputs

Transactions

Elements

New (Service) Business Models

Solutions	Sales Teams?
Outcomes	Risks?
Relationships	Incentives, coverage?
(Eco)Systems	System optimum?



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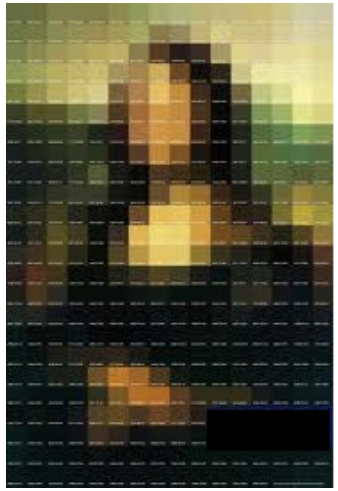
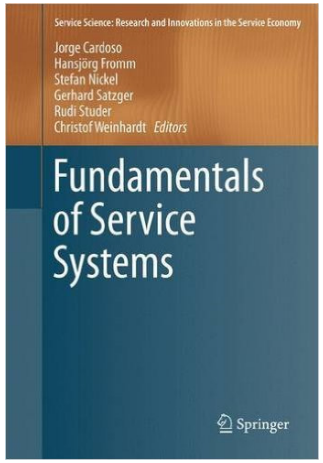
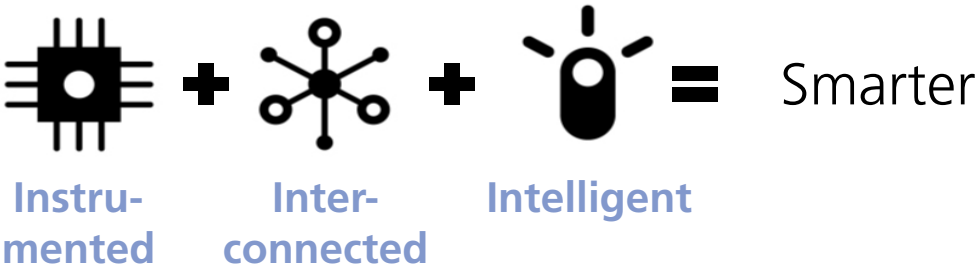
Analytical insights needed

Based on: Visnjic/Neely (2014)

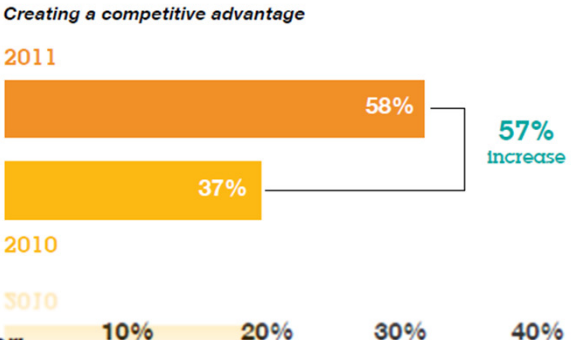
Observation 4: Essential is the creation of insight by connecting data across sources - and entities (!)

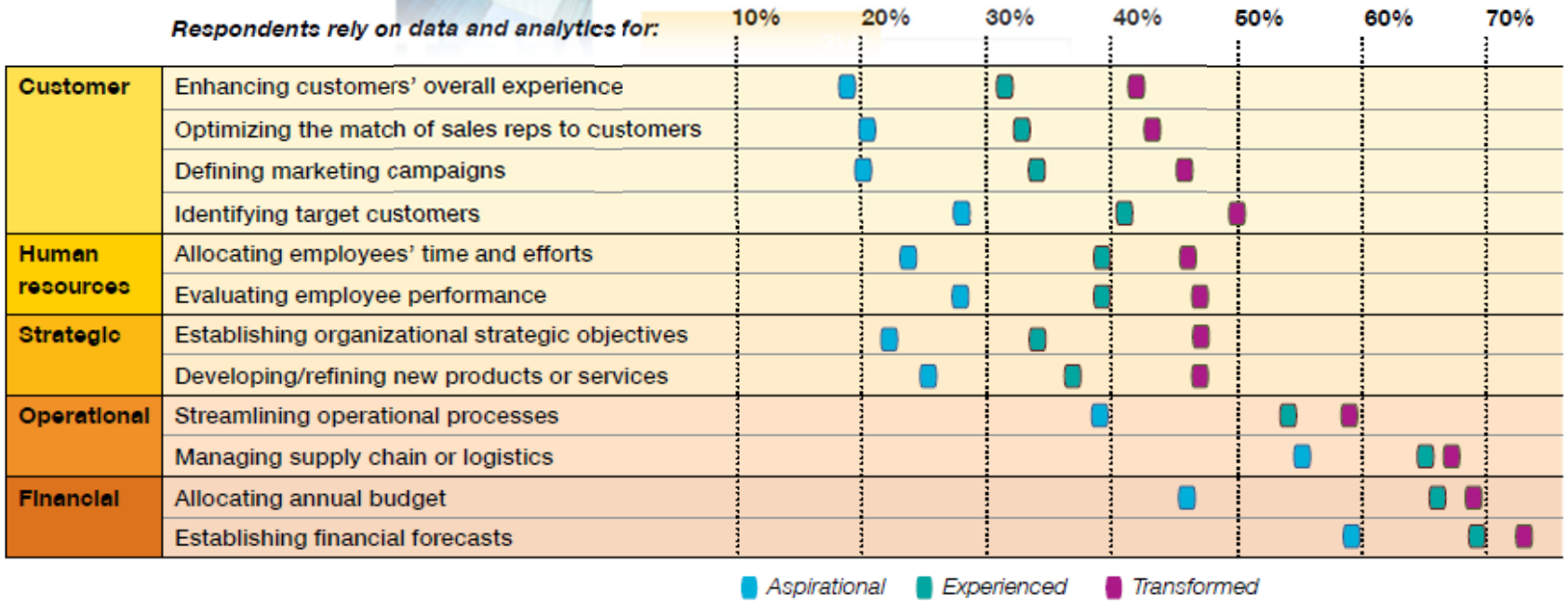






Observation 5: Analytical insights do pay off and further potential exists as analytics penetration varies across enterprises





Source: MIT (2011), The New Intelligent Enterprise, a joint MIT Sloan Management Review and IBM Institute of Business Value analytics research partnership.

Agenda

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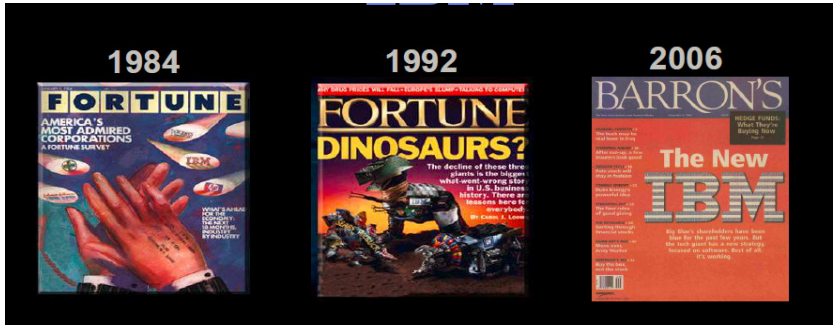
4 What‘s next ?

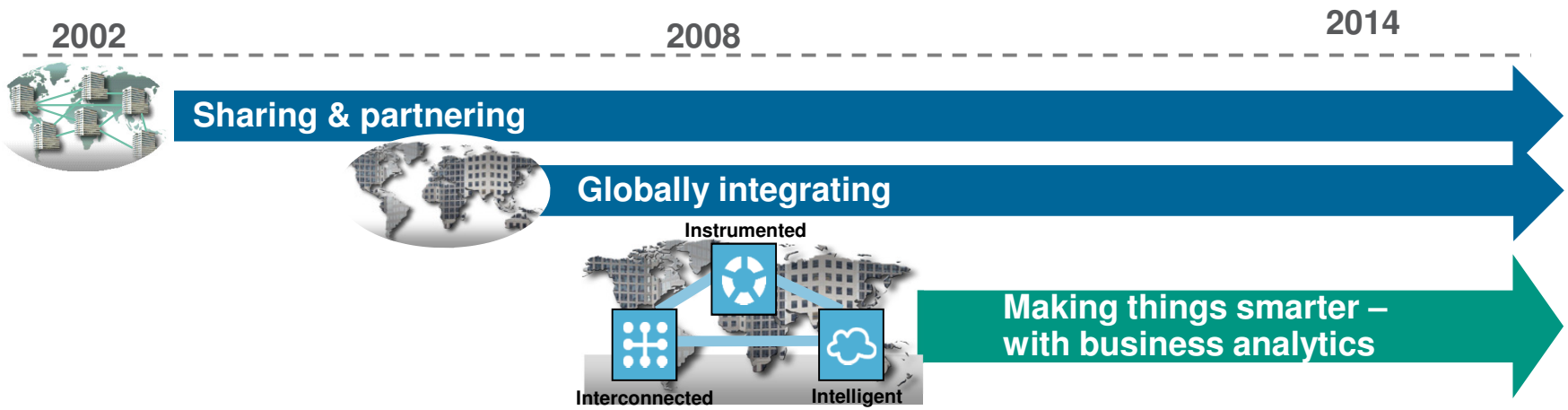
IBM and its finance function have undergone significant transformations in the past

2015: $81.7B revenue, $14.7B income

60% services share, ~380k employees



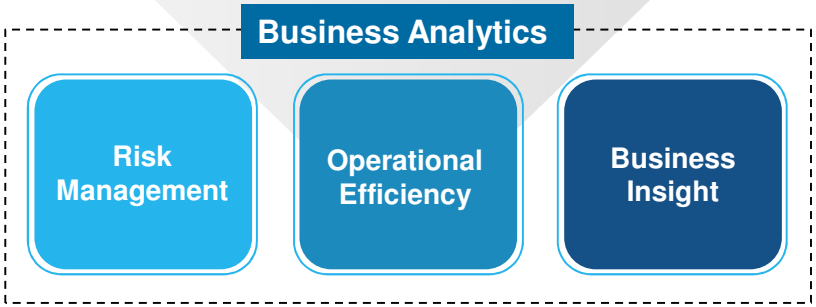
	Then	Now
Finance E/R	3%	1%
Days to close the books	18	7
Time spent on high-value activities	30%	70%
Finance staff in Centers of Excellence	0%	50%
Ledgers	60+	1
Chart(s) of Account	60+	1



IBM‘s Analytics Center of Competence has developed internal analytics solutions

Client	Business Challenge
CFO	Revenue Forecasting
CFO	Contract Risk Management
CFO	Strategic Financial Planning
CFO	Spend Optimization
CFO	Capacity and Productivity Management
GM	Market Business Unit Deep Dives

Client	Business Challenge
CSO	Customer Segmentation
CSO	Territory Optimization
CSO	Coverage Optimization
CSO	Channel Optimization
CSO	Quota Optimization
CHRO	Proactive Retention / Strategic Workforce Planning



Forecasting revenue – from art to science... : Standardized, automated, analytically supported

IBM Example 1

Revenue Forecast

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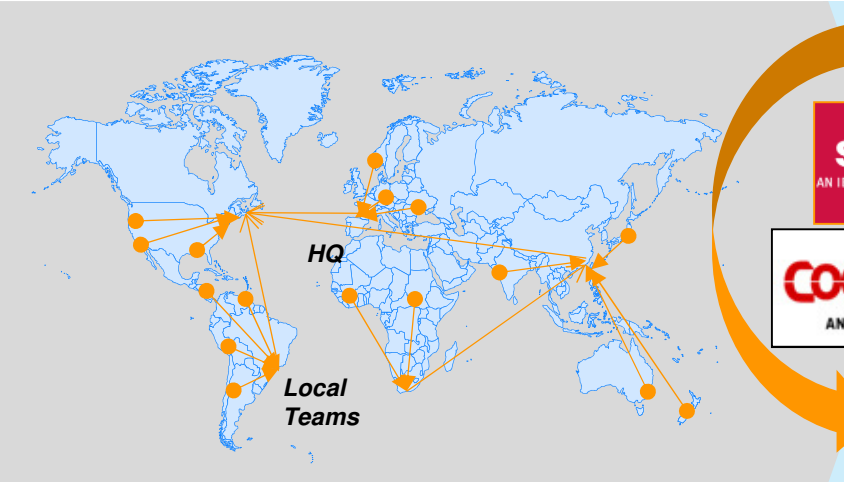
Traditional Forecasting



STAR* Solution

1. 12 divisions across 25 regions spend hundreds of hours each week assessing, reviewing and consolidating forecasts
2. Local teams apply inconsistent methods depending on their skill level using error prone spreadsheets

1. Centralized team maintains automated end-to-end process
2. Reports immediately available
3. More accurate forecasts using best of breed statistical methods
4. Forecasts up to 6 months out, not 3 months, as the new global norm
5. Leverages existing global data sources

180 Days

** STAR = Statistical Tracking and Assessment of Revenue*

An adaptable set of forecasting models and their self-learning composition is at the heart of STAR

IBM Example 1

Revenue Forecast

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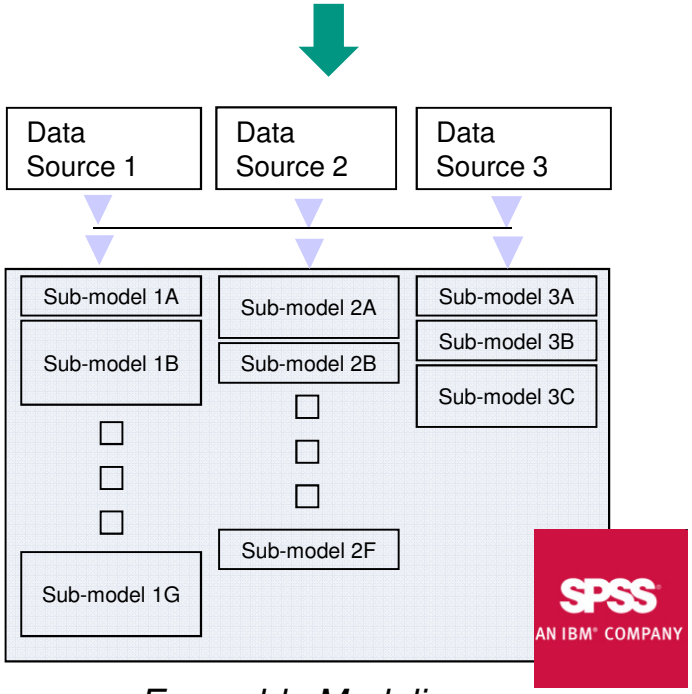
Challenge

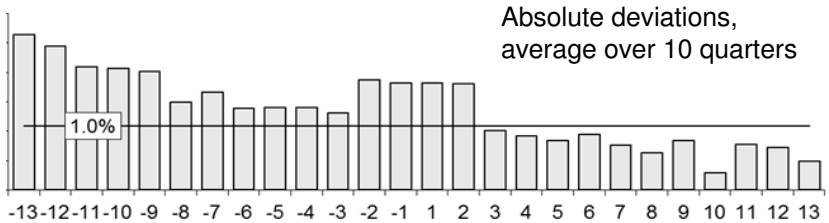
- Time-consuming, expensive forecast process
- Lack of consistency and precision
- Reflecting subjective views

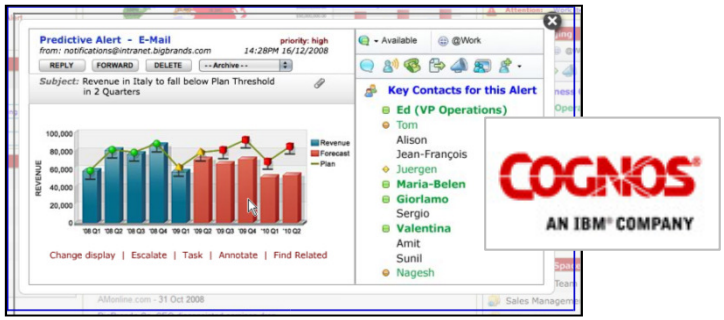
Benefit

- "Push button" forecast frees up controllers' time for higher value tasks
- Comparable or better quality
- Objective and self-learning



Ensemble Modeling



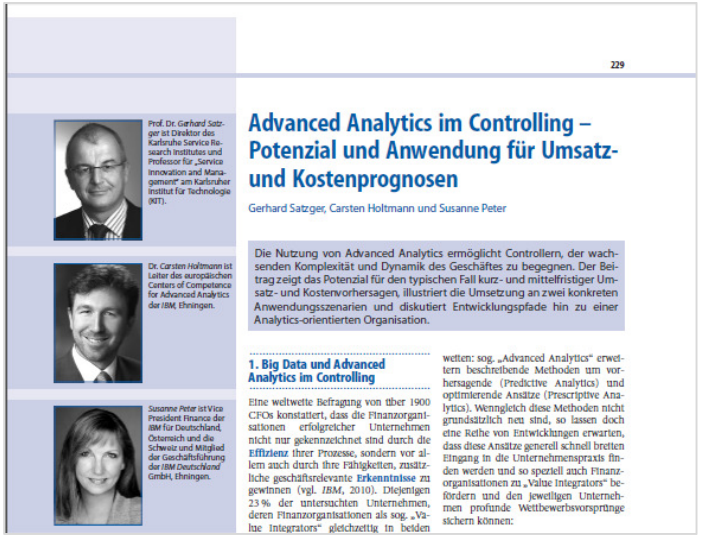


Business Intelligence Reporting

More details can be found in...

IBM Example 1

Revenue Forecast



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Advanced Analytics im Controlling – Potenzial und Anwendung für Umsatz- und Kostenprognosen

Gerhard Satzger, Carsten Holtmann und Susanne Peter

Prof. Dr. *Gerhard Satzger* ist Direktor des Karlsruhe Service Research Institutes und Professor für „Service Innovation and Management" am Karlsruher Institut für Technologie (KIT).

Dr. *Carsten Holtmann* ist Leiter des europäischen Centers of Competence for Advanced Analytics der IBM, Ehningen.

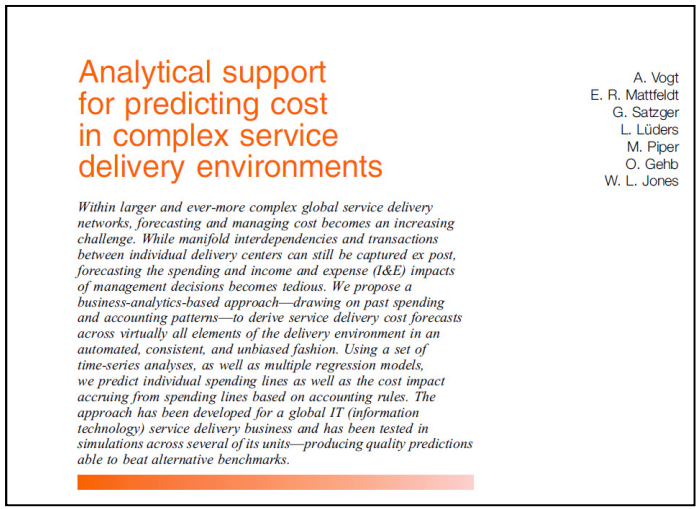
Susanne Peter ist Vice President Finance der IBM für Deutschland, Österreich und die Schweiz und Mitglied der Geschäftsführung der IBM Deutschland GmbH, Ehningen.

Die Nutzung von Advanced Analytics ermöglicht Controllern, der wachsenden Komplexität und Dynamik des Geschäftes zu begegnen. Der Beitrag zeigt das Potenzial für den typischen Fall kurz- und mittelfristiger Umsatz- und Kostenvorhersagen, illustriert die Umsetzung an zwei konkreten Anwendungsszenarien und diskutiert Entwicklungspfade hin zu einer Analytics-orientierten Organisation.

1. Big Data und Advanced Analytics im Controlling

Eine weltweite Befragung von über 1900 CFOs konstatiert, dass die Finanzorganisationen erfolgreicher Unternehmen nicht nur gekennzeichnet sind durch die **Effizienz** ihrer Prozesse, sondern vor allem auch durch ihre Fähigkeiten, zusätzliche geschäftsrelevante **Erkenntnisse** zu gewinnen (vgl. *IBM*, 2010). Diejenigen 23 % der untersuchten Unternehmen, deren Finanzorganisationen als sog. „Value Integrators" gleichzeitig in beiden weiten: sog. „Advanced Analytics" erweitern beschreibende Methoden um vorhersagende (Predictive Analytics) und optimierende Ansätze (Prescriptive Analytics). Wenngleich diese Methoden nicht grundsätzlich neu sind, so lassen doch eine Reihe von Entwicklungen erwarten, dass diese Ansätze generell schnell breiten Eingang in die Unternehmenspraxis finden werden und so speziell auch Finanzorganisationen zu „Value Integrators" befördern und den jeweiligen Unternehmen profunde Wettbewerbsvorsprünge sichern können:

Controlling – Zeitschrift für erfolgsorientierte Unternehmenssteuerung, 27 (2015) 4/5, p. 229-235



Analytical support for predicting cost in complex service delivery environments

A. Vogt
E. R. Mattfeldt
G. Satzger
L. Lüders
M. Piper
O. Gehb
W. L. Jones

Within larger and ever-more complex global service delivery networks, forecasting and managing cost becomes an increasing challenge. While manifold interdependencies and transactions between individual delivery centers can still be captured ex post, forecasting the spending and income and expense (I&E) impacts of management decisions becomes tedious. We propose a business-analytics-based approach—drawing on past spending and accounting patterns—to derive service delivery cost forecasts across virtually all elements of the delivery environment in an automated, consistent, and unbiased fashion. Using a set of time-series analyses, as well as multiple regression models, we predict individual spending lines as well as the cost impact accruing from spending lines based on accounting rules. The approach has been developed for a global IT (information technology) service delivery business and has been tested in simulations across several of its units—producing quality predictions able to beat alternative benchmarks.

IBM Journal of Research and Development, 58 (2014) 4, p. 7:1-7:10

Obtainable from:
http://www.ksri.kit.edu/team_282.php

Do you know which sales effort you incur for each customer?

IBM Example 2

Coverage Optim.

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Client Information

Country	Rev 11-14 ($M)	Rev. CAGR	Gross Profit	Profit Margin	Growth Opp.	Avg. FTE (11-14)
TR	13.8	-4%	4.3	-27%	5.8	12.05

Revenue 2014, FTE and HC 2014

Cut

	Total	S&D	SWG	STG	GTS	GBS
Rev.	4.5		0.6	3.3	0.4	0.1
FTE	14.51	5.03	5.59	1.81	1.66	0.43
HC	68	12	31	12	9	4

GTS — Cut

#	Job Role	FTE
1	SRBS	0.54
2	BCR	0.37
3	BCR	0.21
4	SM	0.16
5	SRBS	0.11
6	SRBS	0.07
7	SR	0.07
8	SRBS	0.07
9	BCR	0.05
Subtotal Reps' FTE		**1.66**
Total FTE		**1.66**

GBS — Cut

#	Job Role	FTE
1	Associate Partner	0.31
2	Associate Partner	0.06
3	BSP	0.04
4	AMS CSE	0.02
Subtotal Reps' FTE		**0.43**
Total FTE		**0.43**

COGNOS AN IBM COMPANY

S&D — Cut

#	Job Role	FTE
1	Team Leader	1.00
2	Client Representative	0.95
3	Client Representative	0.87
4	Client Representative	0.62
5	Client Representative	0.39
6	Client Representative	0.13
7	Client Technical Architect	0.06
8	Solution Rep - Brand Specialist	0.03
9	Client Representative	0.03
10	Solution Rep - Brand Specialist	0.03
11	Other	0.00
Subtotal Reps' FTE		**4.11**
Managers		**0.92**
Total FTE		**5.03**

SWG — Cut

#	Job Role	FTE
1	Other Direct Sales	0.65
2	Specialty SSR	0.51
3	SW Client Leader	0.36
4	Software Architect	0.35
5	Software Tech Specialists	0.30
6	Specialty SSR	0.25
7	Specialty SSR	0.25
8	Software Tech Specialists	0.22
9	Software Tech Specialists	0.19
10	Software Tech Specialists	0.17
11	Other	1.43
Subtotal Reps' FTE		**4.69**
Managers		**0.90**
Total FTE		**5.59**

STG — Cut

#	Job Role	FTE
1	Solution Rep	0.61
2	Solution Rep - Brand Specialist	0.15
3	Solution Rep	0.15
4	Solution Rep - Brand Specialist	0.13
5	Solution Rep - Brand Specialist	0.12
6	Not available	0.12
7	Client Technical Specialist	0.11
8	Solution Rep - Brand Specialist	0.06
9	Not available	0.04
10	Solution Rep - Brand Specialist	0.03
11	Other	0.01
Subtotal Reps' FTE		**1.52**
Managers		**0.28**
Total FTE		**1.81**

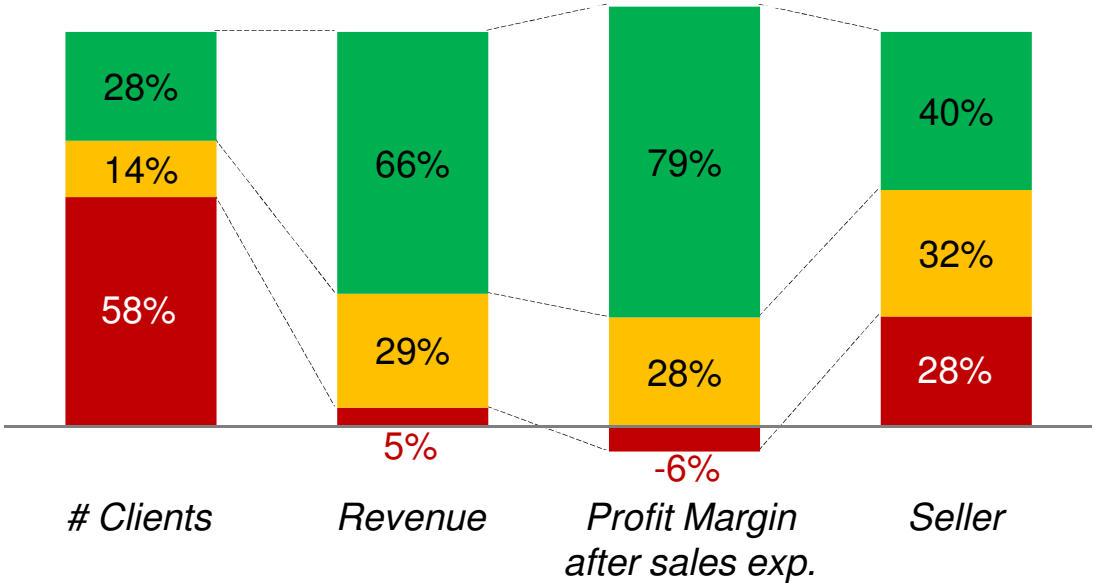
Customers are segmented depending on revenue potential, growth pattern and profit margin (including sales expense)

IBM Example 2

Coverage Optim.

	High Growth		Low Growth	
Margin	**1. High revenue potential**	**2. Low revenue potential**	**3. High revenue potential**	**4. Low revenue potential**
A. High	+	+	+	=
B. Medium	+	=	=	=
C. Low	=	-	-	-
D. Very low	-	-	-	-

Business Unit X



For each customer transparency is created – as a base for strategic discussions

IBM Example 2

Coverage Optim.

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Customers

2011 - 2014 ($M)						2014 ($M)						2014 ($M)		
Trans. + S&S Profit	Profit Margin	Trans. Rev	Trans. + S&S Revenue	Total Revenue	Revenue CAGR	Average FTE	Total FTE	Quota / ASP FTE	GDP / PSP FTE	Mgr. FTE	Trans. + S&S Revenue	Total Revenue	MAP Aspiration	Action
48.0	95%	17.5	50.3	79.4	22%	4.73	5.46	3.25	1.48	0.74	20.1	33.7	27.3	Add
39.2	92%	18.3	42.7	47.1	79%	6.03	11.69	4.30	5.88	1.51	25.3	26.4	9.0	Add
30.3	91%	22.9	33.3	51.5	-3%	4.72	1.93	1.15	0.60	0.17	6.3	11.7	20.1	Add
20.1	74%	13.9	27.3	41.4	43%	12.40	13.80	3.87	8.68	1.25	13.0	18.1	15.2	Add

Customers

Trans. + S&S Profit	Profit Margin	Trans. Rev	Trans. + S&S Revenue	Total Revenue	Revenue CAGR	Average FTE	Total FTE	Quota / ASP FTE	GDP / PSP FTE	Mgr. FTE	Trans. + S&S Revenue	Total Revenue	MAP Aspiration	Action
-2.6	-110%	0.3	2.3	40.0	1%	11.66	13.99	7.65	4.08	2.26	0.5	13.8	14.1	Cut
0.0	-1%	3.8	4.9	4.9	19%	12.16	13.72	5.39	6.67	1.66	1.8	1.8	3.0	Cut
-2.1	-120%	1.2	1.7	2.9	223%	8.84	12.33	3.43	7.56	1.34	0.8	1.9	1.5	Cut
-2.5	-122%	1.3	2.0	2.2	-64%	7.99	12.00	3.79	6.57	1.64	0.2	0.2	1.7	Cut

Coverage optimization boosts sales productivity by „smart“ allocation of sales resources

IBM Example 2

Coverage Optim.

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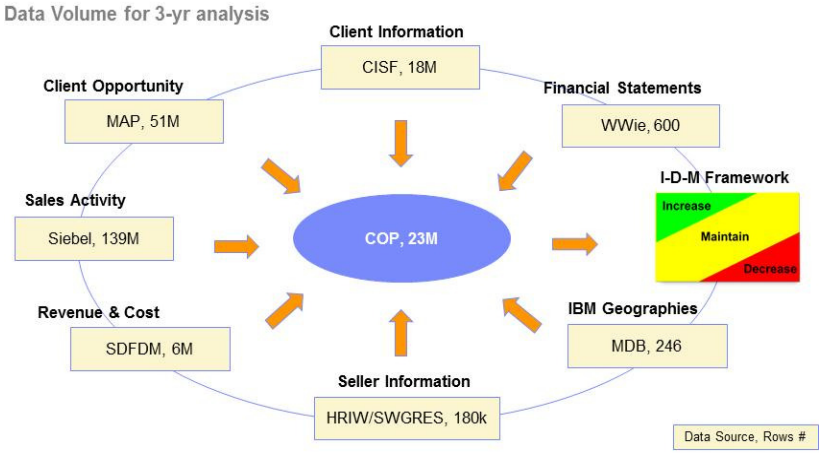
Challenge

- Lack of insight into potential and sales productivity per client
- Suboptimal allocation of sales resources

Benefit

- Detailed recommendations for sales coverage decisions and opportunity prioritization
- Measurable improvement of sales productivity of 40-60% on recommended changes



Margin	High Growth: 1. High revenue potential	High Growth: 2. Low revenue potential	Low Growth: 3. High revenue potential	Low Growth: 4. Low revenue potential
A. High	+	+	+	=
B. Medium	+	=	=	=
C. Low	=	-	-	-
D. Very low	-	-	-	-

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2009 - 2011 ($M)						2011 ($M)						2012 ($M)		
Trans. + S&S Profit	Profit Margin	Trans. Rev	Trans. + S&S Revenue	Total Revenue	Revenue CAGR	Average FTE	Total FTE	Quota / ASP FTE	GDP / PSP FTE	Mgr. FTE	Trans. + S&S Revenue	Total Revenue	MAP Aspiration	Action
48.0	96%	17.5	50.3	79.4	22%	4.73	5.46	3.25	1.48	0.74	20.1	33.7	27.3	Add
39.2	92%	18.3	42.7	47.1	79%	6.03	11.69	4.30	5.88	1.51	25.3	26.4	9.0	Add
30.3	91%	22.9	33.3	51.5	-3%	4.72	1.93	1.15	0.60	0.17	6.3	11.7	20.1	Add
20.1	74%	13.9	27.3	41.4	43%	12.40	13.80	3.87	8.68	1.25	13.0	18.1	15.2	Add
16.4	76%	6.6	21.6	35.3	-43%	8.16	7.24	3.80	2.78	0.65	4.6	4.8	15.9	Add
12.5	82%	11.4	15.2	29.4	24%	4.63	3.55	0.84	2.34	0.37	6.9	12.7	9.8	Add

Kunden

2009 - 2011 ($M)						2011 ($M)						2012 ($M)		
Trans. + S&S Profit	Profit Margin	Trans. Rev	Trans. + S&S Revenue	Total Revenue	Revenue CAGR	Average FTE	Total FTE	Quota / ASP FTE	GDP / PSP FTE	Mgr. FTE	Trans. + S&S Revenue	Total Revenue	MAP Aspiration	Action
-2.6	-110%	0.3	2.3	40.0	1%	11.66	13.99	7.65	4.08	2.26	0.5	13.8	14.1	Cut
0.0	-1%	3.8	4.9	4.9	19%	12.16	13.72	5.39	6.67	1.66	1.8	1.8	3.0	Cut
-2.1	-120%	1.2	1.7	2.9	223%	8.84	12.33	3.43	7.56	1.34	0.8	1.9	1.5	Cut
-2.5	-122%	1.3	2.0	2.2	-64%	7.99	12.00	3.79	6.57	1.64	0.2	0.2	1.7	Cut
-1.2	-54%	0.6	2.2	5.1	-19%	5.41	6.60	1.67	4.19	0.74	0.5	1.4	6.7	Cut
0.8	32%	1.5	2.4	2.5	-51%	4.10	6.24	2.64	2.81	0.80	0.3	0.3	2.5	Cut

COP = Coverage Optimization with Profitability /
ACCENT = Analytics on Clients and Coverage for the Enterprise

Risk analytics help to understand risks of new acquisitions and large service contracts

IBM Example 3

Contract Risk Mgt.

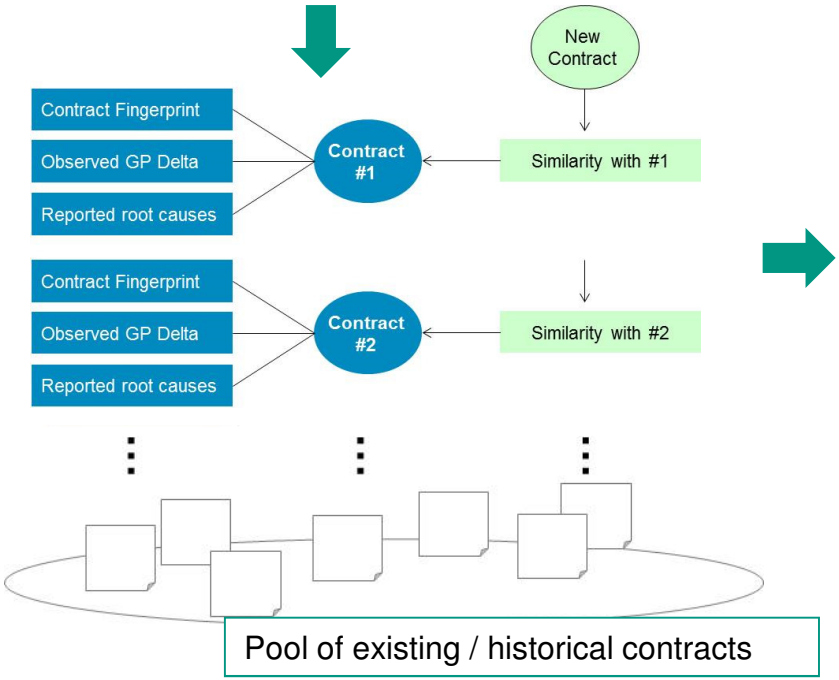
Karlsruhe Institute of Technology

Challenge

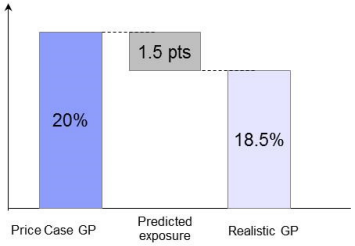
- Long-term contracts bear a variety of risks that are unknown or hard to quantify at time of signature

Benefit

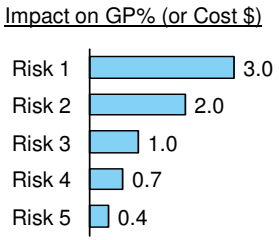
- Identification of risks and their quantification before signing a contract
- Early start of mitigation actions
- Mandatory treatment of large contracts since 2013; expecting 4% margin increase



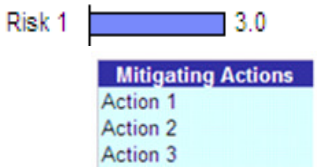
1 Predict total risk exposure to profit margin



2 Predict individual risks



3 Recommend mitigation actions



SPSS AN IBM COMPANY

Adding systematic risk evaluation within enterprise strategic planning

IBM Example 4

Strategic planning

Karlsruhe Institute of Technology

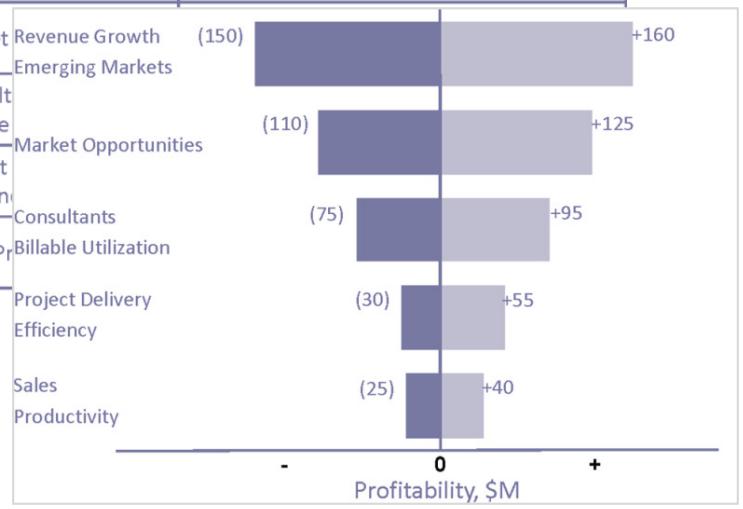
Challenge

- Number, uncertainty, and mutual interdependence of operational „levers“ obfuscate risk of strategic plans

Benefit

- New support for Enterprise Risk Management:
  - Strategic planning under uncertainty
  - Sensitivity analyses

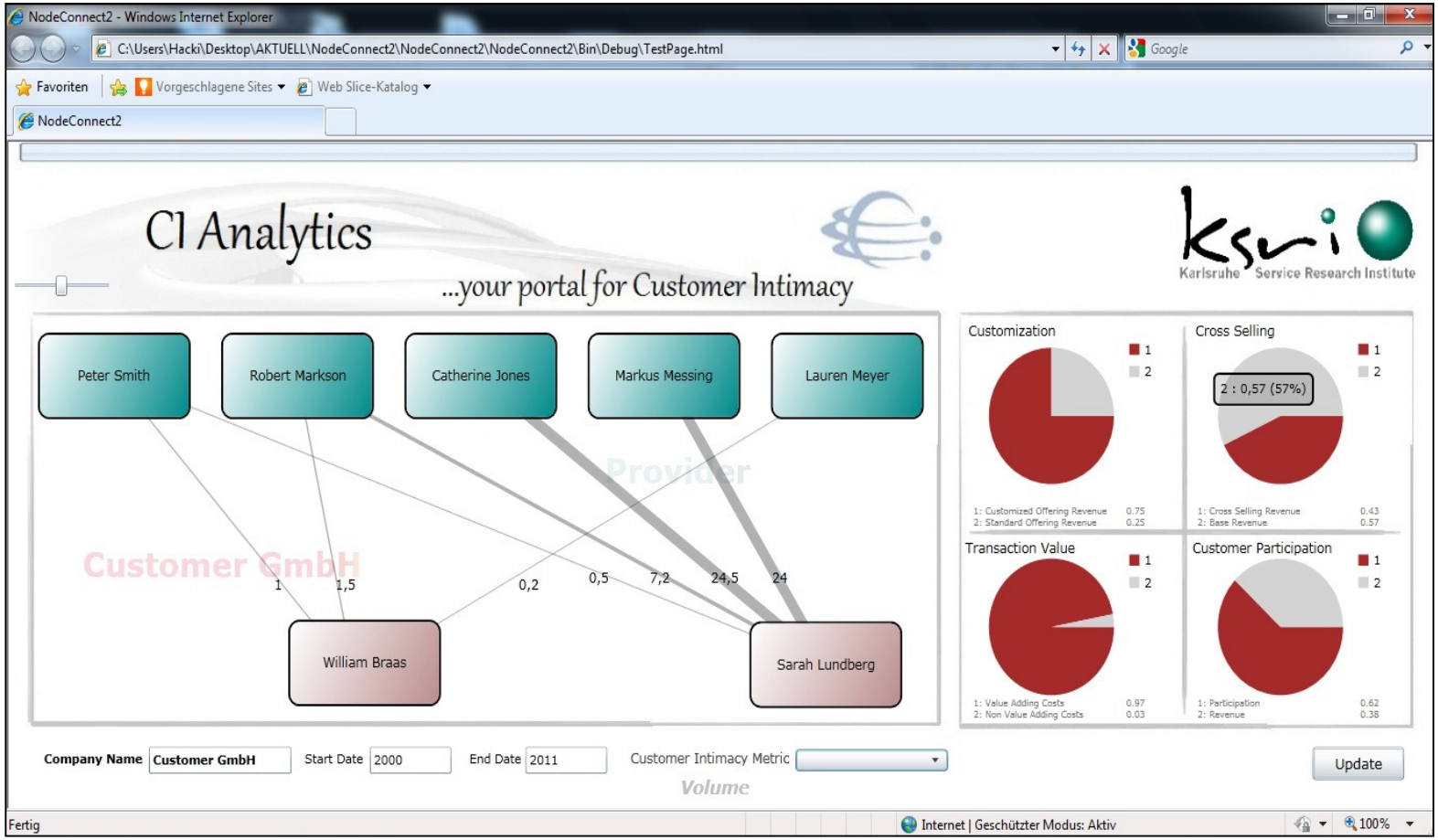
Lever	Variation
Revenue Growth – Emerging Markets	Between +1% to -1% growth rate
Market	
Consult Billable	
Project Efficien	
Sales Pr	



Complementing CRM with analytics and social network capabilities to assess and monitor customer intimacy

KSRI Example 5

Customer intimacy



Customer Intimacy driven organizations "continually tailor and shape products and services in order to fit an increasingly fine definition of the customer" (Treacy and Wiersema, 1993)

Agenda

1 Challenges for Finance Organizations

2 Analytics and the „Big Data Hype“

3 Analytics Applications in Finance and Controlling

4 What‘s next ?

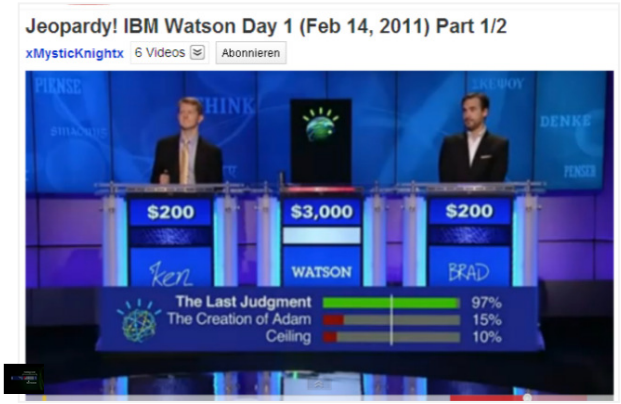
So far we have demonstrated the value of analytics in individual cases but there is more to come – and to do!

Mentality Change

“ In God we trust,
all others must bring data”

(W. Edward Deming)

Breadth (application / technology use)

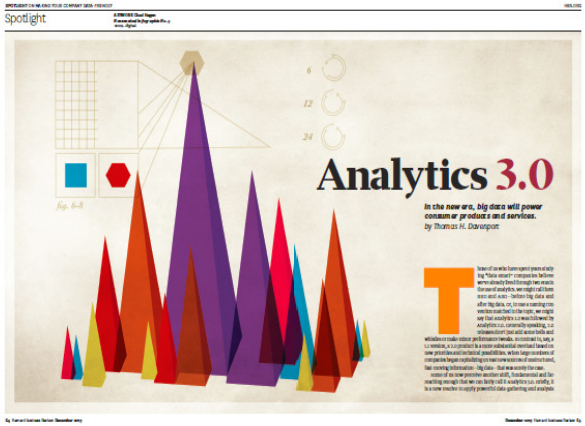


Cognitive Computing based on unstructured and natural language knowledge repositories

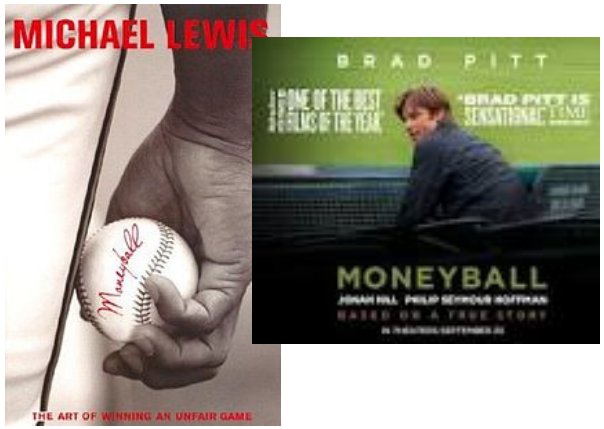
Depth (penetration of organization)

Enablement and access for all parts of the IBM population

Outlook : Analytics will fundamentally change whole industries... – controllers need to be leaders !



„Today it isn‘t just online and information firms that can create products and services from analyses of data. It‘s every firm in every industry.“ *(T.H. Davenport)*



„Moneyball: The Art of Winning an Unfair Game“
(M. Lewis)

Source: Davenport, T.H., Analytics 3.0; Harvard Business Review (2013), 64-72

Thank you for your attention –

and please do contact me for more anytime …

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