The Value of Big Data

From Data-Driven Enterprises to a Data-driven Economy

Prof. Dr. Stefan Wrobel

Fraunhofer-Institute for Intelligent Analysis and Information Systems IAIS

Fraunhofer Alliance Big Data

www.iais.fraunhofer.de

bigdata.fraunhofer.de

Fraunhofer IAIS

Fraunhofer IAIS: Intelligent Analysis and Information Systems

Do more with data

200 people, at the campus Birlinghoven castle close to Bonn

universitätbonn

Research areas

- Data Science and Big Data
- Data Linking, Open Data
- Machine Learning, Data Mining, Multimedia Pattern Recognition, Sensor Analytics
- Visual Analytics
- Big data in business processes

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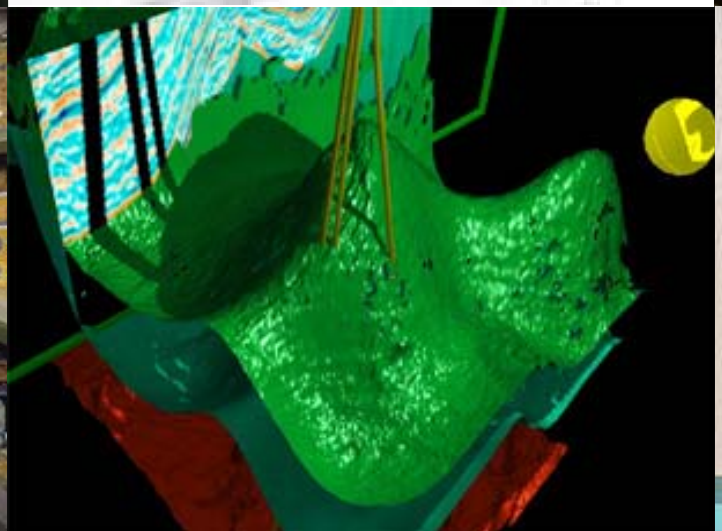
Saisissez votre code
platinum


60



Fraunhofer Alliance Big Data

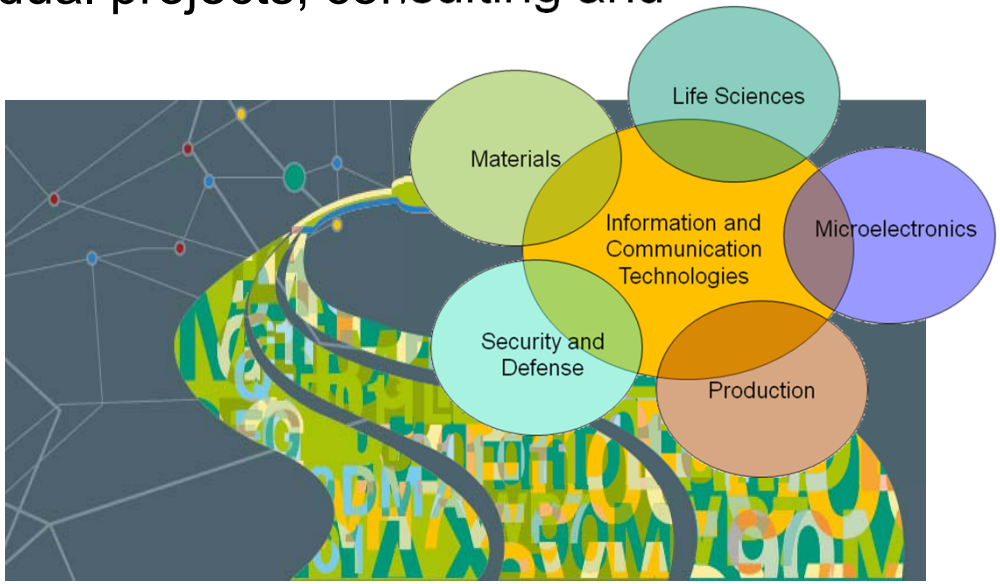
Joint competences in a »Big Data Factory« for Germany

Strategies, Solutions and Successes

24 Fraunhofer institutes – one central coordination point

Synchronized and broad competence portfolio with many years of expertise in big data in different sectors

Best of class Big Data solutions for individual projects, consulting and qualification of personnel



bigdata.fraunhofer.de

Contact: Prof. Dr. Stefan Wrobel (Chairman)

Fraunhofer
BIG DATA

Handelsblatt

Home Finanzen Unternehmen Politik Technologie Auto Meinung Karriere Sport
IT + Telekommunikation Forschung + Medizin Energie + Umwelt

ARTIKEL KOMMENTARE (2) KURSE DOSSIERS

BIG DATA

Wie aus Daten ein Wettbewerbsvorteil wird

Mehr Service für Kunden, bessere Logistik, optimierte Verteiler: Mit Hilfe neuer Analyse-S
Datenmengen künftig sinnvoller nutzen können. Das bringt auch Vorteile im Wettbewerb.

von Ingmar Höhmann und Andreas Schulte

COMPUTER
Special z

VIDEO

CEBIT
„Die St
Zum End
Ausstelle
Die Stimı
Chef Diet

Deutschlandfunk

Wir über uns Programmvorschau Frequenzen

COMPUTER UND KOMMUNIKATION

29.06.2013

Hohe Investitionen, fehlendes Personal, ungeklärte Rechtsfragen – viele Firmen stehen Big Data skeptisch gegenüber. (Bild: AP)

Big Data: Das Warten auf den großen Profit

Petabytes auf der Suche nach rentabler Auswertung

Von Keywan Tonekaboni

Unter dem Motto "Impulse für Ihr Business" hat der Branchenverband BITKOM nach Bonn eingeladen, um Unternehmen das Prinzip Big Data schmackhaft zu machen. Zwar soll die schnelle Auswertung großer Datenmengen in vielen Branchen das Geschäft ankurbeln, besonders aber der Mittelstand zeigt sich skeptisch.

The New York Times

SundayReview | The Opinion Pages

WORLD U.S. N.Y. / REGION BUSINESS TECHNOLOGY SCIENCE HEALTH

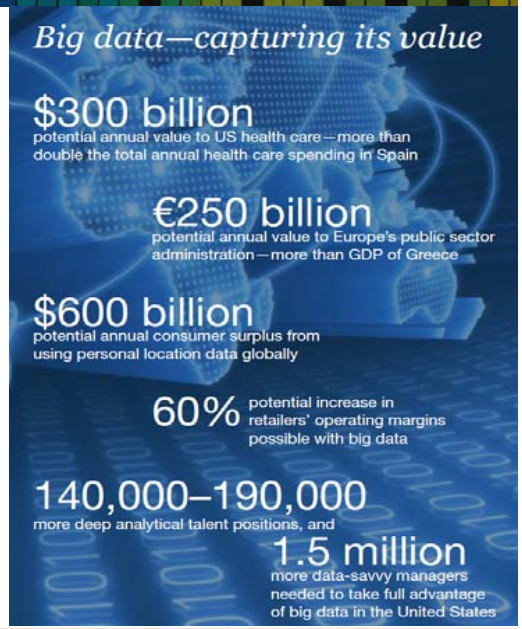
NEWS ANALYSIS

The Age of Big Data

By STEVE LOHR

Published: February 11, 2012 | 82 Comments

GOOD with numbers? Fascinated by data? The sound you hear is opportunity knocking.



Technology Review

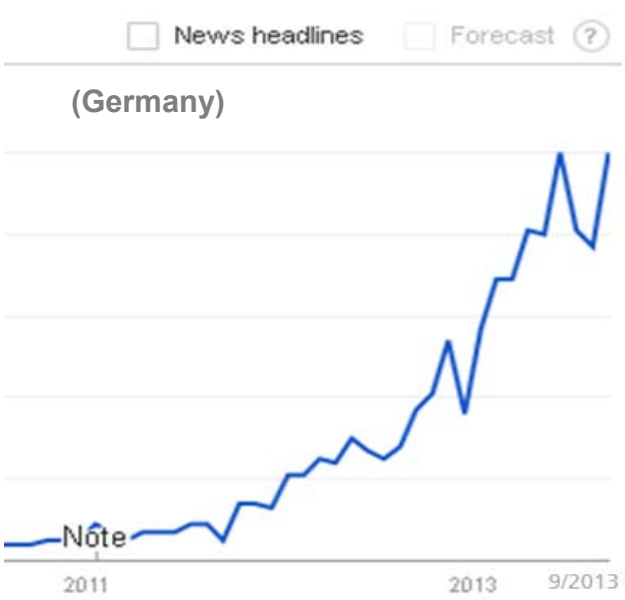
DER UNGEHOBENE SCHATZ

Insbesondere große Unternehmen versprechen sich Wettbewerbsvorteile von einer gezielten Analyse ihrer Datenmengen. Kleine Firmen sind noch skeptisch. Doch auch sie könnten von der Technologie profitieren.

VON BERND MÜLLER

Dann schauen Sie sich doch Google an." Diesen Satz müssen sich Manager deutscher Unternehmen in den letzten ein oder zwei Jahren öfter anhören. Wer von ihnen bezweifelt, dass Big Data Analytics – die Analyse riesiger Datenmengen – ihrem Geschäft nutzen könnte, dem kontern IT-Berater gebetsmühlenartig mit dem Beispiel des amerikanischen Suchmaschinenkonzerns. Ihr Argument: Google sei der Prototyp des datengetriebenen Unternehmens und erfolgreich obendrein. Denn wer seine Daten intelligent verknüpfe, wisse mehr über seine Kunden, und das bringe mehr Profit.

Auch wenn manche Vergleiche hinken – ein mittelständischer Maschinenbauer ist schließlich kein 30-Milliarden-Dollar-Internetkonzern –, so gibt es doch Parallelen. Langsam wird auch Unternehmen außerhalb der IT-Branche klar, dass Big Data mehr zu sein scheint als nur eine weitere Sau, die von geldh Softwarehäusern durch Information stechnolog ben wird. Vielmehr ge rum, etwas, das ohnehi meidlich und ständig v produziert wird, za sch teil zu nutzen. Viele Fir Maschinenbauer. Sup kette oder Versicherun Daten an: Steuer- und St lagen, das Einkaufsverh dungen von Verkehrsan die richtigen Schlüsse z teile – das sagt auch de Anlagenbau.



Prof. Stefan Wrobel

Prof. Stefan Wrobel (Computerwissenschaftler)

Als Direktor des Fraunhofer-Instituts für Intelligente Analyse- und Informationssysteme IAIS beschäftigt er sich mit den technischen Möglichkeiten von Big Data und deren Folgen. Stefan Wrobel warnt vor Kulturpessimismus – die Umwälzungen seien eine große Chance für die Entwicklung der Weltwirtschaft.

Süddeutsche Zeitung

Nach unserer Zukunft

Ein Besuch bei den Fraunhofer-Forschern für „Intelligente Analyse- und Informationssysteme", Deutschlands avanciertesten Big-Data-Propheten

„Hypotheses non fingo", ich stelle keine Hypothesen auf, sagte Francis Bacon.

davon aber nur einen Schritt entfernt. Tom Cruise weiß, wer wann ein Verbrechen be-

ter D gemacht. Im dritten Schritt wendet man die Regel auf den individuellen Fall

hält. Private Firmen erlaubten sich mehr. „Wir sollten Dürrenmatts ‚Die Physiker'

ter. Das geht bis zum Punkt „Radikalisierung". Doch was, wenn wir jetzt in Kairo, Is-

ne Wege und seine Freunde und seine Suchbegriffe bekannt sind, in der Sprache noch

Big Data Trends

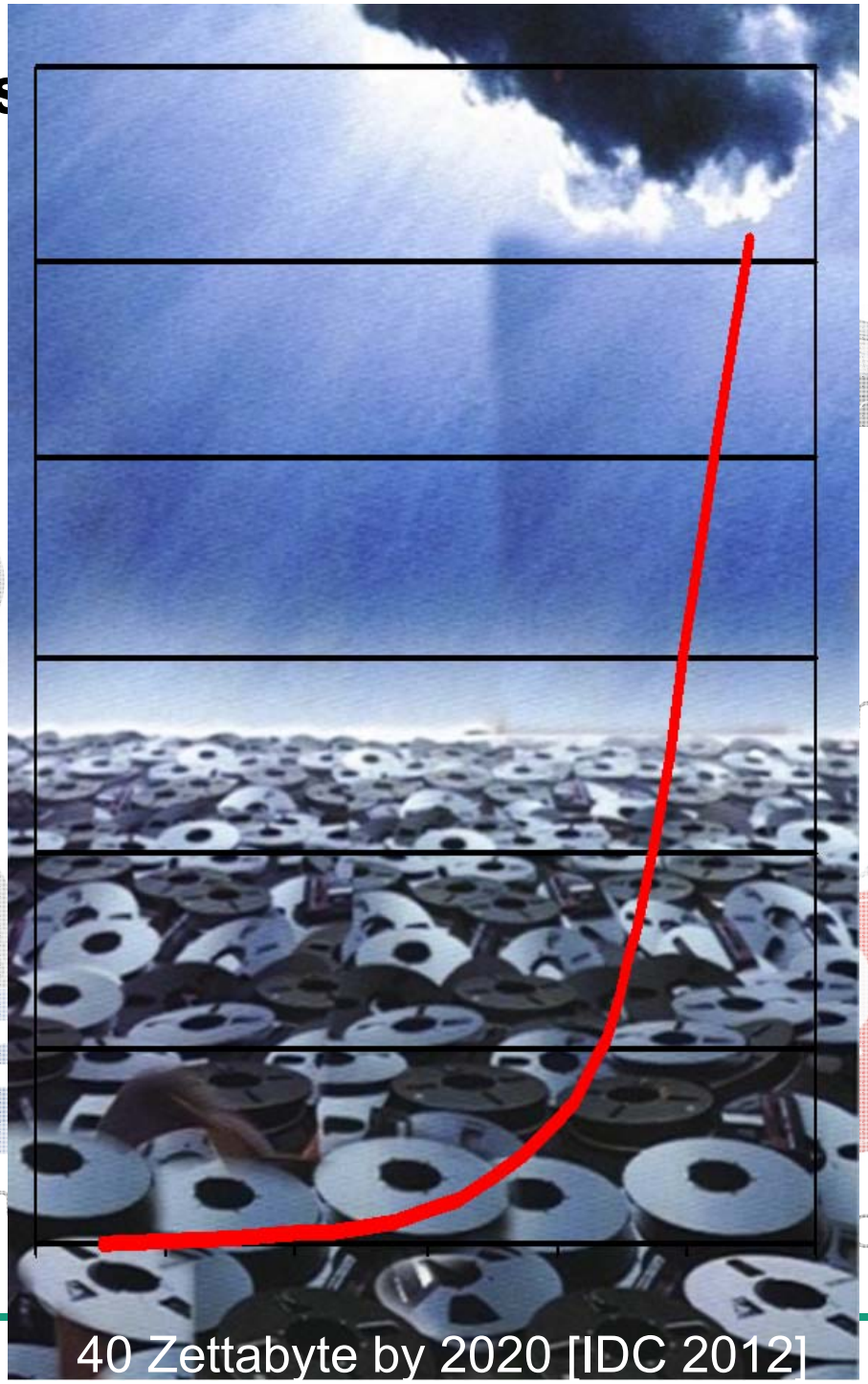
Convergence

Ubiquitous Intelligent Systems

User Content

Open Data

Big Data Trends



Convergence

Intelligent Systems

User Conter

Open Data

Fraunhofer IAIS

Big Data

A definition attempt

Big Data in general refers to

- The trend towards availabity of ever more detail than ever closer to realtime data
- The switch from a model-driven to a model- and data-driven approach
- The economic potentials that result from the analysis and use of big data when properly integrated into company processes

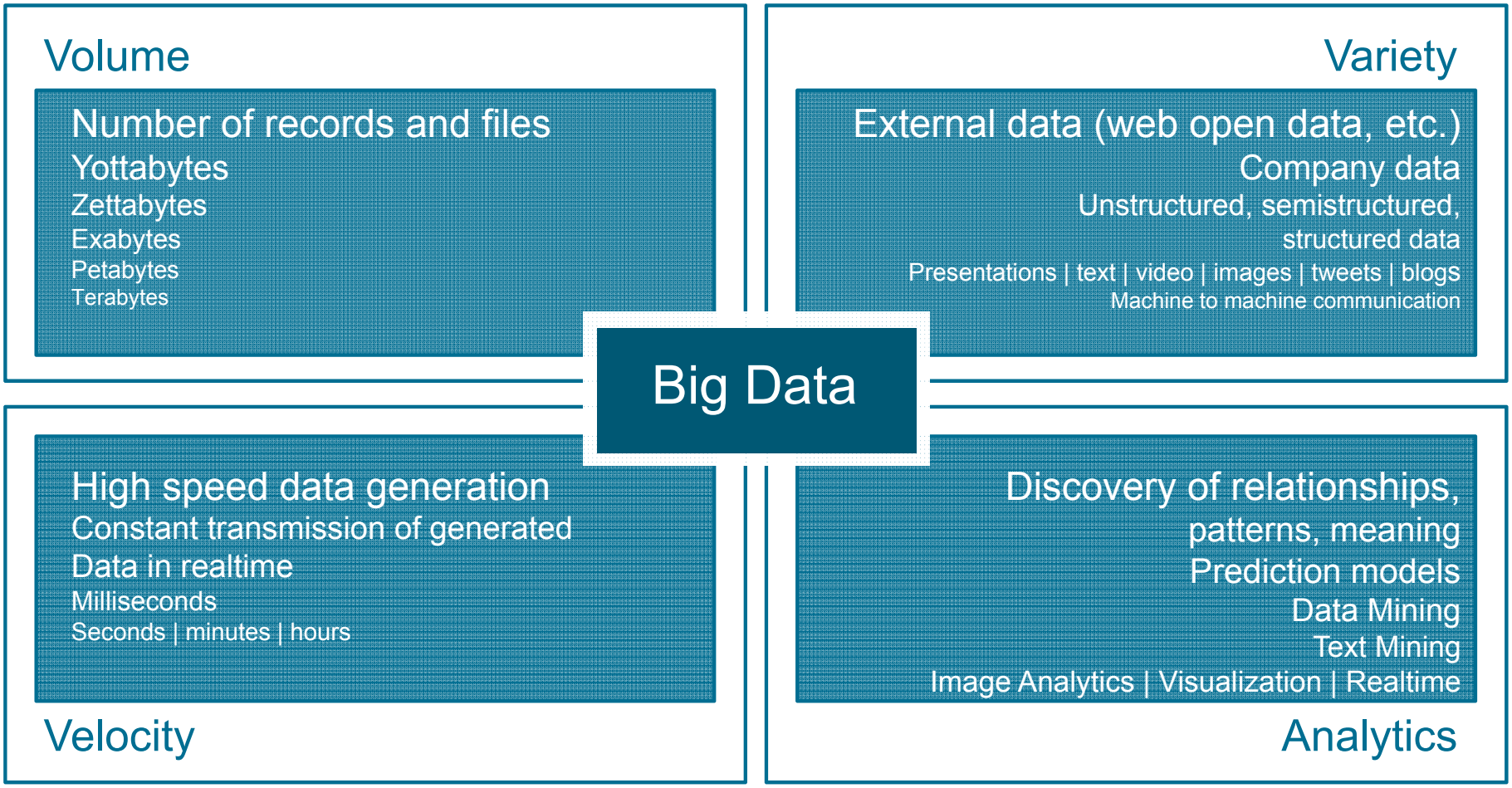
Big Data currently focuses technically on the following aspects

- Volume, Variety, Velocity
- In-memory computing, Hadoop etc.
- Real-time analysis and effects of scale

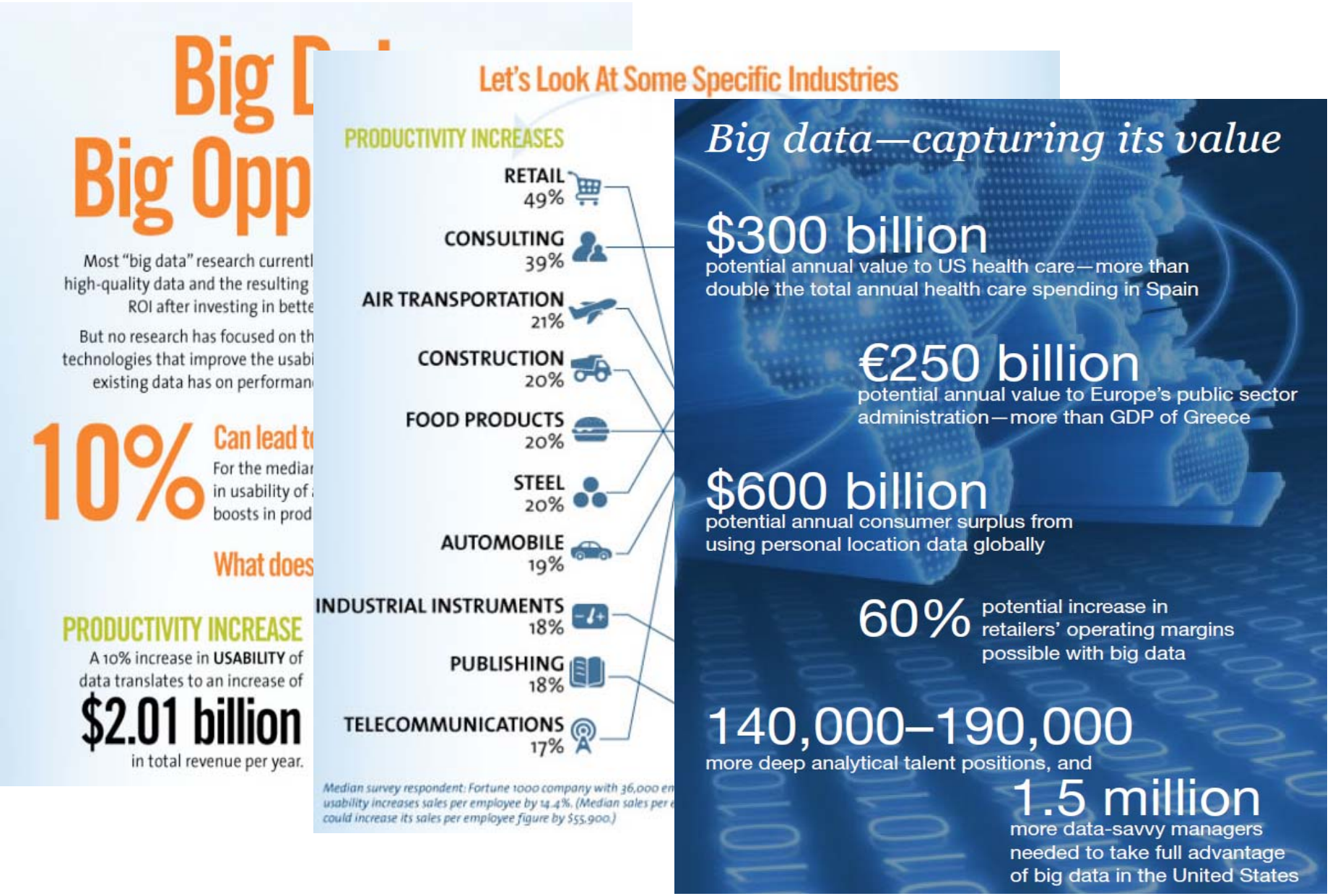
Big Data must take implications to society into account

Big Data

The view of BITKOM, The German IT Association



Source: BITKOM Big Data Leitfaden, 2012. BITKOM AK Big Data



Sources/©: http://m.sybase.com/detail?id=1095954 und McKinsey Studie, 2011

Innovation study Big Data

THESEUS
Forschungsprogramm für eine neue internetbasierte Wissensinfrastruktur

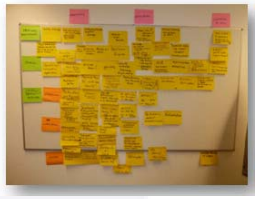
Gefördert durch:
Bundesministerium für Wirtschaft und Technologie
aufgrund eines Beschlusses des Deutschen Bundestages

Desk research (current state of affairs)

- Detailed overview of the national and international Big Data landscape
- More than 50 systematic Big Data Business Cases

In-depth workshops for industry sectors (qualitative study)

- Expert workshops
- Finance, Telecom, Market research, E-Comm., Insurance



Online survey (quantitative study)

- 1.10.2012 to 30.11.2012
- 82 high-ranking executives from small and large companies

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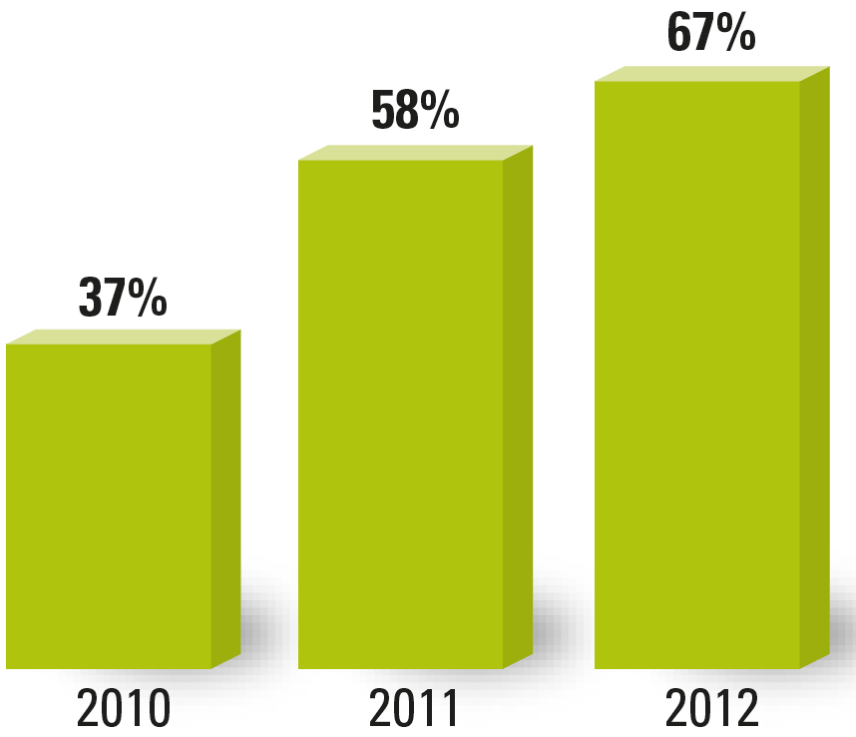
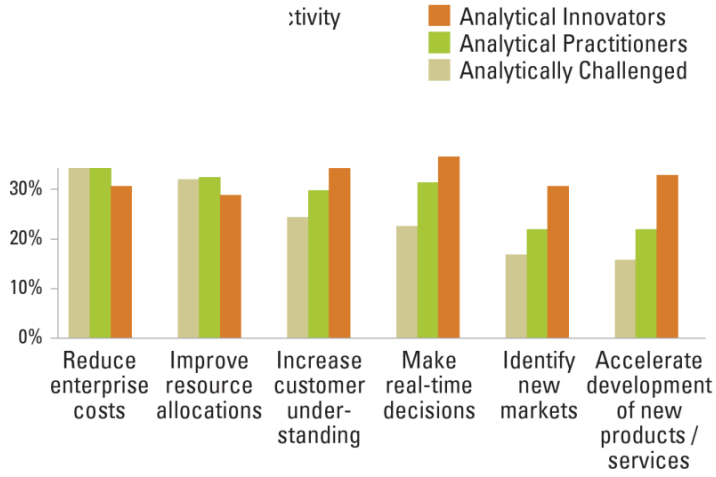
Big Data Competitive Edge



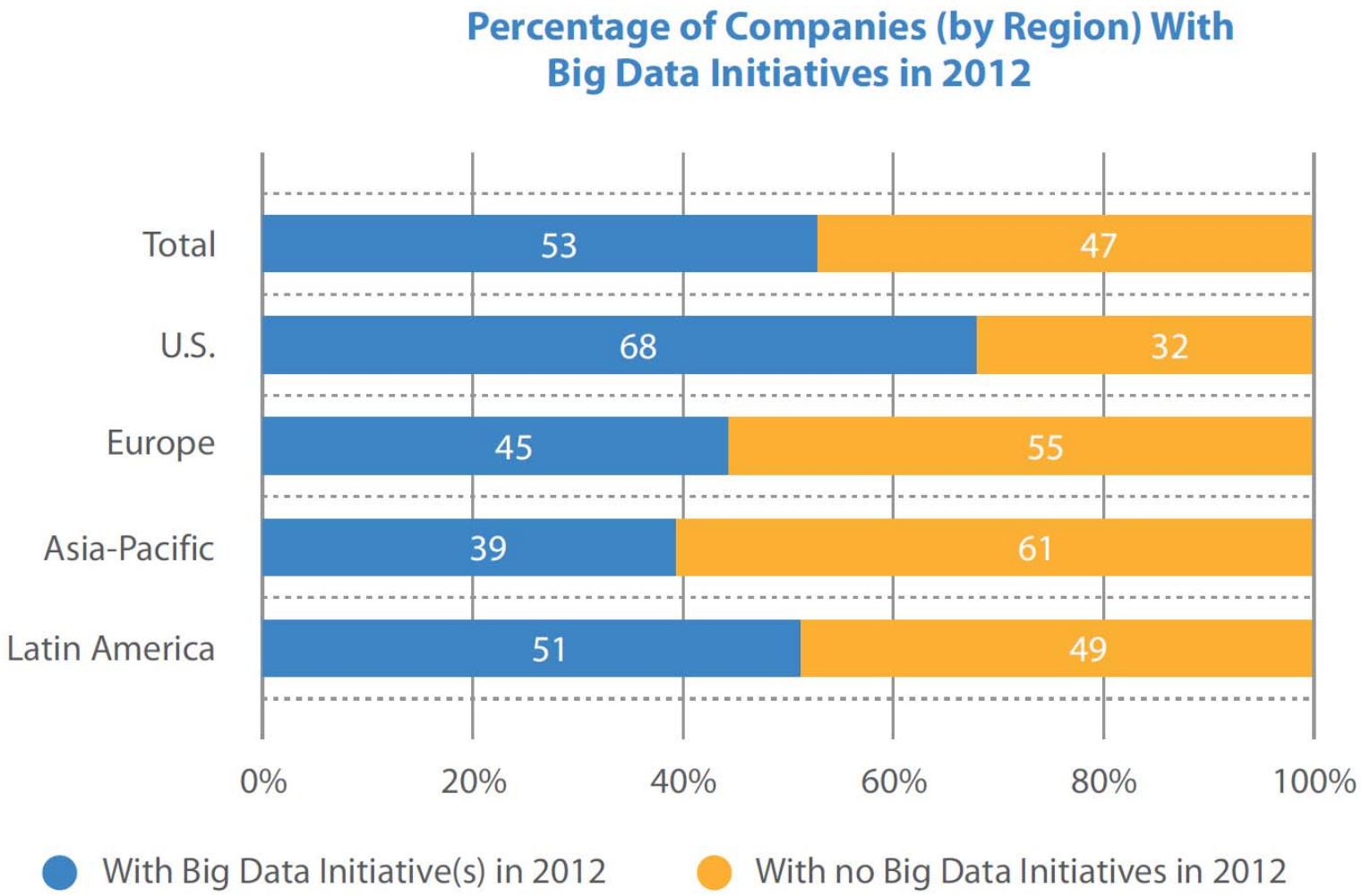
Percentage believing that business analytics creates a competitive advantage in their organization



[Sources/©: MIT Sloan Management Review 2012, 400 companies]

Big Data Uptake Worldwide

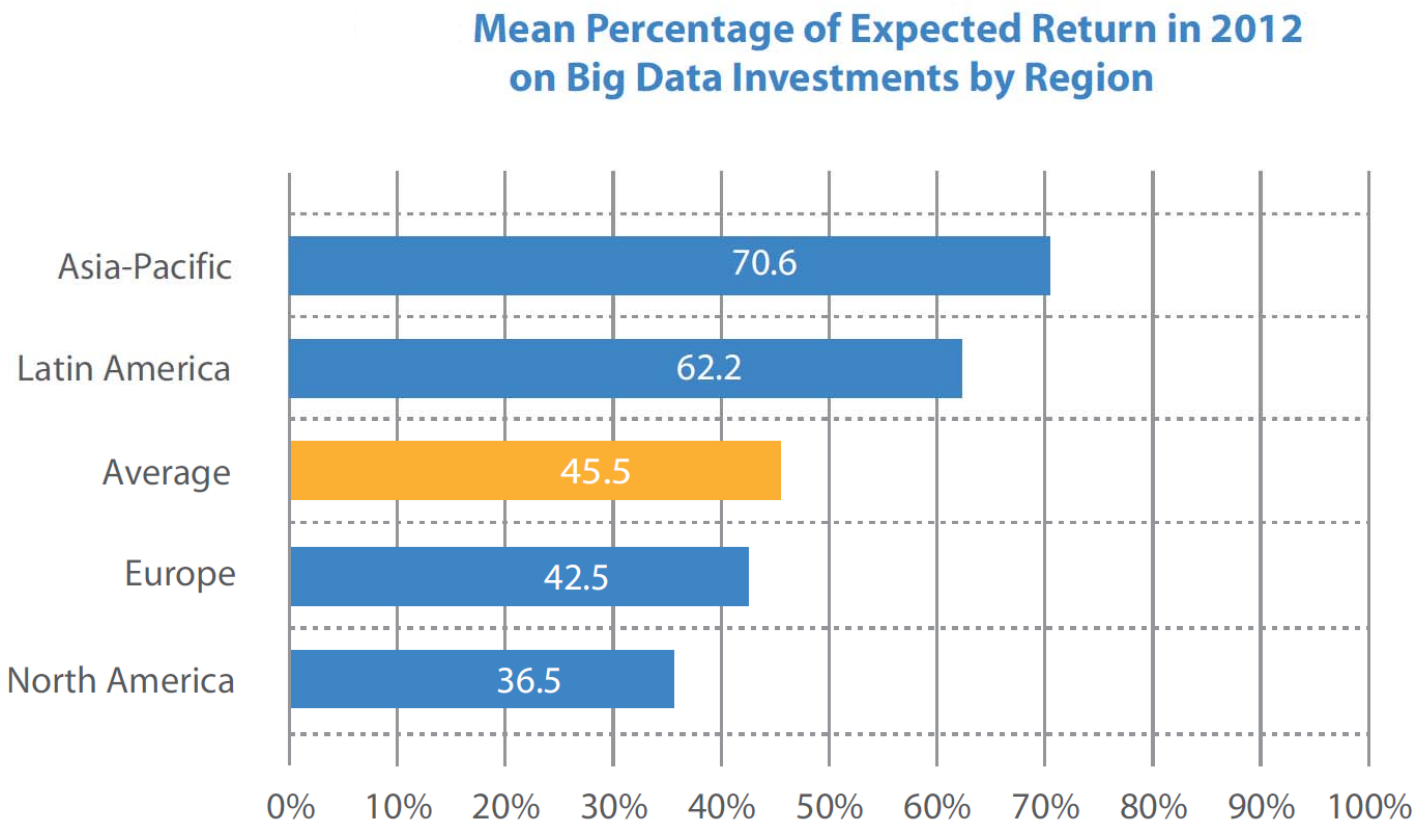
U.S. Ahead, Europe Coming



[Sources/©: TCS 2013 Trend Study Big Data, 643 companies]

Big Data ROI

Very positive ROIs across all regions



$$\text{Percentage ROI} = \frac{\text{Gain from investment - Cost of investment}}{\text{Cost of investment}} * 100$$

[Sources/©: TCS 2013 Trend Study Big Data, 643 companies]

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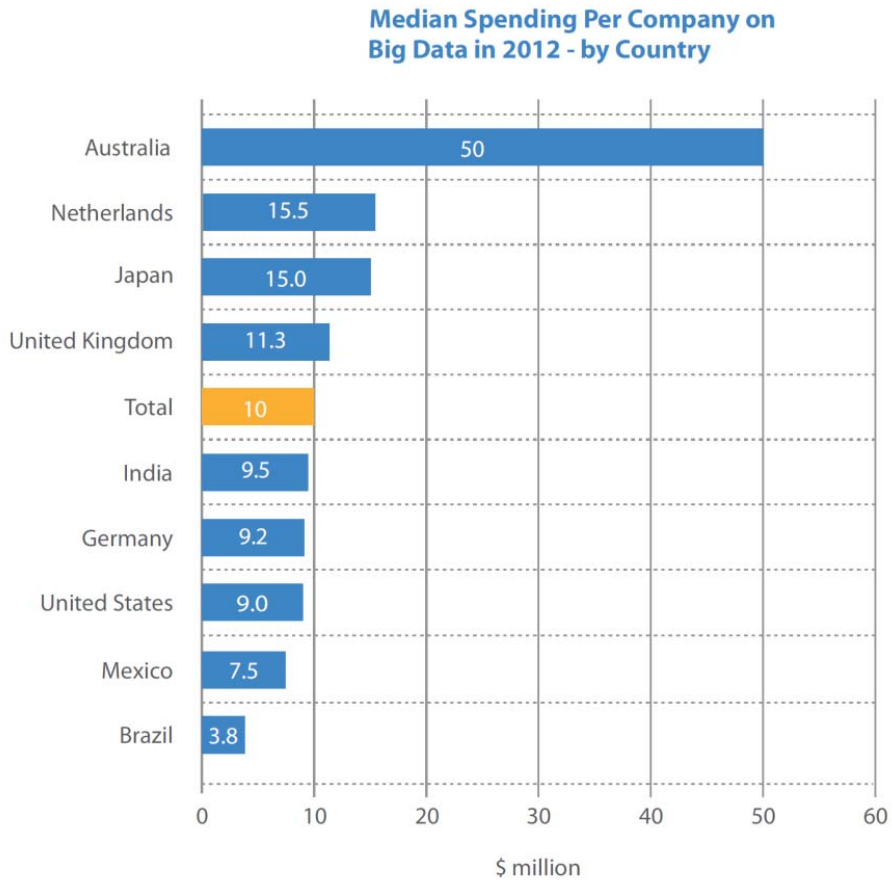
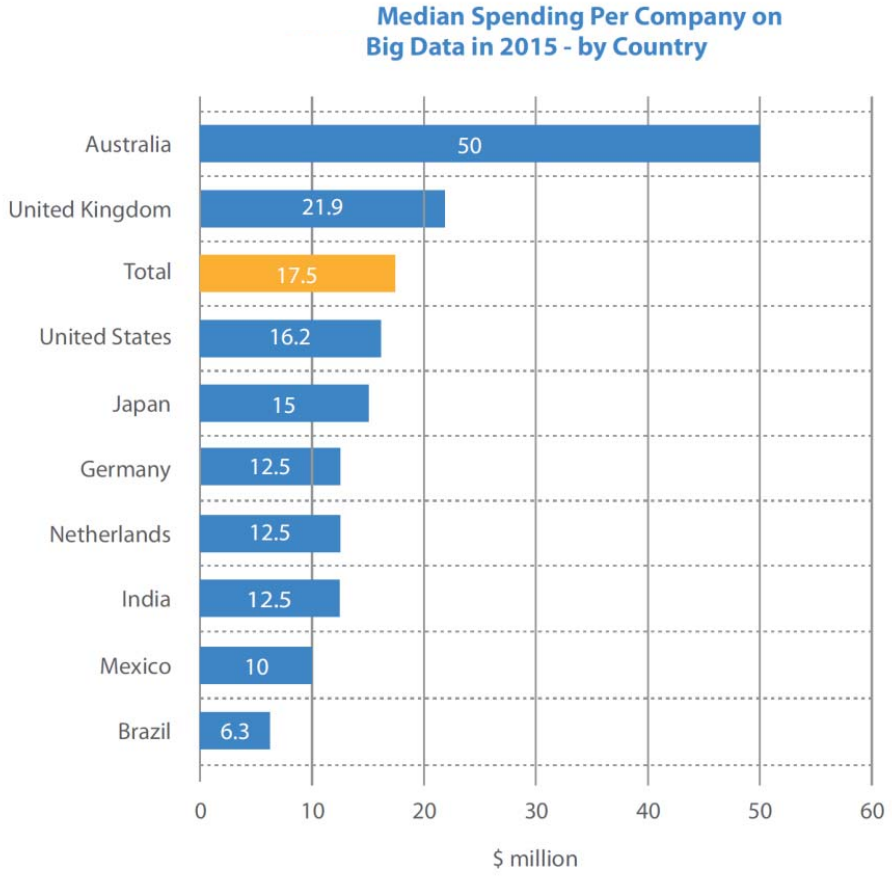
Big Data Efforts Will Increase

Comparison of Actual Volume 2012 with Projected Volume 2015





[Sources/©: TCS 2013 Trend Study Big Data, 643 companies]

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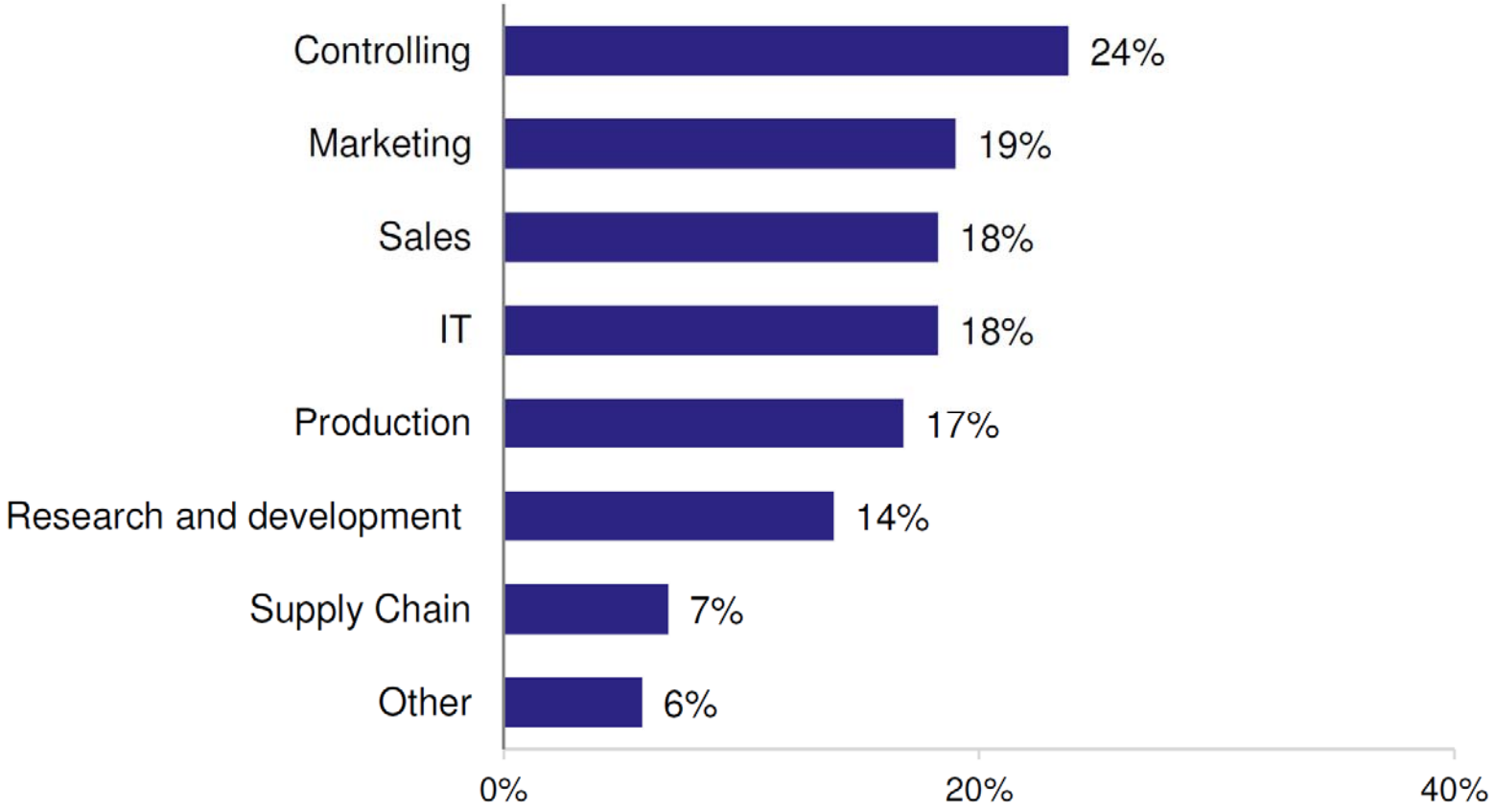
Use Of Big Data in Company Functions

From controlling to research



[Source/© BARC Big Data Survey Europe 2013, 274 Europ. Companies]

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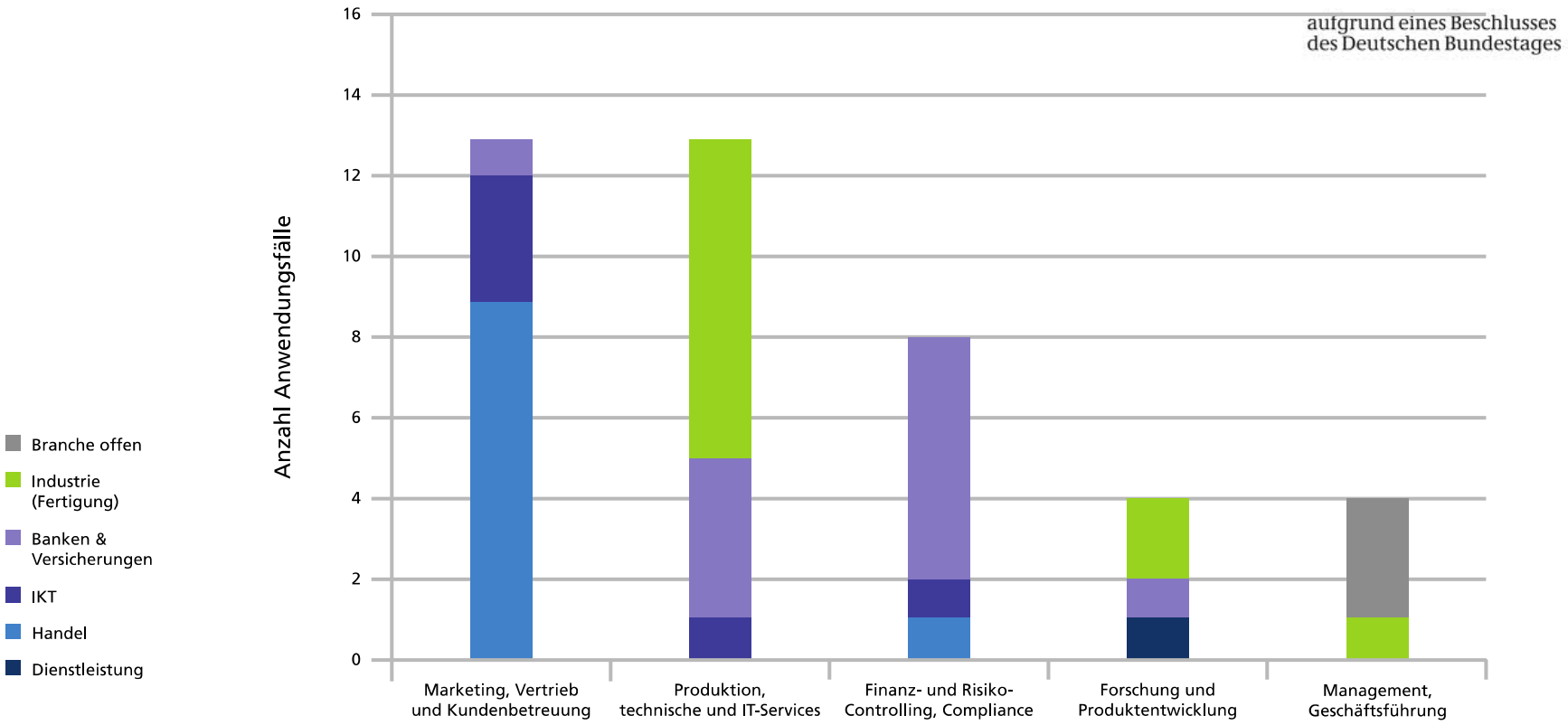
Published Success Stories Across all Sectors

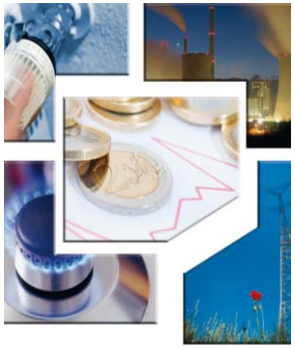
Gefördert durch:
Bundesministerium für Wirtschaft und Technologie
aufgrund eines Beschlusses des Deutschen Bundestages



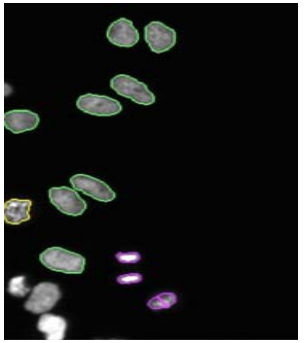
Fraunhofer alliance projects across all sectors

Highlights

Business & Finance



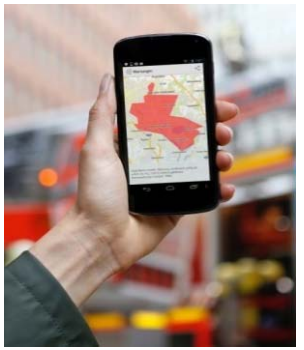
Energy & Environmt



Life Sciences & Health Care

Logistics & Mobility

Production & Industry 4.0

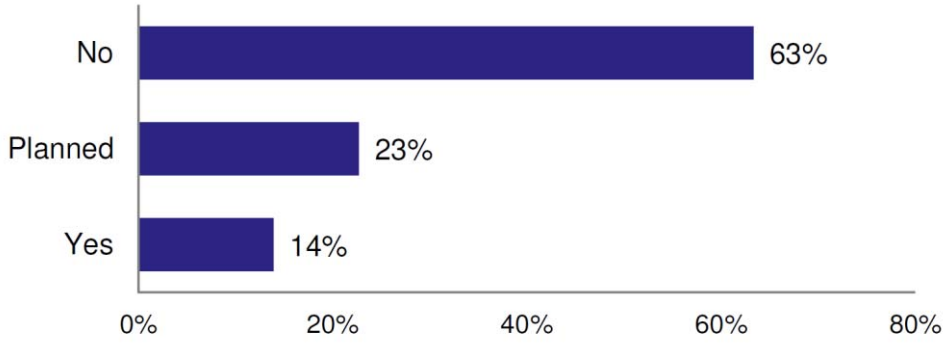


Security

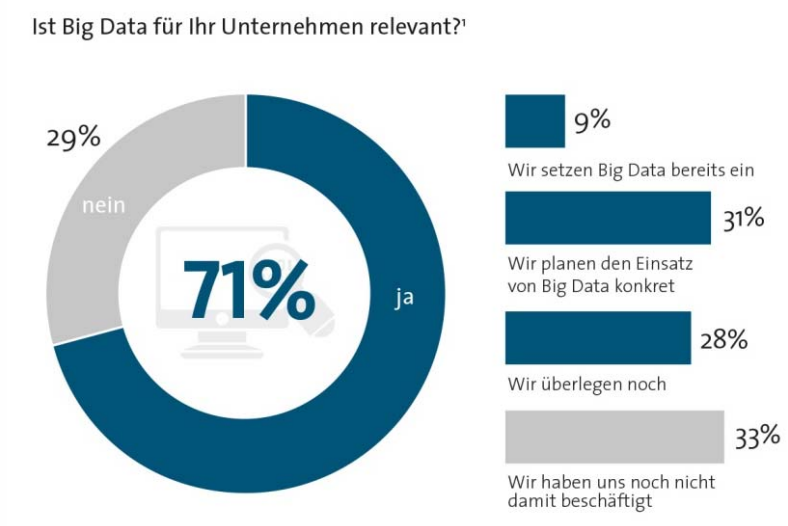
Fraunhofer BIG DATA

Big Data Comprehensive Strategies Rare

Only few companies have comprehensive strategies

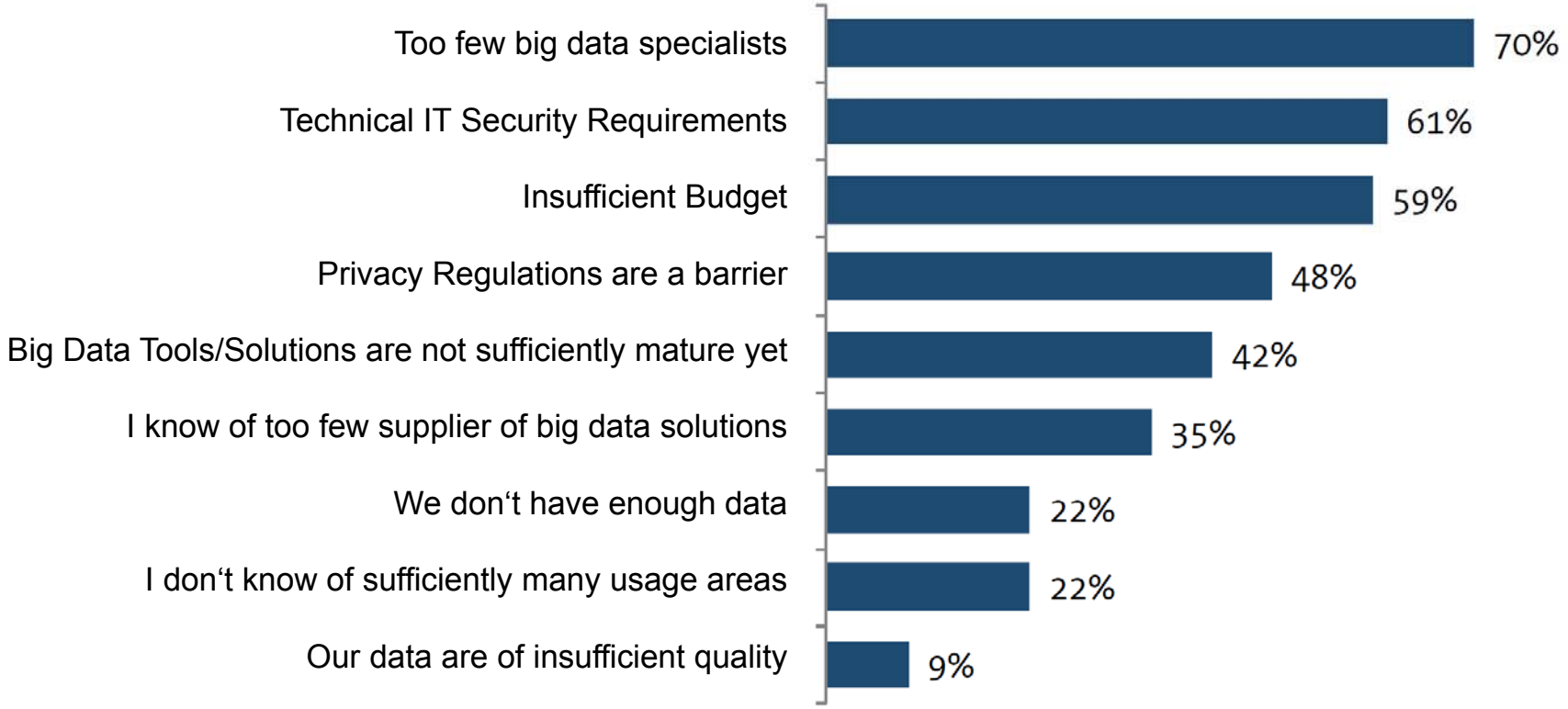


[BARC Big Data Survey Europe ©2013, 274 Companies]



[BITKOM Big Data Survey Germany ©2014, 507 Companies]

Barriers to Big Data in Companies



[BITKOM Big Data Survey Germany ©2014, 507 Companies, transl. SW]

Big Data – Challenges towards Data Value

From data-driven companies to a data-driven economy

Big Data is not an isolated IT topic, but must address business value end-to-end in company/sector specific ways

Technical solutions must be designed-to-fit

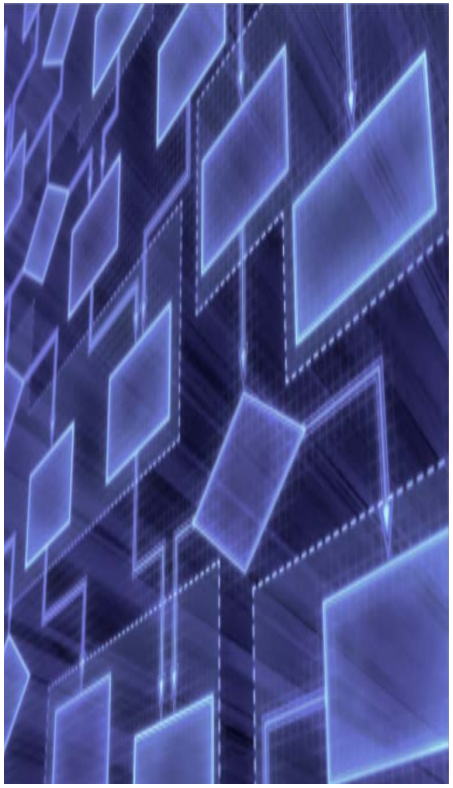
Further innovation needs beyond off-the-shelf software

Data Linking and brokering need open standards

Security and Privacy are demanded by business and society alike – „by design“

Enormous education and training needs

SMEs and startups face special challenges and need a supportive ecosystem



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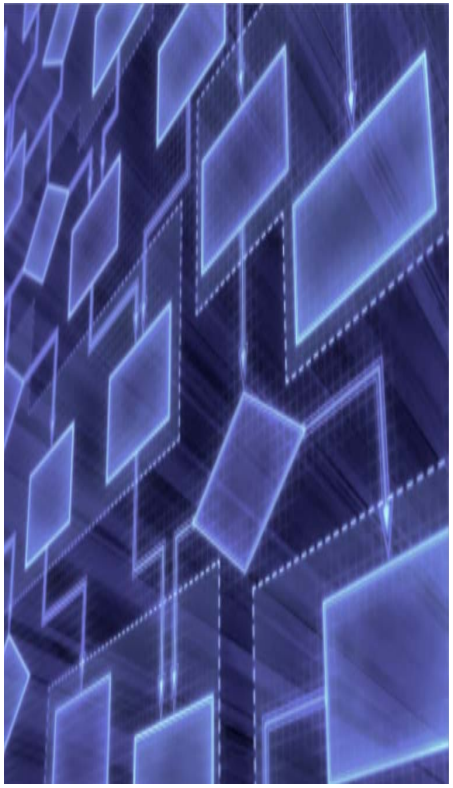
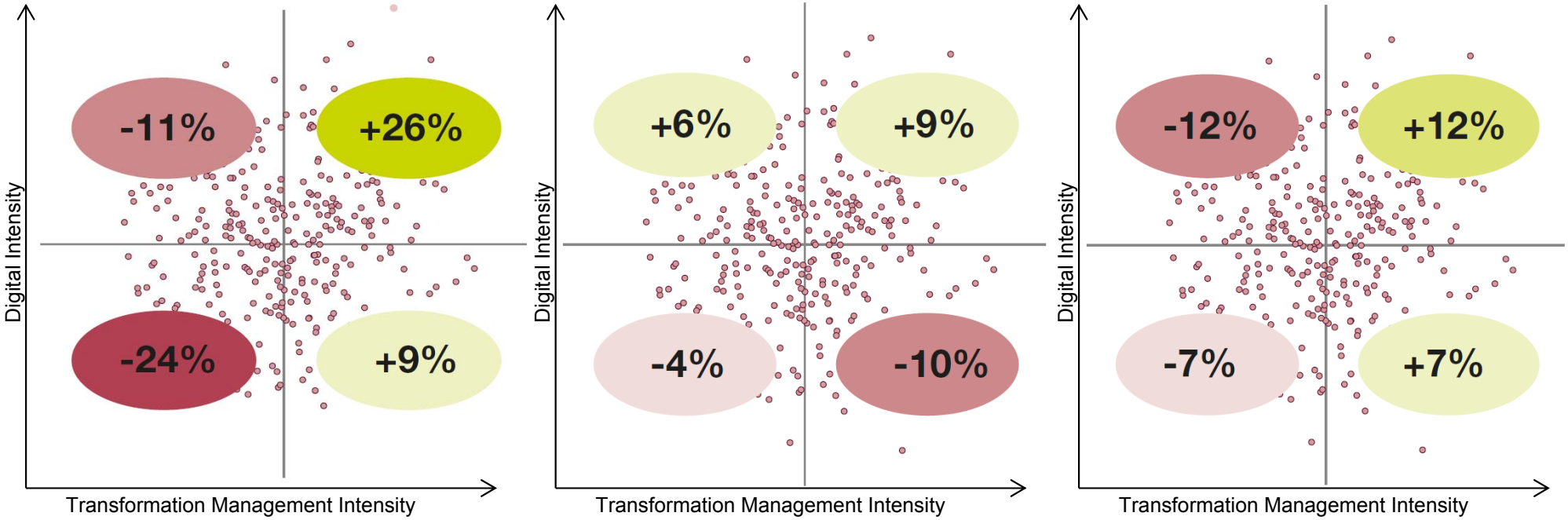


Big Data and the Digital Company

Intensity and Leadership!



Revenue
Revenue/Employee
Fixed Assets Turnover

Profitability
EBIT Margin
Net Profit Margin

Market Valuation
Tobin's Q Ratio
Price/Book Ratio

[MIT Sloan Management Review ©2012]

Operational Excellence

Big Data as a Key Enabler

OE is a complex interplay of multiple factors

- Who do we want to be?
- What are we offering?
- How are we organized?
- What is our style of working?
- What is our common understanding?
- How do we optimally use our means?
- …

Whenever too few factors are being considered, a lot of potential is lost

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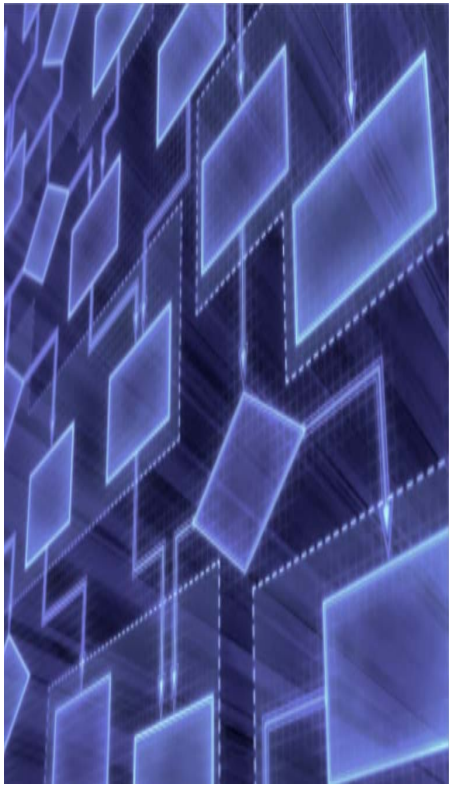

Suppliers and technologies in the context of Big Data (Selection)

[© trademark holders]

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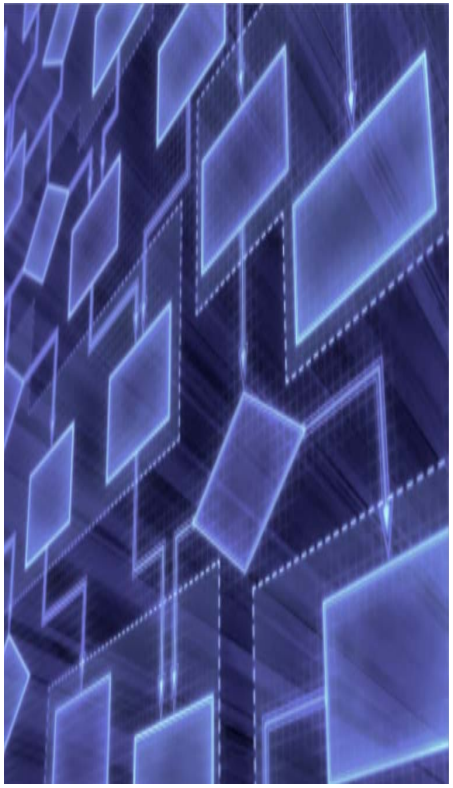
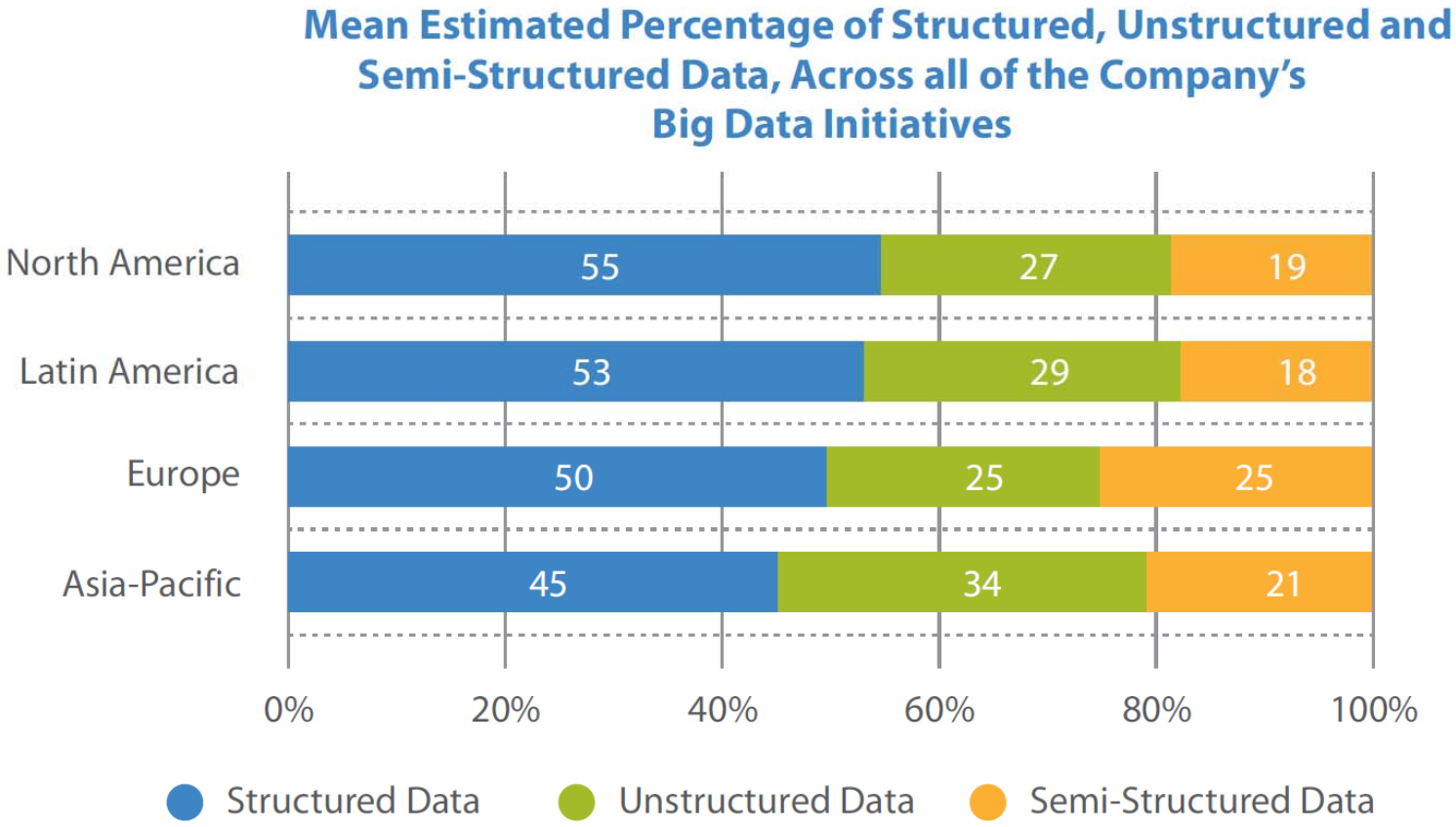


Multimedia dominates

Types of Data in Companies

Structured, Semistructured, Unstructured



[TCS ©2013 Trend Study Big Data, 643 companies]

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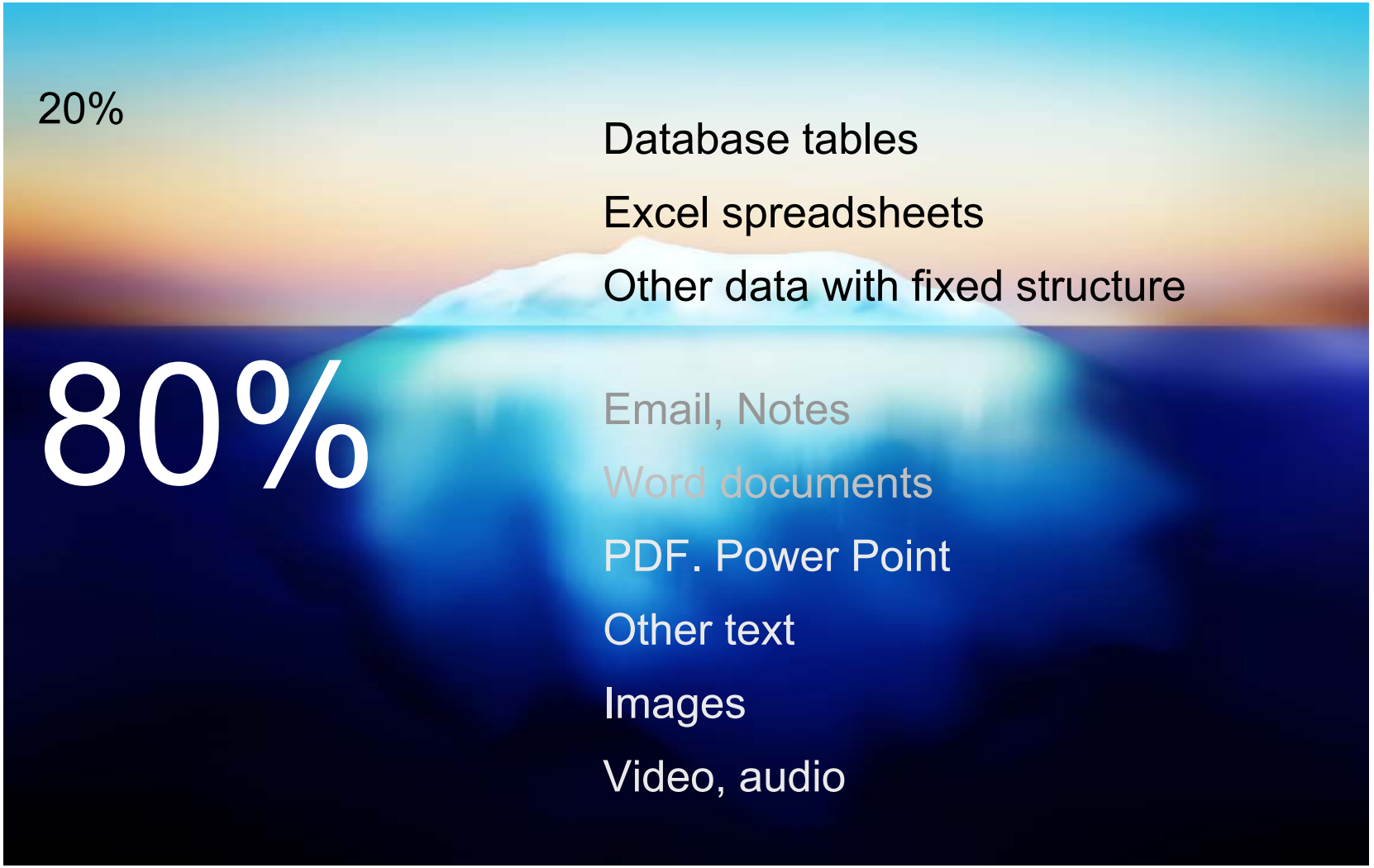
The data iceberg



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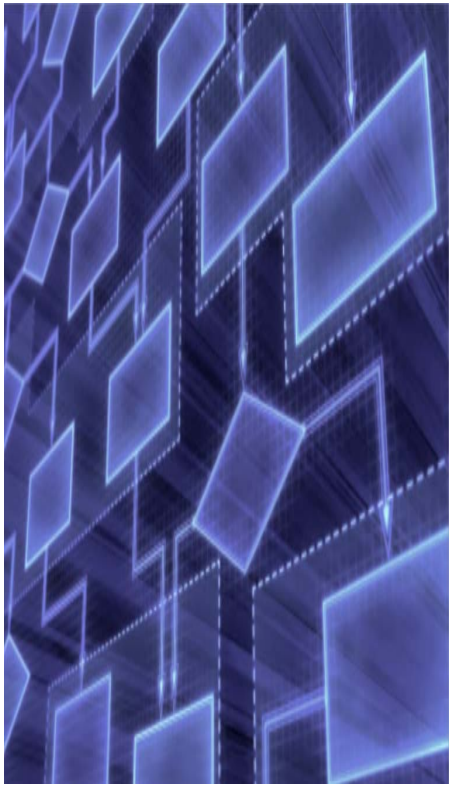
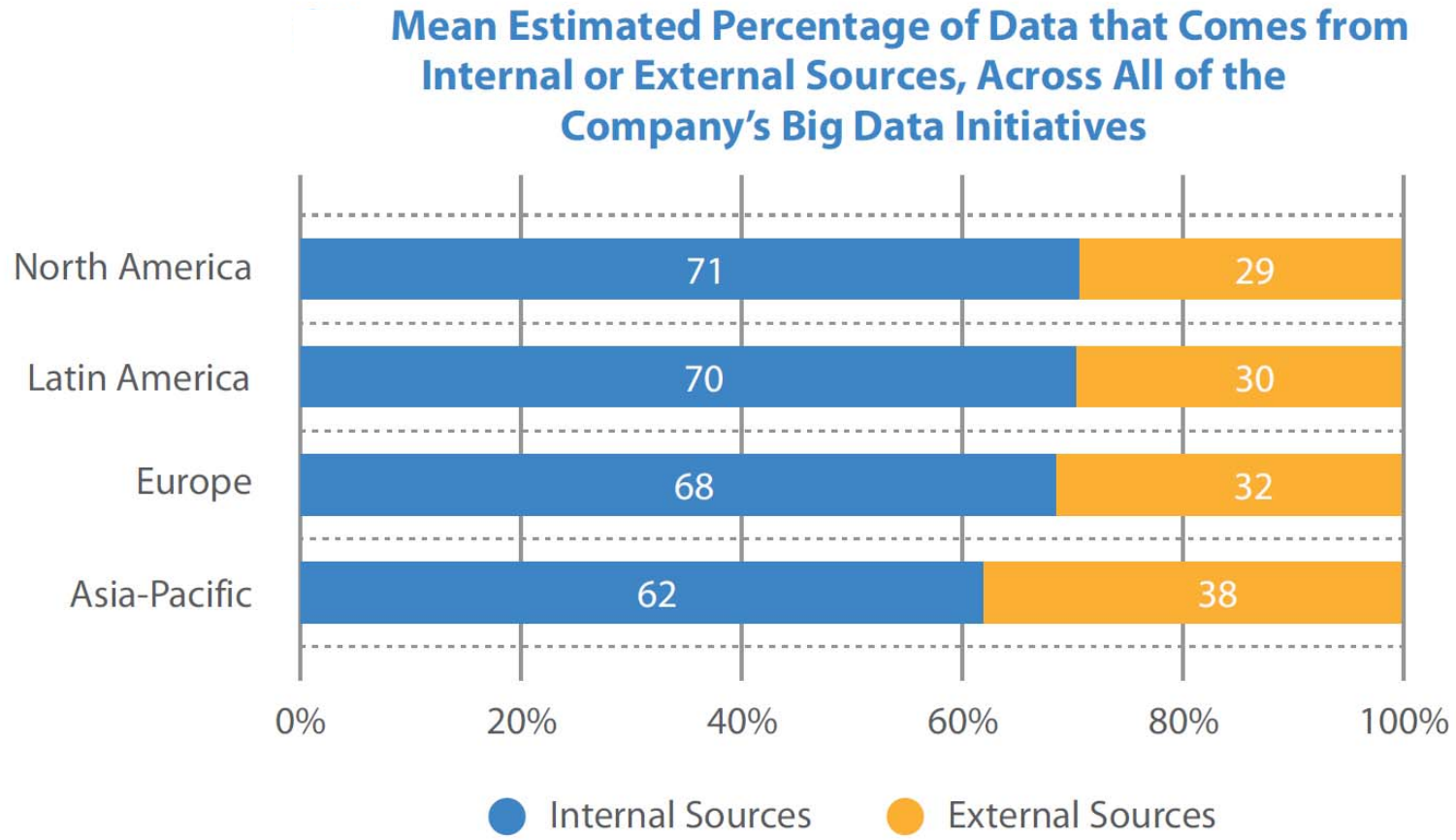


Data sources and origin in companies

Internal vs External



[TCS ©2013 Trend Study Big Data, 643 companies]

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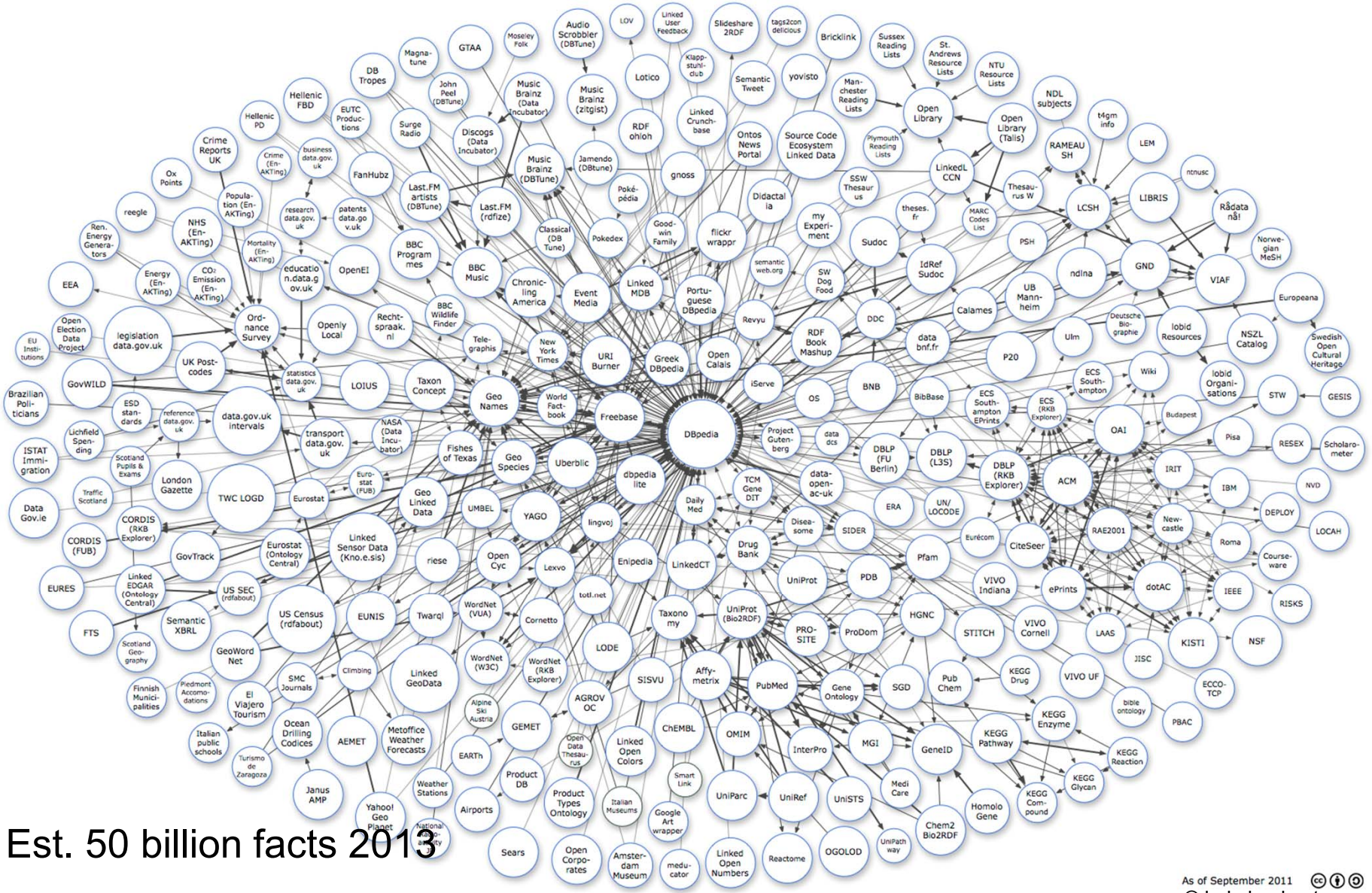
The Linked Open Data Universe



Est. 50 billion facts 2013

As of September 2011

© lod-cloud.net

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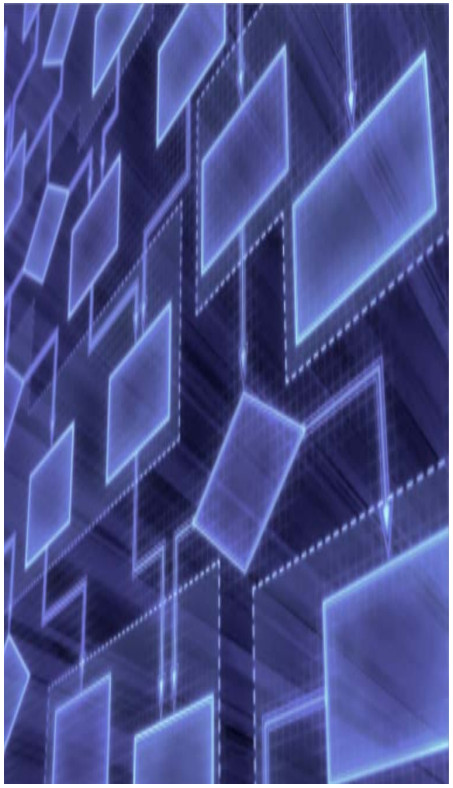
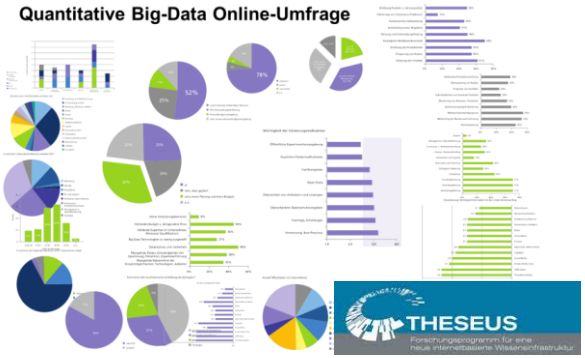


Case study: privacy attitudes in Germany

62	87	95	50
Percent want better privacy protection	Percent believe that companies are using data beyond what is publicly annouced	Percent pay attention to whom they give their data	Percent read the general terms and conditions and privacy rules
10	10	75	80
Percent ready to give their data in social web for coupons	Percent would give data for personalized recommendations	Percent would provide them for medical good	Percent sold their data for 5 € in a lab setting

[Handelsblatt Research Institute 2013]

Roadblocks seen in survey



- Companies see the main challenges in the following areas:
  - Privacy and security (49%)
  - Budgets and priorities (45%)
  - Technical challenges of data management and analytics(38%)
  - Expertise (36%)
  - Lack of familiarity with big data technologies (35%).
- To address these issues, 95% of companies requested
  - Best Practices, Trainings, Supplier and solution catalogues and better privacy lawas and regulation

Big Data – Challenges towards Data Value

From data-driven companies to a data-driven economy

Big Data is not an isolated IT topic, but must address business value end-to-end in company/sector specific ways

Technical solutions must be designed-to-fit

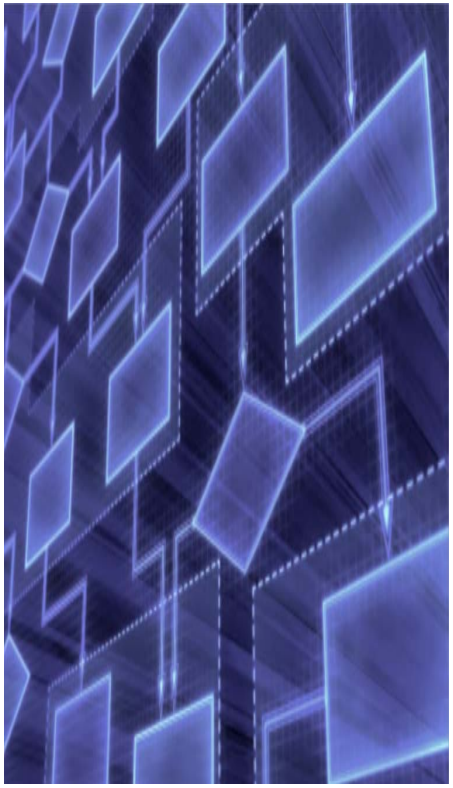
Further innovation needs beyond off-the-shelf software

Data Linking and brokering need open standards

Security and Privacy are demanded by business and society alike – „by design“

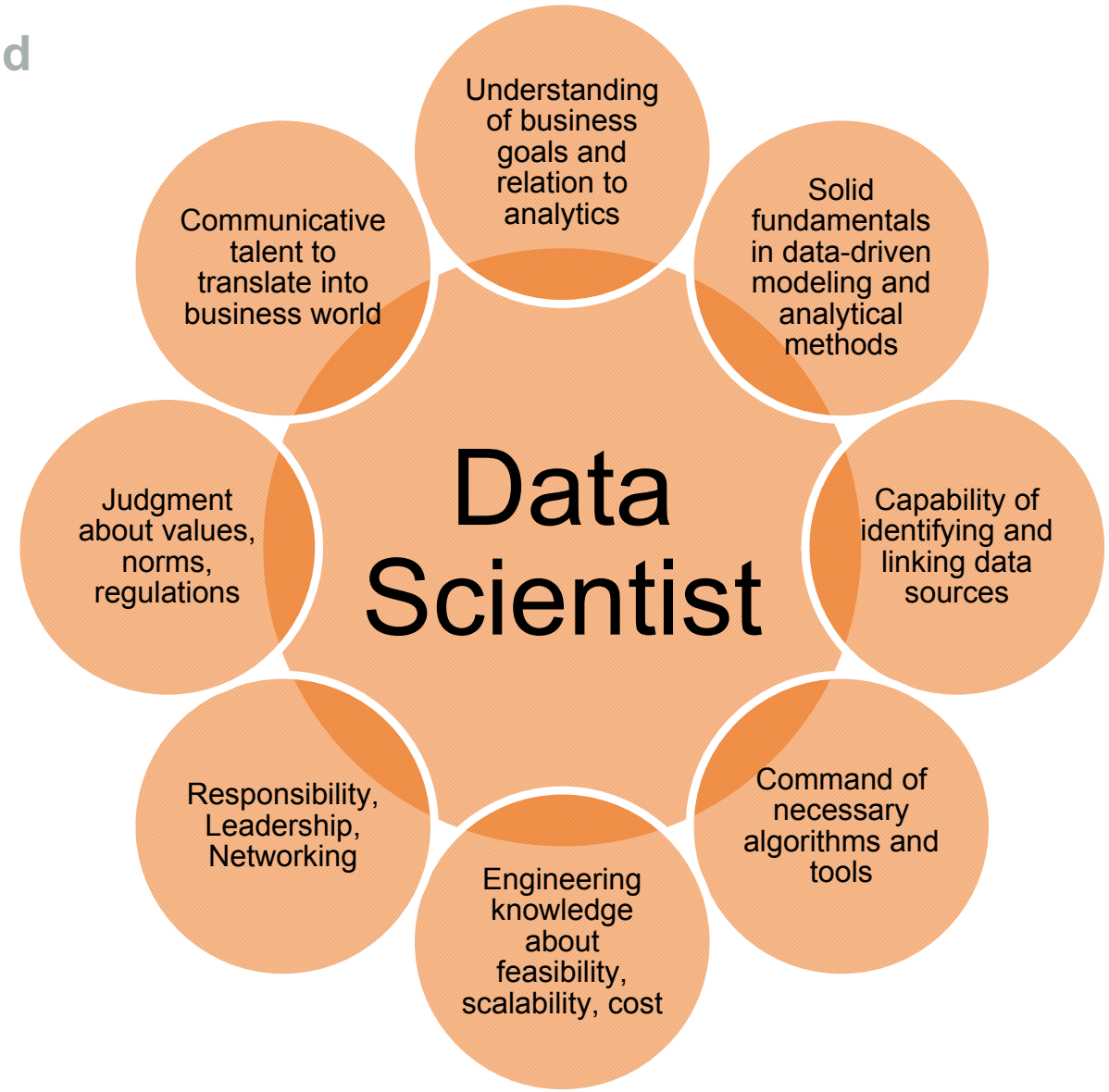
Enormous education and training needs

SMEs and startups face special challenges and need a supportive ecosystem



Data Scientists

From data and analytics to business



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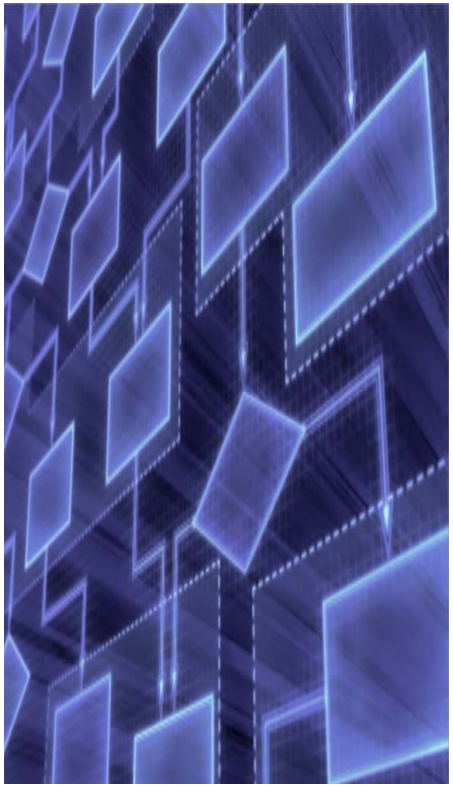
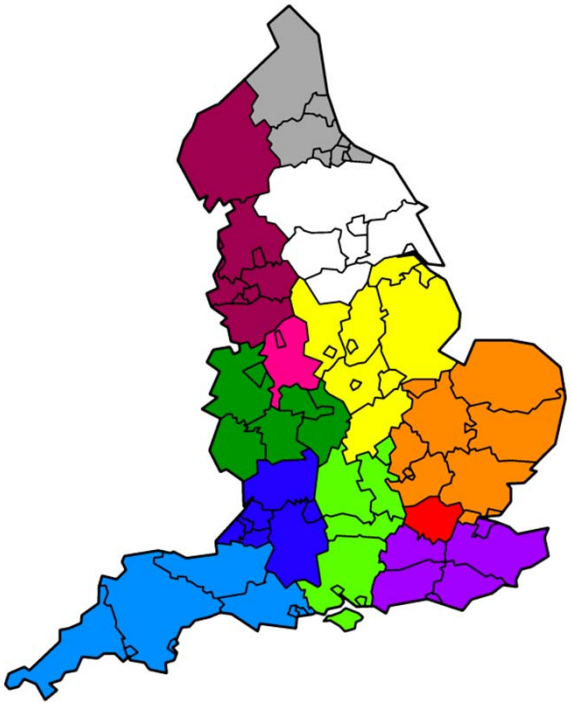


Example National Health Service

The benefits of a working open data ecosystem



NHS provides enormous datasets:

- Hospital Episode Statistics (HES) repository: 100 million records per year (outpatient appointments, A&E attendances, hospital admissions)
- Prescription data: 500 Million records per year, increasingly openly available

Success story:

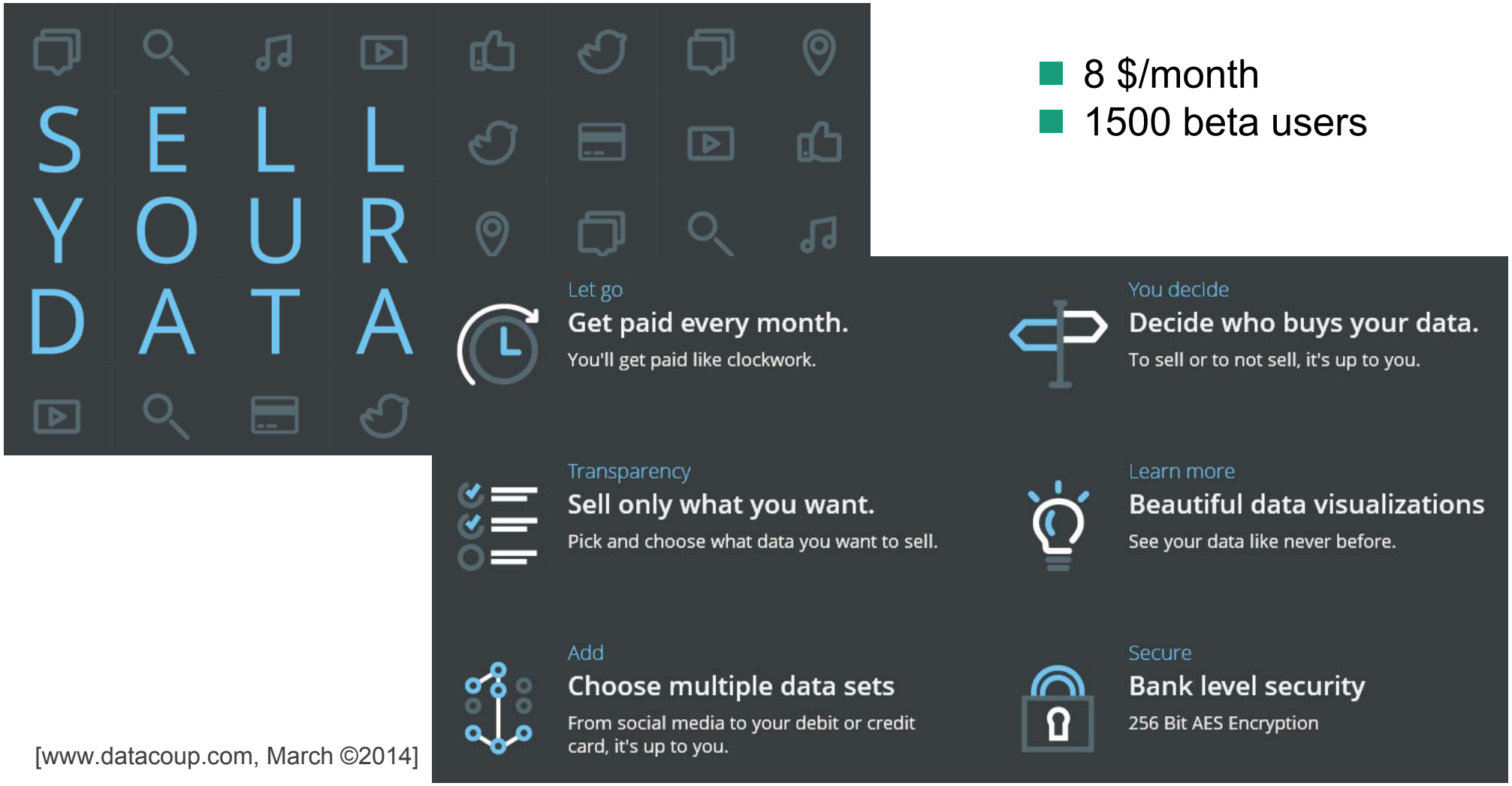
- Analysis of Statin prescriptions 2011-12 (37 Million records) by a team of Mastodon C, Open Health Care UK and BadScience.net
- Annual savings of more than 200 Mio Pounds identified (equally effective medications)

[Guardian, theodi.org, prescribinganalytics.com, wikimedia, 2013]

Returning the value of data

datacoup

An interesting experiment in the U.S.



- 8 $/month
- 1500 beta users

[www.datacoup.com, March ©2014]

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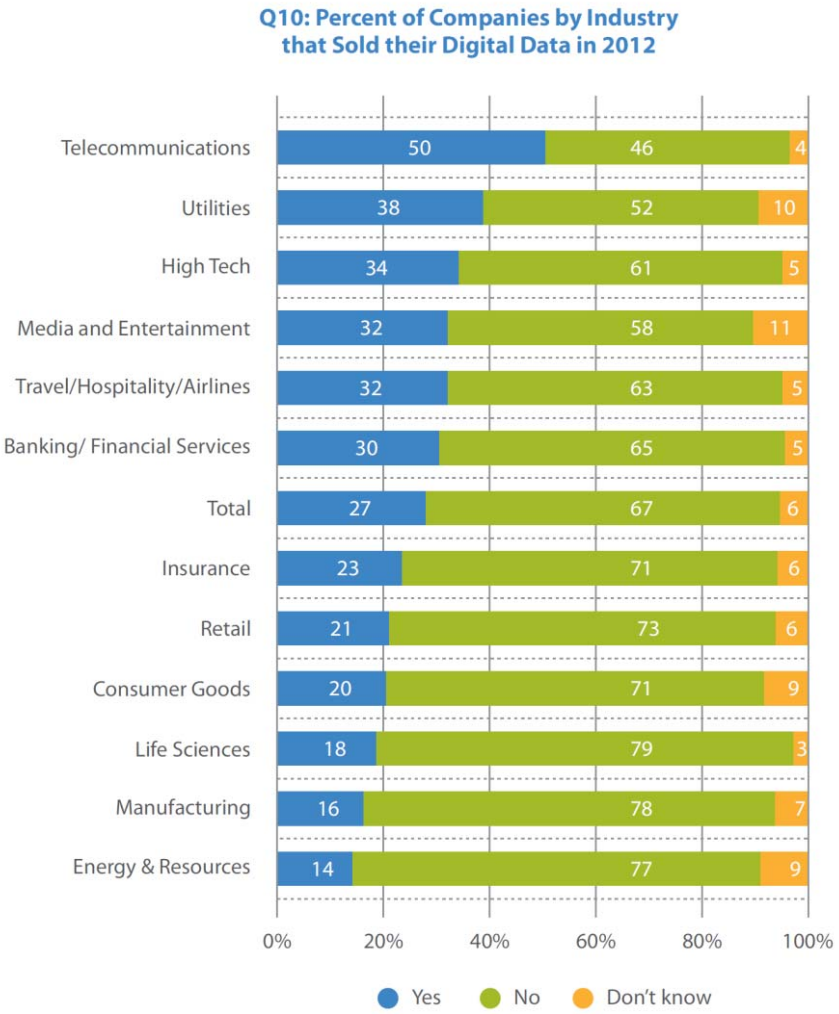
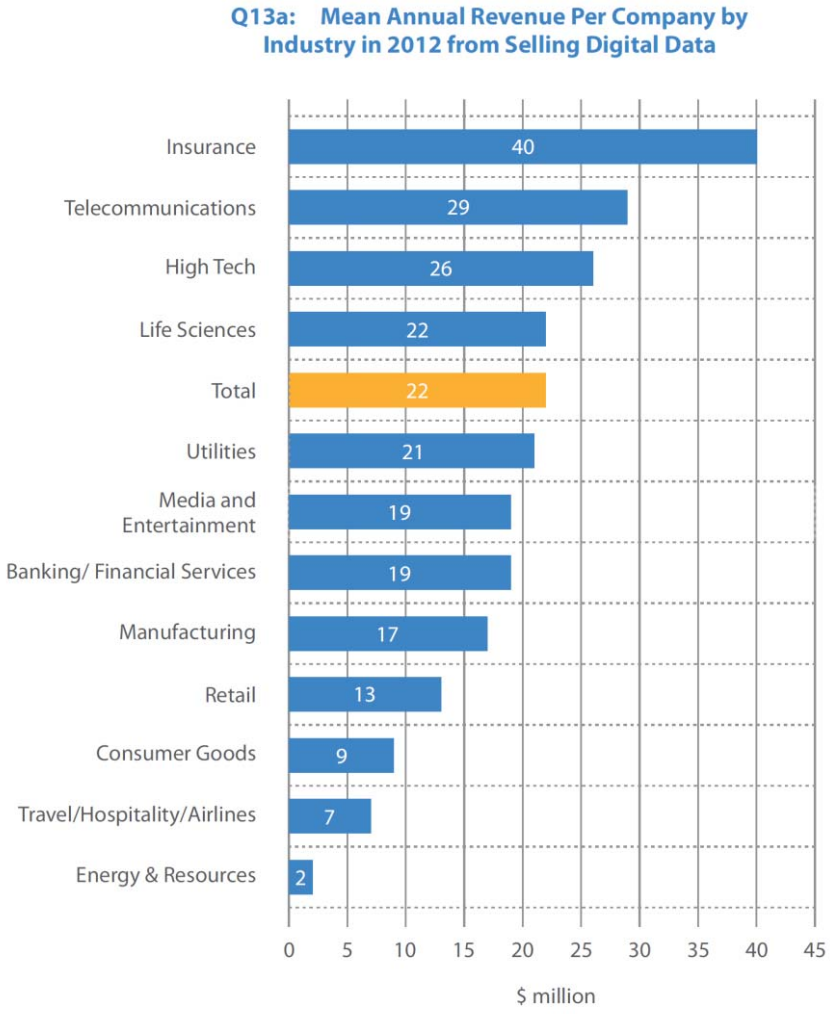
Data as a Product

Is it worth selling?





[TCS ©2013 Trend Study Big Data, 643 companies]

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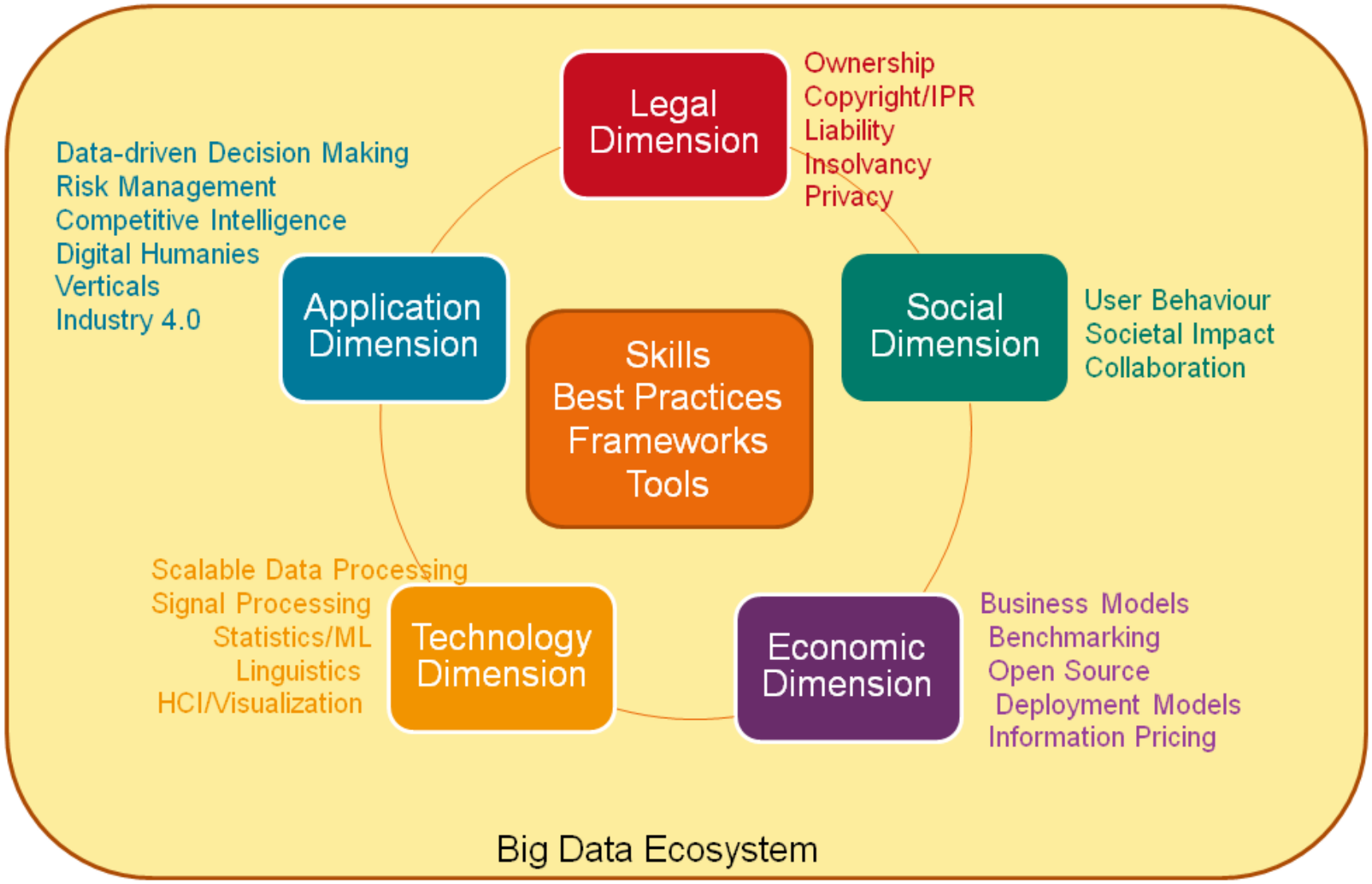
Dimensions of the big data ecosystem

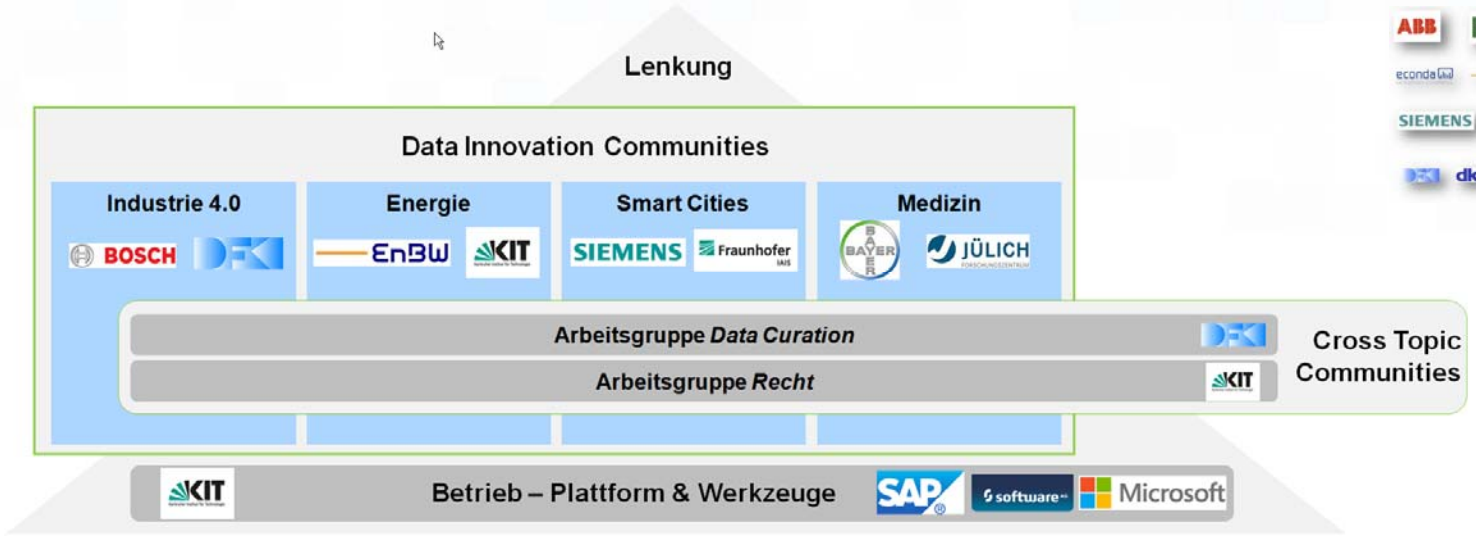


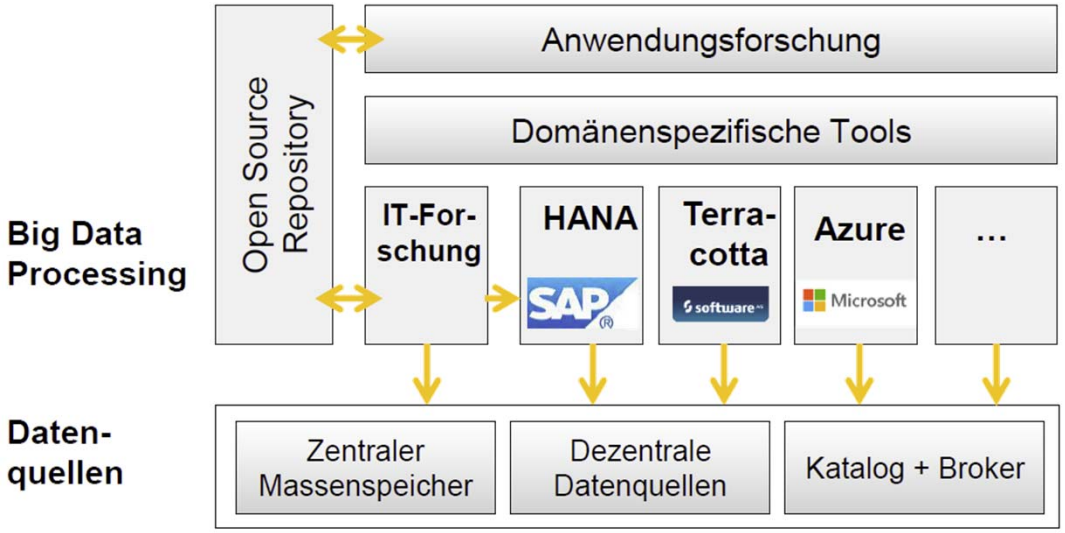
[Cavanillas, Markl, May, Platte, Urban, Wahlster, Wrobel – Big Data Value (Draft), 2014]

Smart Data Innovation Lab

Smart Data Innovation Lab

A nationwide industry-research plattform for big data value





[S. Fischer, SAP/SDIL, ©2014]

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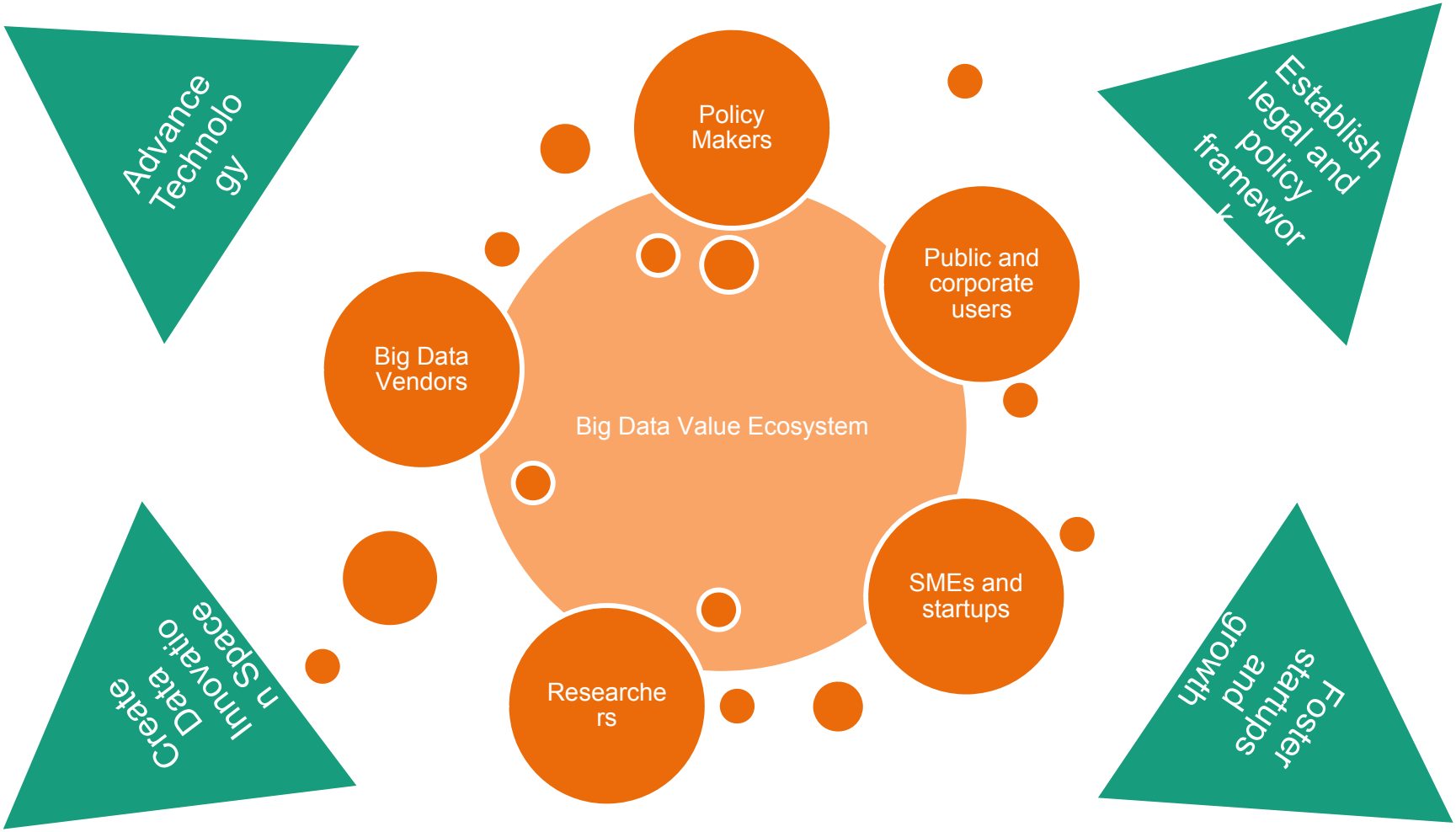
Creating a European Big Data Ecosystem

A Partnership of multiple stakeholders will be needed



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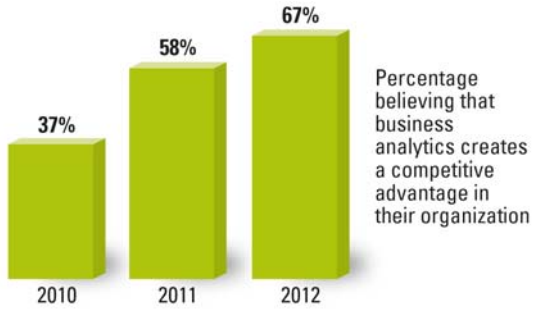
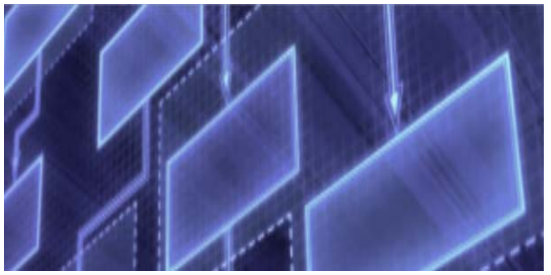
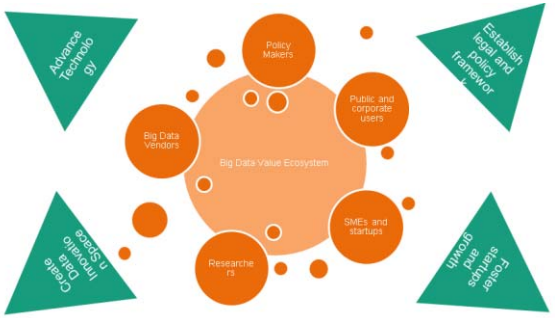
Conclusion

- Big Data is here to stay: significant uptake in companies
- Enormous potential and growth expected
- Significant barriers exist: the big 7 challenges
  - Business value, designed-to-fit, innovation, data linking, privacy, education, SMEs
- Coordinated action by multiple stakeholders at European level needed







[Guardian, theodi.org, prescribinganalytics.com, wikimedia, 2013]