THINK
ACT

THE BIG PROMISE OF BIG DATA

Growing data and the challenges for the telco industry

Roland Berger
Strategy Consultants

THE BIG ✸3

① op·por·tuni·ties

Big Data holds a strong promise for telcos as they can access rich and rare customer data in real-time, providing them with ample opportunities to extract more value from their customer base, optimize costs and create new revenue streams

② po·ten·tial

Telcos that have not moved on Big Data should do so today by defining their Big Data ambitions, establishing what IT solutions to implement and initiating the work to build the supporting organization necessary to unlock the company's Big Data potential

③ suc·cess

Companies who jump onto the Big Data bandwagon need to secure 4 key success factors:
- **Big Data requires C-suite support**
- **Big Data depends on talent**
- **Big Data needs a dedicated organization and clear governance**
- **Big Data requires a supporting IT architecture**

✸ **Big Data architecture p. 6-7**

The telecommunications industry is under pressure, facing declining revenues in developed markets and stagnating growth in emerging ones.

To turn this trend around, telcos will need to tap into new sources of topline growth, while optimizing their cost structure. Big Data has been proposed as one of the potential answers for the industry's revenue growth and cost savings.

While we believe that Big Data could be one of the solutions for telcos to drive revenues and optimize costs, our experience is that players are lagging behind. Many telcos are still to take the first step on the road towards full Big Data implementation. We believe that this is a mistake, as Big Data holds strong promise and telcos are well positioned to occupy a central role in the dawning data ecosystem.

A key stepping stone on the road to Big Data is to implement the necessary IT infrastructure. Companies that want to make Big Data a success also need to design a supporting organization – while making sure to contain the implementation risks throughout the process.

Big Data's big bang

Big Data refers to large, complex data quantities that are difficult to process. The term was coined in 2000 to mark the shift towards surging volumes of data, exchanged at high speed and in a variety of forms. It is accelerated by the growing usage of social media and ubiquitous, connected devices ('The Internet of Things').

In the past, companies have mostly dealt with structured data. This type of data has a high degree of organization, with information stored according to standardized rules. These characteristics make the data easier to exploit; for instance by using classic search-engine algorithms. Unstructured data do not have a pre-defined model or is not organized in a pre-defined manner. This kind of data is typically text-heavy and more complex to manipulate.

The trend towards online solutions (everything from interacting with government authorities to managing social exchanges) is contributing to an overall data volume increase by generating an ocean of unstructured data. Big Data solutions provider EMC predicts that the number of bits in the digital universe will grow by 40% per year between 2013 and 2020.

Companies can now analyze Big Data thanks to new solutions which drastically reduce storage costs and increase processing speeds. This is further boosted by improved statistical methods and the rise of applications to apply these advancements to unstructured data. Big Data aggregates data across systems – from computers to sensors or meters – and leverages huge sets of data points in analyses to deliver unprecedented, accurate insights on customers' behavior that help improve performance and drive revenues.

Big deal for telcos

Big Data is an especially big deal for telcos, which already harness vast amounts of structured data. These data include for example network usage, location, billing transactions and personal information. With Big Data solutions, telcos can add to this pool

both longer time series for its traditional structured data and unstructured data such as call center transcripts and social media exchanges.

Telcos' first Big Data priority tends to be, quite naturally, to leverage analytical solutions in order to improve the efficiency and effectiveness of their current business. Leveraging Big Data can help grow telcos' revenues by optimizing pricing, improving targeting and extending customer lifetime. It will also allow telcos to reduce costs by enabling smarter spending. **A**

Optimizing the performance of existing revenue streams is one important aspect of the Big Data promise, but the large amount of rare, real-time customer data gives telcos a unique position in the Big Data ecosystem. Operators that leverage this unique position to become a customer insight center for other companies will be able to establish new revenue streams and offer a variety of Big Data-based products or services with differing degrees of sophistication and value add.

Some telcos are already leveraging Big Data both to improve current performance and to establish new revenue streams. In the US market, Verizon uses anonymized customer data to sell highly targeted ads to third parties through its subsidiary *Precision Market*

Insights. Its competitor AT&T has created a Big Data powered tower-outage tool to better prioritize repairs of sites where customer experience was the most impacted.

First steps towards Big Data

Although there are telcos that have ventured faster and farther than others into the Big Data domain, our project experience is that many telcos have not yet made the move. Many have instead approached the Big Data topic as an investment in reinforcing analytical tools and skills to process and interpret traditional, structured data sets of accessible size. These data are based on raw data which have been fed into a storage facility ('data warehouse') through an Extract-Transform-Load (ETL) approach. In the process, data are standardized to fit the relational architecture – information which does not fit is discarded.

This pragmatic approach, that we call *smart analytics*, often constitutes our clients' first step towards Big Data. A telco does not need to source new kinds of data, to build substantial storage capacity, or to ensure fast data processing speeds to use smart analytics. It can be run on a traditional data warehouse setup, leveraging basic statistical software. Given the

A

KEY AREAS WHERE TELCOS CAN BENEFIT FROM BIG DATA

AREA	Optimize prices	Improve marketing ROI	Reduce churn	Detect fraud	Optimize network	Resell data	Potential to move into providing data/insight to other parties - ranging from raw data to Big Data as a service.
POTENTIAL INITIATIVE	Determine price sensitivity on a micro-segment level	Identify customers with high likelihood of ac-ceptance	Predict churn and target high risk, high value customers	Correlate calling patterns with fraud	Align investment and main-tenance with presence of high value customers	Source, enhance and package data for resale to other parties	Promising domains for telcos include: • Urban planning and 'smart cities' • Retail network optimization • Enhanced/highly targeted advertisements • Geo-marketing and real-time promotions • Tele-medicine and epidemiology • Connected mobility • Data security and protection
MOVER	Airtel	Celcom	Telefónica	T-Systems	AT&T	Orange	

limited investment necessary, smart analytics often show positive ROI.

Smart analytics can have a substantial impact for telcos that leverage it in the right way. We worked together with a European telco to improve its business performance with such an approach. The results were a list of operational improvement levers that together contributed to an increase of the company's prepaid EBITDA by ~10%.

Another European telco applied smart analytics to improve the smartphone penetration of its customer base in a developing market. The company leveraged statistical analyses on calling patterns to distinguish different calling circles, and within these identify the 'influencers' – a simplified version of T-Mobile's Big Data-based social analysis project. This analysis helped the company target influencers with attractive offers for a set of smartphones, which then generated a threefold increase of the smartphone penetration within the calling circle.

The fact remains however that most telcos have had the possibility to access rich, structured data in their data warehouses for decades. Beginning to apply advanced statistical analysis to their accessible data in order to improve performance is a first step in the right direction. Yet, it is not the usage of mathematical statistics and computer science that makes a company move from small to Big Data. The difference lies rather in sourcing new types of data, storing longer time series of existing data and securing sufficient processing speeds to manage this growing and increasingly complex data pool.

The typical telco's IT infrastructure does not however allow for storage of long time series of data or to process large data sets at high speed – not to mention the incapacity to deal with unstructured data. So for a telco to unlock the full potential of Big Data analytics, it needs to move further than smart analytics by implementing Big Data IT solutions. These solutions are capable of removing the hurdles of insufficient storage capacity, of the current limitation to only leverage structured data, and of data processing speed issues.

Big Data needs big IT

Telcos that aim to move into Big Data therefore need to ensure that they implement an enabling IT solution, which in turn ensures sufficient data storage capacity and processing speed. One solution that has proven to be a relevant for Big Data – with an accessible cost – is Hadoop, named by one of the creators after his son's toy elephant.

As an open-source alternative on the market, it is free to download, to use, and to contribute to the software. Hadoop is based on distributed data storage and processing. This means that data are stored and processed across a network of computers, and data computations can be run in parallel.

The non-relational characteristic of Hadoop also opens up the possibility to store different types of data in 'Data Lakes', without the typical constraints of SQL-based solutions. This makes it attractive for companies that wish to store new types of data (especially unstructured) and to relieve their traditional Enterprise Data Warehouses (EDW) of historical data.

Hadoop's combination of characteristics makes it possible for companies to store, handle and process substantial amounts of complex data quickly. Moreover, several components have been added on-top of the basic Hadoop solution to facilitate its usage and improve its utility. **B**
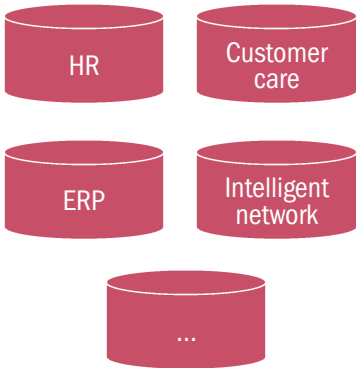
There are however specific skills needed to manipulate data effectively in Hadoop and these skills are rarer on the job market than for instance SQL-skills. One telco executive told us that his company faced a challenge when trying to secure the necessary Hadoop skills internally: "People with these skills are rare and cost a lot of money ... they do not want to be on the payroll, but rather work as contractors".

The substantial lack of Hadoop skills in the market has opened up the field for solution providers to commercialize proprietary, relational solutions on top of Hadoop-based Big Data ones. Traditional enterprise hardware and software companies such as IBM, Oracle and SAP all offer commercial, relational Big Data solutions based on Hadoop. Such solutions offer an
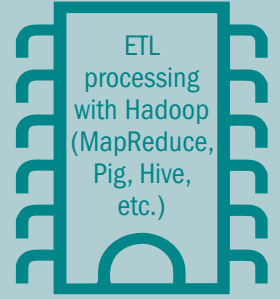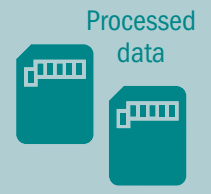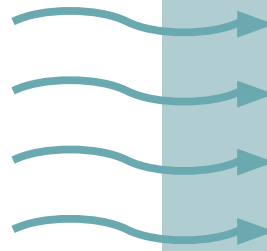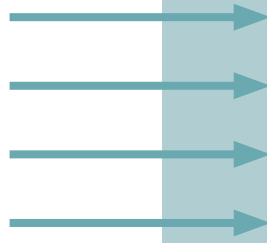
DATA LAKE WITH HADOOP

TRADITIONAL DATA SOURCES

- HR
- Customer care
- ERP
- Intelligent network
- ...

IN-MEMORY PARALLEL INGEST

Processed data

ETL processing with Hadoop (MapReduce, Pig, Hive, etc.)

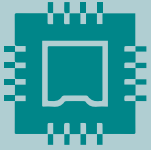**NEW DATA SOURCES**

Social media
Sensor data
Search data
...

Raw data
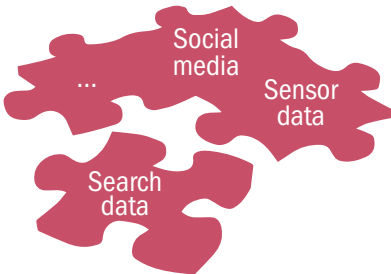
In-memory
services

Analytical

data-marts

Data management/
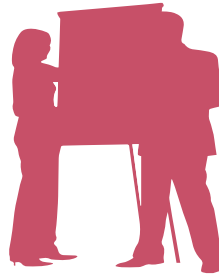search engine

Enterprise

data

warehouse/

data-mart

SECURITY AND CONTROL

BI/ANALYTICAL TOOLS

BIG DATA DEPARTMENT

MARKETING AND SALES

NETWORK

opportunity to telcos and other companies to implement Big Data solutions to be used by their current, SQL-savvy resources – although securing training on the new solutions will still be necessary.

Other solutions that can be used together with Hadoop or stand-alone on another shared file system are also gaining traction. One example is Apache Spark, which claims that its users can run programs in-memory up to 100 times faster than with MapReduce. Companies can leverage these solutions while using Hadoop as a cost efficient data repository.

As companies across the globe look for the right Big Data solution, the Big Data industry is booming. IDC, a research firm, predicts that the global Big Data technology and services market will grow by 26.2% annually between 2014 and 2018 to reach USD 41.5 billion.

The multitude of solutions available in the market leads many executives to feel confused when evaluating the available offers. Our clients' gut feeling often tells them that IT investments are substantial, intensive in hardware and possibly quick to become outdated. Yet this image of the IT reality does generally not hold true for Big Data – as the open-source, distributed solutions offer more flexibility and access at a lesser cost than traditional IT investments. This makes the options more flexible, opening up the opportunity to start small – and then scale up.

Interviewing some of the main providers of Big Data solutions, we find that they all have case studies to prove that they can help drive value through Big Data in telecommunications. However, we gather that most of their work with telcos has not been conducted with key decision makers. In fact, senior management of many of our telco clients say that they are yet to see obvious positive returns on Big Data investments.

Other clients have still not made Big Data an important board-level topic. It is in an early stage and, although case studies abound with proof of concept, it is so far a market primarily driven by Big Data solutions providers rather than telcos' C-suite. We believe that this is a mistake. Telcos' top management should guide the expenditure on Big Data as this market is set to grow significantly in the near future.

Freeing up the necessary funds to invest and securing the implementation of Big Data IT solutions are necessary but not sufficient conditions for a telco to tap into the potential of Big Data. In order to make Big Data investments work, telcos need to build a supporting Big Data organization.

Big hand for Big Data

Telcos need to identify what organizational setup will allow them to best drive their Big Data agenda. Our experience is that clients better manage Big Data projects by creating a central Big Data team, which ensures efficient procurement and use of systems and solutions as well as consistency and coherency in how data is collected and organized. Setting up a Big Data team also allows telcos to better manage all levels of business ambitions for Big Data, from partnerships to free-standing business units and joint ventures.

A Big Data team will also perform better in a context where data analysts are encouraged to experiment and to generate a portfolio of smaller projects rather than a few large-scale ones. This test-and-learn approach must not however lead the Big Data team to become disconnected from the business, making the team an internal 'Math Lab' focusing only on its own priorities.

This is why some telcos have been successful in building one central Big Data team, while creating Big Data satellite resources within other departments. This helps to maintain strong links to the business and to steer the analytical efforts toward solving business issues and uncovering commercial opportunities. Still, there will be a need to recruit and/or train staff on both sides of the barrier to understand the 'other side' – for the business to master the basis of data analysis and for analysts to grasp the fundamental business challenges and priorities. **C**

Managers must also be patient when implementing Big Data solutions. It will take time for the initiatives to bear fruit, and the portfolio approach to projects and analyses will generate not only successful but also failed ones. Telcos need to account for this in their Big

Data strategy and roadmap. If the expectations are set too high too early, telcos run the risk of underinvesting resources and time on Big Data and becoming unable to realize the significant business opportunities that it could unlock. **D**

Big Data not without pitfalls

Implementing adequate IT solutions and building the supporting organization will facilitate telcos' journey toward Big Data. Companies should however anticipate potential risks throughout their implementation process. In our work with clients we are regularly asked to help their Big Data implementation work gain traction (several of them had faced set-backs during their implementation process). The most common pitfalls that our clients have encountered include:
1. Lack of analytical talent
2. Data quality and/or availability issues
3. Ineffective Big Data team of champions
4. Difficulty in securing necessary funds
5. Legal/regulatory challenges
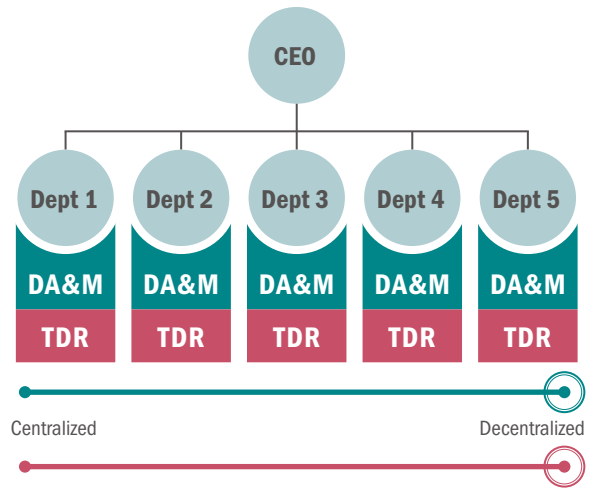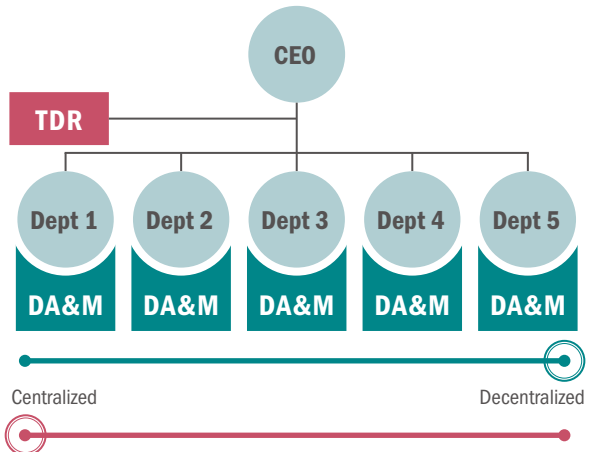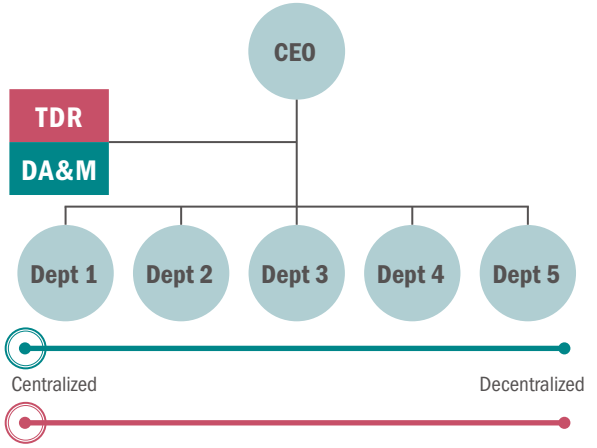
1. LACK OF ANALYTICAL TALENT
Lack of analytical talent and the intense competition to attract resources risks becoming a major drag on Big Data performance. Gartner, a research firm, predicts that one in three Big Data jobs will be vacant in 2015 due to the lack of skilled resources. Any investment is doomed to failure without securing that resources with the right skill sets are onboard.

2. DATA QUALITY AND/OR AVAILABILITY ISSUES
Companies often face these issues particularly when they have not defined a proper data governance setup. Unsatisfactory data quality and/or availability is a key obstacle to overcome as they generate inaccurate datasets, resulting in potentially flawed analysis and conclusions. This can be a challenge especially in emerging markets, where many operators struggle to source and organize accurate data in their systems.

C

ORGANIZATIONAL CHOICES FOR A BIG DATA SETUP

D

BIG DATA PROCESS

- Identify trends
- Query data to find unexpected correlations
- Enrich/improve algorithms and analysis

CRITICALITY
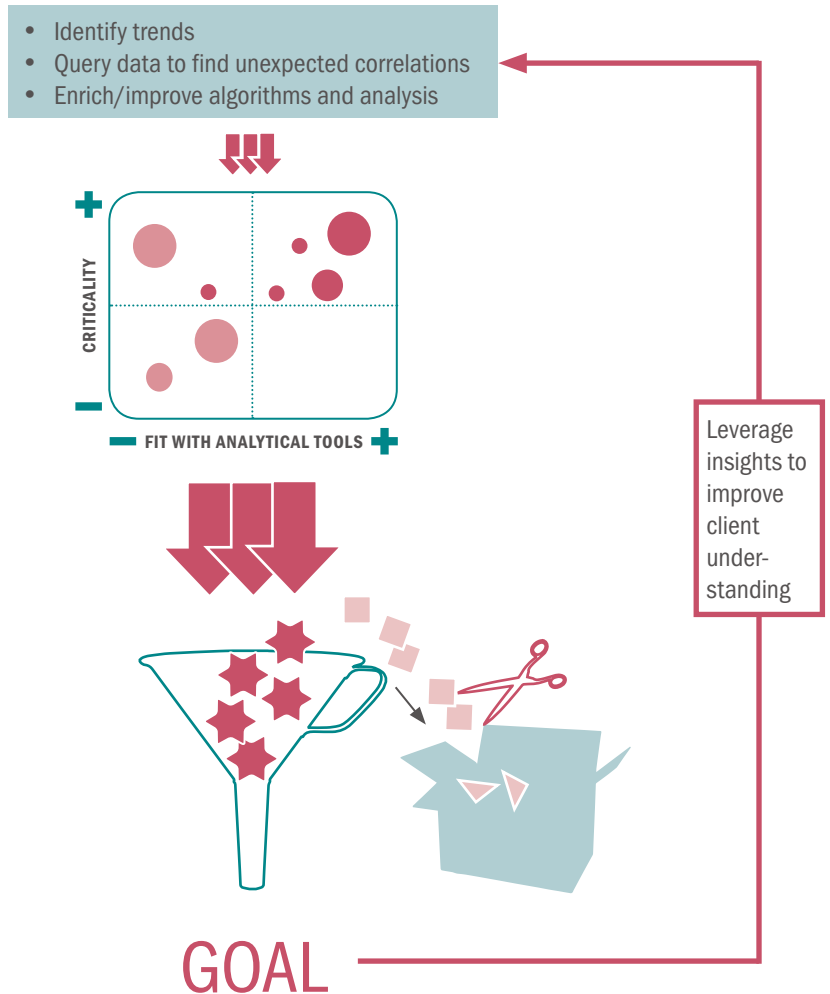
FIT WITH ANALYTICAL TOOLS

Think Big

Identity the most critical business issues to address

Test Small

Build analytical sandbox with iterative testing of a concept portfolio

Learn Fast

Ramp-up successful concepts and kill failed ones

Leverage insights to improve client under-standing

GOAL

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3. INEFFECTIVE BIG DATA TEAM OF CHAMPIONS

Our experience is that many telcos assign their Big Data considerations to the IT/Business Intelligence departments, leaving the commercial departments with little influence on setting priorities and choosing solutions. This is partially because Big Data vendors are doing a good job pitching their solutions to companies' IT/BI staff.

4. DIFFICULTY IN SECURING NECESSARY FUNDS

Many telcos find themselves in a CAPEX squeeze to protect their margins, and executives are unwilling to invest. Thus, Big Data solutions and their associated investments need to be adapted to the company's ambitions and phased accordingly.

5. LEGAL/REGULATORY CHALLENGES

Telcos need to be aware of and respect legal restrictions concerning customer data. As one executive put it, "One thing that would have made our Big Data efforts more efficient, would have been to involve the legal department from day 1". Customers also need to trust that their data are used in their best interest, for example to provide them with more relevant offers.

Big Data organizations

As telcos define what IT solutions to implement and what supporting organizational structure to setup, they should also establish their strategic vision for how they aim to position their company in the Big Data market.

This is why operators that are making the move on Big Data would be wise to look for inspiration among the early movers. We believe that there is no 'one size fits all' for how a telco should position itself on Big Data, and different strategies will require different organizational and governance recipes. The most common strategies for positioning telcos on Big Data in the market are:

1. The Big Data pragmatic
2. The Big Data partnership
3. The Big Data branded solution
4. The Big Data selfstanding business unit/spin-off
5. The Big Data joint venture

What positioning a company chooses to target in the data ecosystem will determine what level of incremental value it can expect to generate from Big Data, with Big Data pragmatics leveraging Big Data in a fashion similar to smart analytics. **E** **F**

#1 THE BIG DATA PRAGMATIC

The Indonesian operator Telkomsel leverages real-time analytics to identify the 'next best offer' for subscribers, ensuring up-sell and improving value extraction from the customer base. The company also leverages data analytics to reduce churn, thus reducing total subscriber acquisition costs and boosting customer lifetime on the network. We recommend companies that wish to implement 'next best offer' solutions to ensure that they have the proper business rules in place to make sure that promoted offers do not harm customer profitability.

Another telco that has leveraged Big Data analytics to reduce churn is T-Mobile in the US. Leveraging a data analytics platform provided by SAS, they managed to identify and analyze social networks

E

POSITIONING ALONG THE VALUE GENERATION AMBITION DIMENSION

#1 The Big Data
pragmatic

#2 The Big Data
partnership

#3 The Big Data
branded solution

#4 The Big Data
selfstanding business unit/ spin-off

#5 The Big Data
joint venture

within their customer base – as well as assigning varying degrees of influential power to people within a given network. This allows T-Mobile to target influencers within social networks, preventing them from churning, thus reducing the churn probability of all customers that are part of the same network.

#2 **THE BIG DATA PARTNERSHIP**

Operator Airtel has joined forces with Mobileum (*formerly*: Roamware) to analyze the data from its

African customers. The goal of this partnership was to leverage Big Data analytics on Airtel's customer data to better understand and predict international travelling and customers' needs while abroad. This initiative can help Airtel push customized offers to probable roamers ahead of travel.

Vodafone has partnered up with the Personal Navigation Device (PND) manufacturer TomTom, providing a global SIM for TomTom's devices in 34 countries. The SIM enables machine-to-machine (M2M) communication between the devices and

F

BIG DATA USE CASES FROM AROUND THE GLOBE

UK Telefónica #4
UK Vodafone #2
GERMANY #3 Deutsche Telekom
SPAIN Telefónica #5
ITALY #2 Deutsche Telekom
INDONESIA #1 Telkomsel
FRANCE Orange #3
SINGAPORE SingTel #4
US T-Mobile #1
AFRICA Airtel #2
NEW ZEALAND Spark New Zealand #4

TomTom's infrastructure. TomTom then leverages the data to provide real-time traffic reports and propose optimized routes in real-time to avoid congestion – creating a value added service for its customers.

Deutsche Telekom partnered with the firm Kiunsys to offer 'smart city' solutions to the Italian city of Pisa. The pilot project, launched in June 2014, provided the city with a Big Data parking optimization service. Sensors in the floor of each parking spot detect whether they are free or occupied. The sensors collect information and share it with the city's server infrastructure. Customers can access information on free spots via the city's free Tap&Park app – and use the app to pay for the parking. This initiative could constitute a stepping stone on the road to make Pisa a 'smart city'. To this could be added demand-based public transportation in real-time, smart traffic lights, optimized routing of emergency vehicles, etc.

#3 THE BIG DATA BRANDED SOLUTION

French telco group Orange has created a Big Data product as part of its business service portfolio named *Flux Vision*. French tourism bodies use this tool to tap into anonymized data on the characteristics and behavior of the telco's customers to better understand for instance the number and profile of tourists present at a given event.

Deutsche Telekom offers several Big Data solutions through its subsidiary T-Systems' enterprise solutions. Their Big Data service portfolio includes real-time security analytics (e.g. identification of data anomalies) and connected mobility (e.g. machine-to-machine information exchange)

#4 THE BIG DATA SELFSTANDING BUSINESS UNIT/SPIN-OFF

Several telcos have launched dedicated business units that provide Big Data solutions to external parties. Spark New Zealand (*formerly* Telecom New Zealand) created a selfstanding Big Data business unit in 2014 called Qrious (pronounced: curious) which offers Big

Data insights and services as well as cloud solutions (software as a service and platform as a service) to private companies and public organizations.

SingTel created *DataSpark* (its Big Data company) in mid-2014 to provide Big Data solutions to third parties. It offers services such as GeoAnalytics which identifies density, movement patterns and footfall data of different target segments. This solution can bring value not only to retailers but also to outdoor advertising agencies, tourism and hospitality companies.

Telefónica's *Dynamic Insights* offers a product it calls *Smart Steps* which leverages analysis of crowds' behavior to help companies and public authorities make better decisions thanks to an improved customer understanding. In one project carried out together with UK retailer Morrisons, Smart Steps leveraged data from UK operator O_2's mobile network and helped increase visits of new or reactivated customers by 150%.

#5 THE BIG DATA JOINT VENTURE

Telefónica has taken a further step in creating new revenue streams through Big Data, creating Yaap. This joint venture with Banco Santander and CaixaBank – the first ever European alliance between a telecom operator and banks – has as its objective to create digital services to simplify people's daily lives. Its first application, Yaap Shopping, aims to become Spain's largest loyalty network, amassing substantial data on customers' shopping behavior.

Big decisions

Even if the full potential of Big Data is not yet crystal clear to all telcos, its potential to generate revenues and optimize costs is enormous. The question should not be whether Big Data works, but how a telco can best make it work. We have identified four key success factors in our work with clients who succeed with Big Data:

BIG DATA REQUIRES C-SUITE SUPPORT
IT departments tend to drive Big Data topics, but Big Data will only work if the 'business' departments (for

example Marketing, Sales, Customer Care, and Network) leverage their business insight to ask the right questions and to set Big Data objectives. Business and IT should approach top management together to convince them of the Big Data promise, build a strategy, establish a roadmap and secure the necessary investment.

BIG DATA DEPENDS ON TALENT

Big Data requires people who are highly skilled in data management, data analysis, and data visualization. Telecom data scientists should ideally also understand the business in order to identify Big Data opportunities. But it also requires other resources, and especially managers, to be trained to better understand the mechanics of the analyses. Companies should also work toward changing the way that they make business decisions, giving data insights more weight when considering different actions.

BIG DATA NEEDS A DEDICATED ORGANIZATION AND CLEAR GOVERNANCE

Telcos that make the move on Big Data need to adapt both their IT and organizational structure. Creating a Big Data team is one necessary step on the way, rethinking how the company deals with data is another one. Internal accountability for data management also needs to be formalized, standards established, policies adopted, processes defined, ownership attributed and all governance aspects shared with internal stakeholders. Companies should also make sure to include an opt-out possibility for customers who do not wish that their data are used for Big Data initiatives. This is paramount in order to maintain customers' trust in the market.

Adequate data governance will help assure data availability and quality. It is also key to ensure respect of regulations for handling customer data. In short, a company with Big Data ambitions needs to become a Big Data organization and the organizational setup should reflect what Big Data positioning the company aims to adopt.

BIG DATA REQUIRES A SUPPORTING IT ARCHITECTURE

Big Data cannot be parachuted into an organization. Telcos that want to move ahead with Big Data first need to establish a strategy for how they aim to collect, manage, and analyze data. Big Data setups will for instance require an integration of structured and unstructured elements, together with supporting, analytical tools. Data quality also needs to be assured throughout the process. Telcos will need to ensure that they invest their IT CAPEX wisely, adapting and phasing the investments to match their ambitions, as defined in their Big Data strategy.

We believe that telcos in mature and emerging markets alike should act now and define their Big Data strategy and roadmap. By adopting a step-by-step, learning-by-doing approach toward fully-fledged Big Data implementation they will ensure that capital is well spent. Telcos that do not invest in Big Data now will be left behind by competitors that leverage its potential to grow their businesses.

ABOUT US

Roland Berger Strategy Consultants

Roland Berger Strategy Consultants, founded in 1967, is the only leading global consultancy with German heritage and of European origin. With 2,400 employees working from 36 countries, we have successful operations in all major international markets. Our 50 offices are located in the key global business hubs. The consultancy is an independent partnership owned exclusively by 220 Partners. **WWW.ROLANDBERGER.COM**

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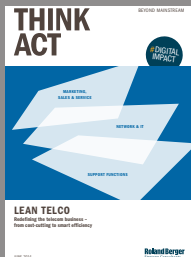
LEAN TELCO – REDEFINING THE TELECOM BUSINESS

New challenges await telecommunication companies in Europe: The cost-cutting strategies that have boosted growth and profits in the past have long since exhausted their potential. Until 2007, telcos were still able to increase profits by as much as 7% per annum. Since 2008, however, this upsurge has given way to a constant decline of around 2% a year – and there is no sign of an end to this negative trend in the years ahead.

SOCIALIZE YOUR BUSINESS - DIGITAL TRANSFORMATION 2014

Digitalization is a game changer: Social media as part of the fourth industrial revolution will give rise to radical innovations and disruptive business models. The digital company of the future will be better networked, more intelligent and more 'social'.
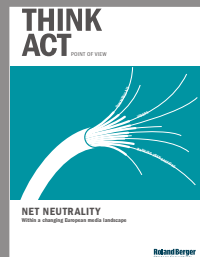
NET NEUTRALITY WITHIN A CHANGING EUROPEAN MEDIA LANDSCAPE

Some Internet Service Providers are looking at forms of paid traffic management to cover investments in network capacity expansion to prevent congestion. In the meantime, the European Parliament has submitted a proposition to block such initiatives, hence imposing Net Neutrality by law. This seemingly technical discussion has far reaching business implications for this industry and the economy.

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