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VanillaPlus Insight April/May 2013

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The report author,
Justin van der Lande,
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Analysys Mason

Executive summary

Big data although poorly defined has created considerable interest in both vendors and Communication Service Providers (CSPs) and has got big data onto the agenda of most CSPs at board level. However, tight fiscal conditions, coupled with the unsettled nature of vendors, are causing some delays in decision making. This does not detract from the increasing realisation by CSPs that the data that they is hold is valuable and should be used to optimise current internal processes or should be offered as a service for external consumption.

The market for big data analytics (BDA) tools is immature with little information on what the best uses are for CSPs to give vendors guidance on what to focus on when building their solutions. There are many different ideas about what uses are most valuable, leading to a highly fractured market for vendors to address and one that is less attractive for them to develop applications for. This has resulted in few out-of-the-box applications on the market. This in turn continues to make implementation more costly and complex for CSPs and therefore they are less likely to implement them.

Making a business decision on prioritising which project or use case needs addressing must be taken by CSPs to provide the impetus for vendors to develop better solutions and in the medium term this will provide CSPs with better more developed applications to deploy.
Big data analytics skills are scarce, which increases the costs of implementing and operating new solutions for CSPs. This requires organisational change in most CSPs to create a cross departmental, centralised BDA department. The expensive resources and skills can then be utilised across the complete organisation and not restricted to a single functional department, such as marketing, which occurs today. In addition this improves the sharing of data from across the enterprise. BDA can only improve current processes if it is able to apply new data and with better analytics models, the sharing of data is therefore is an integral part of any implementation.

Introduction

This report looks as how BDA can be used within the CSPs to create value. Big data is not new within telecoms, CSPs are one of the heaviest users of data, but the advent of the recent hype has helped raise the topic high on to the agenda of every major CSP leaving four key questions to be answered.

- What are the business challenges that big data analytics should be used to solve?
- Where is the data needed to build optimum analytics models?
- What is the right business structure to support this requirement?
- What software tools are there to support BDA?

The use of BDA has grown over time within CSPs and should be viewed as evolution of technology and businesses requirements. Technology is driving increasingly sophisticated subscriber devices that are using communication networks in new ways and becoming part of the fabric of every telecoms market, both developed and emerging. The types of services that are now available are increasing and the content and applications that use them changing in variety rapidly. Technology changes also provide the ability to monitor, store and analyse data cheaper than ever before allowing for much greater detail on every aspect of a consumer, device, network or services to potentially be used to optimise every process that is impacted by it.

Business requirements are driving CSPs into needing to better utilise their resources, as the once powerful growth of telecoms services are in now decline in some mature markets. This saw headlines such as the Dutch mobile market declining by 4.5% in 2012 (reported in the Dutch daily news), or Spain losing 5% of its mobile subscribers in 2012 (reported in Forbes). These financial pressures have shifted an agenda based heavily on growth, to one more based on extracting greater value from current assets. BDA is widely seen as one of the tools that can be applied to current processes on order to do this. In addition BDA can be used as a revenue generation tool to provide potential new streams of income from outside more traditional telecoms services.

This report looks at the issues in three sections: an overview of what big data is and what elements are needed to deliver a successful project, what the key business uses are for BDA within telecoms and finally what systems are needed to deliver a solution.

Creating a big data analytics solution

There are three elements that need to be considered when creating a BDA solution and all three elements will need to work for a project to be successful.

- **Data** – Every project needs to consider the implications of the data that is needed. This is broken into a number of factors:
  - The availability of data, where is it currently held and can it be accessed in the time and format needed.
  - What are the impacts of using this data; does the collection affect network performance or other operational systems?
  - The costs of acquiring, storing and manipulating the required data.

  Often data is not widely available between departments within the same CSP, restricting the data sets that BDA can applied to. Sharing data across departments, particularly network and customer data, will enable solutions to use a richer set of attributes with which to model and optimise business processes.

- **Staff and skills** – To create and manage models and applications needs staff with a deep understanding of data and the implications of changes within it. Big data projects need to find appropriate resources internally with CSPs or rely on software or systems integrators to provide the expertise that is required. This is an on-going commitment as data and requirements change and inevitably models need continuous refinements. The implications of this are that highly skilled resources are expensive and need to be used as efficiently as possible across the CSP.

  CSPs that have taken a more strategic view of BDA have often come to the conclusion that organisational change may be necessary to best utilise the resources they have and have therefore created a centralised function.

- **Software** – The tools needed to support a data driven project to provide the acquisition, consolidation, storage analysis, visualisation and automations that are needed to deliver the project. Software tools are considered later inthis report.

Definition of big data and its implications

Big data is described as having three characteristics:

- **Volume:** The large volume of available data is a key characteristic of big data.
- **Variety:** Data comes from various different sources – CDRs, data sessions, social networks, internal reports, transaction based systems and in different formats (alphanumeric, XML, audio, etc.).
- **Velocity:** The velocity, understood as the frequency at which data is generated. The high frequency of data capture brings new opportunities in terms of real-time management and reporting.

This combination of big data characterteristics is driving substantial changes within the IT requirements, with the greater use of unstructured or semi-structured data changing storage and modelling requirements. Unstructured data had not been stored or had analysis done to it as it was constainly being updated with often the latest reading deemed to be significant. This transient data, sometimes refered to as 'data in motion', can however have a much higher value if it is acted on quickly. In the past the cost to do this in near-real-time was prohibitive, making business cases poor and the value of the data low.

This requirement for near-real-time analytics to be performed on large data sets combined with a need to act of the results for huge volumes of data is moving the BDA to need tight integration into business process management engine as an integral part of the system. In the past most processes were done off-line and required manual interventions, new uses need to act faster, as a lower costs and on larger number of insights need to be automated.

Figure 1 shows the move to process driven and in-line analytics where processes are automated from insights derived from analytics tools and systems.

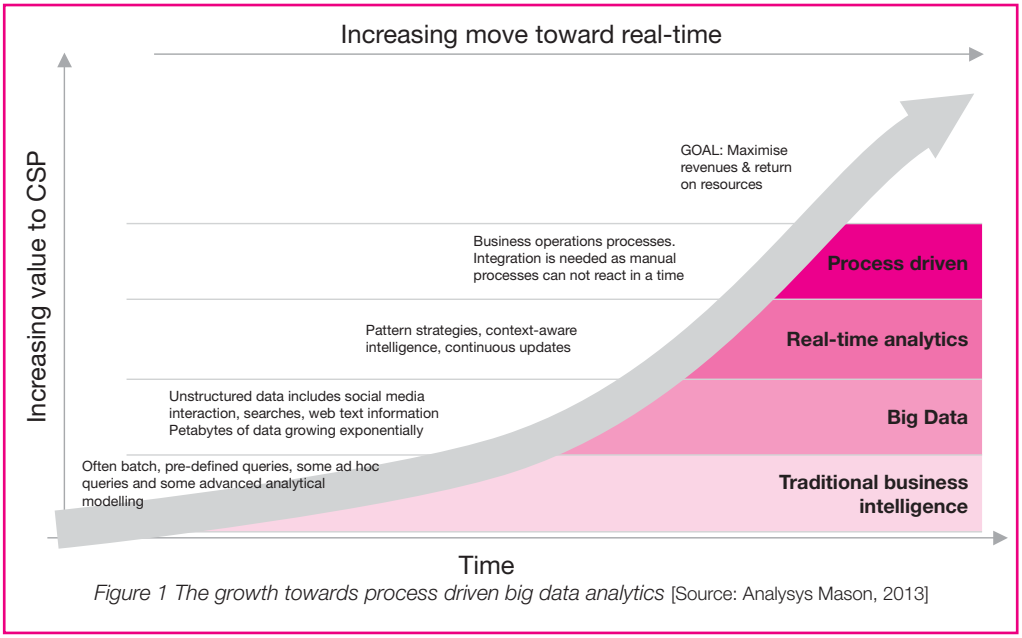

Figure 1 The growth towards process driven big data analytics [Source: Analysys Mason, 2013]

Business drivers and use cases for big data analytics

Analytics and business intelligence tools have been used within CSPs for many years and are established within CSPs today. The most established and recognised users of analytics at CSPs are the marketing functions, where tools are used to provide segmentation and market analysis to help prevent churn and provide new campaigns to increase the sale of new services and products. BDA must be considered across all departments within the CSP to create value. Use cases where big data attributes are added to the current decision-making process or analysis will provide better decisions and better outcomes for the CSP. If current data processes are not supplemented by new data it is unlikely that the performance of the CSP will be improved. Key big data sources include both internal data such as customer data and operational data such as that collected from the network, but can also incorporate market data that can provide additional attributes to the analytics models.

CSPs need to consider which use cases provide them with the best returns for their organisations, most of which will supplement or improve current established processes, but some will provide additional revenues in their own right. There are hundreds of different use cases that CSPs could select for projects, prioritising which ones provide the best return. There are five broad categories of use cases, including: marketing and sales, customer services, financial and regulatory requirements, operations management and external digital services.

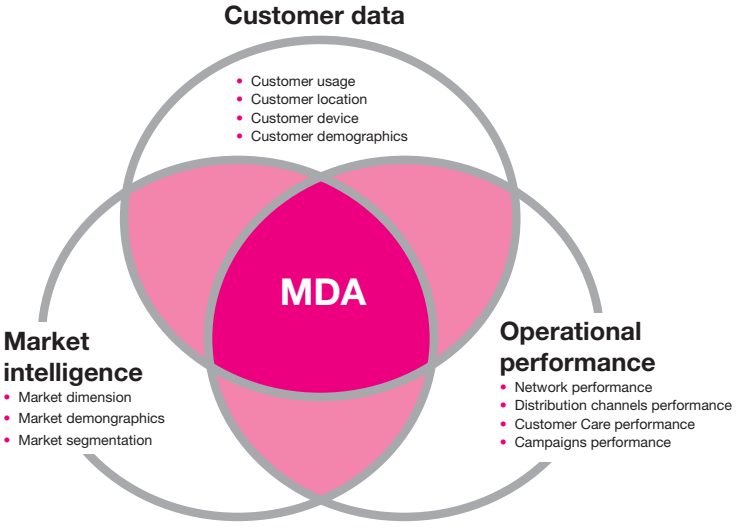

Figure 2: CSP performance is enhanced by integration of new data sources [Source: Analysys Mason, 2013]

Marketing and sales

The marketing and sales functions drive revenue into the CSP and are often already heavy users of analytics and data. The ability to provide micro-segmentation and context-aware approaches with targeted offers is an opportunity for BDA solutions.

Data attributes used within marketing and sales functions are potentially near infinite. Some examples of the newer data analysis that can be used are in the table below:

Data attribute	Description	Improvement with big data
Location information	This provides the ability to segment service offerings based on where subscriber is located.	This enables regular commute patterns to be profiled to make offers when at home or in the office. Location-based adverting can create value through encouraging take-up of offers, or encourage a visit to a local CSP stores.
Social network analysis (SNA)	This provides analysis of whom, how often and when subscribers call others.	This provides a social hierarchy that enables campaigns to be targeted at prospects that can exert greatest influence on their social groups.
Social media – sentiment analysis	To provide analysis of comments on social media in regards services or products.	This provides analysis of the data to ascertain if they are negative or positive.
Content usage	Dependent on technologies such as DPI to understand what content and which applications or web addresses are used by each subscriber.	Analysis of this provides the ability to created appropriate offers, such as heavy gamers can have a package targeted to them.
Network data	Network data covers a broad set of attributes but can include network utilisation of cell sites for example.	Through using this short-term time sensitive offers can be broadcast to user on a cell to get them to use-up voice or data quota when the network is not busy.
Network service quality	Poor network service is often one of the major attributes in churn, where a subscriber has suffered a repeated poor experience, especially at home locations.	The ability to analyse when a customer has suffered poor service and predict the impact this may have on their likelihood of churn.

Typical use cases enhance current processes that are established with in the telecoms market today and are included in the table below.

Use case	Description	Improvement with BDA
Segmentation	The most significant use of analytics by CSPs is to provide better segmentation of their customer base to provide more effective marketing campaigns. As markets become saturated more targeted marketing is required to ensure offer-take-up.	Demographics based segmentation misses several relevant customer dimensions and might give wrong indications regarding the customer true behaviour.
Cross/up-sell products	As voice becomes a mature product, operators may find that the best potential for value creation is through the expansion of other services (broadband business services, etc.).,	Already used successfully by Amazon and other retailers, operators can analyse the profile of customers using certain services, and use it to offer the product/service to customers of the same profile.
Decrease churn	Churn is a general concern in both emerging and developed markets. Due to the large concentration of revenue, even small changes in churn rates can have a significant impact in the bottom-line.	Look at modification of usage patterns, combined with customer profiling to identify algorithms that can help predict churn.
Campaign management	This function provides the execution and management of offers and the rate that they are converted or acted on by the targets.	Mass market batched based processing of static campaigns can be changed to dynamic data to react to customer behaviour and dynamical change offers if they are not working.
New service creation/ design	For instance, understand where and when the network is being underutilised and create localised offers to encourage subscribers to use up data or voice minutes.	The ability to dynamically analysis network data on for example a cell basis and automate a pre-defined offer broadcast to the same cell.
Channel analysis	With multiple different options to reach customers through, email/SMS/applications etc. understanding what is best for the service type and customer segment.	To provide analysis of the different sales channels that best suits individuals.

Customer care services

Customer care service can be enhanced through the use of big data through use cases that provide a clearer understanding of why customers call in, and being able to deflect their call in an automated way or resolve their call faster.

Use case	Description	Improvement with BDA
Improve customer experience	As markets grow and mature, improving customer experience can be key in attracting higher value customers	Understanding the customer behaviour and the experience in the different touch points, through numerical quantitative measures helps driving the organisation towards a more customer friendly experience.
Proactive customer care	Where customer experience has been sufficiently impacted, provide a proactive, automated response to prevent them from calling the CSP	Collating of all customer touch points into a single view of the customer and understanding why they may call in, or provide the customer services representative with the most likely cause of the issues if they do call in helps reduce customer call times and improves customer satisfaction.

Financial and regulatory requirements

Finance departments have been heavy users of analytics, often the same department will manage revenue assurance and fraud as well as requirements that are needed by governments for data retention.

Big data analytics adds to types of analysis can be done, providing greater granularity and detail. An example of this is outlined below

Use case	Description	Improvement with BDA
Capital asset management	The need to expand network, while at the same time keeping costs low, can be supported by BDA.	The network assets are the largest asset of any operator, understanding the exact status of each item of network inventory ensures it optimal usage. In being able to understand if any network assets can be reused, relocated or transferred from un-used spares or other source enables network assets purchases to be delayed or avoided unnecessarily.

Operations management

Performance and assurance systems have always used real-time systems to collect huge data volumes and rules have been applied to reduce the number of events they have reported, these systems and others can however be improved through more sophisticated modes with greater amounts of data attributes.

Use case	Description	Improvement with BDA
Network planning optimisation	The need to expand network, while at the same time keeping costs low, can be supported by BDA	Customers' location based information and profiling can help operators optimise the network roll-out. CSPs need to define first the profile of customers they expect to take the new technology and build based on incremental revenue that is expected.
Improve customer experience	As markets mature, improving customer experience can become the only differentiator in the market.	Understanding what network issues impact which customer, in which locations and running which services provides prioritisation for resolutions Better use of external factors such as weather, sports games, release of new devices, launch of new games and access to new content all potentially impact service quality.
Network performance predictions	There are many factors that can potentially impact the performance of a network, in tracking different data trends a prediction can pre-empt a potential issue allowing for staff to repair or react before it happens	BDA allows for many more attributes to be tracked and monitored, both internal and external to the CSP, helping to refine the models currently in use. These can include the launch of new devices on their network, the impact of a new game or application or the availability of new content.

External digital services

Big data analytics opens up the possibility to offer new service types, potentially the use cases can be based on any of the segmentation criteria used internally with at CSP, so long as privacy issues are addressed. CSPs have found that location-based information is the most compelling use case for selling data externally.

Use case	Description	Improvement with BDA
Mobile advertising based on location	The need to provide segmentation based on location and other information for use for advertising by partners. This is often referred to as geo-fencing, or proximity based marketing. There are a number of different models for this type of service that include: providing data fo a third-party to run specified offers on, or for the CSP to run the promotions and receive a commission commission from partners if they purchase using the promotion.	Customers' location based information and other profiling criteria provide a compelling proposition to sell externally. All the other data attributes can also be used to profile targets, which may include external data such as if the subscribers, are members of a store loyalty scheme that is using the data service for example.
Location-based marketing information	Understanding the location of mobile phone users and tracking them is valuable information for infrastructure planners. Mobile phone operators are able to collect data on all their subscribers, track their movements, make anonymous and provide data externally. This is used for governments planning transport or retailers trying to understand potential store sites.	Customer location is clearly the most important criteria, but other criteria such as starting location (for example at a football match) or any other data attribute that can be used to segment the user base can potentially be used to provide greater value to help sell the service.
Trending of M2M data	This is where sensor data can be used to monitor different aspects of an M2M offering. The oldest example of this is using location information to provide traffic speeds to satellite navigations systems.	Big data analytics is able to provide the collated information experience of multiple drivers based differences in location and overlay this information onto a road location to give average traffic speed. This system needs to work in all locations and be provided in near to real-time.

Software tools and systems

The market for BDA tools is growing and changing rapidly, large software vendors Software AG, Oracle Corporation, IBM, Microsoft, SAP, and HP have spent more than US$15 billion on software firms specialising in data management and analytics in past five years. The software industry across all sectors is estimated to be worth US$100 billion and growing at 10% per year. The telecoms sector is a significant user of these systems. Understanding where each player sits is complex as they evolve leaving many CSPs unable to make a choice on their technology until clear leaders come forward in the market.

Large data warehouse projects were set up in the past with considerable investments that are only now starting to pay back often tempers enthusiasm for new projects. Current data warehouse systems also need to be considered as an integral part of the big data analytics infrastructure to continue to use this investment and source of structured data.

The tools that CSPs select for their big data analytics are driven by the use cases that are being supported. Critical in the selection of tools are:

- the type of data
- the volume of the data
- the timeframe that analytics needs to be run on the data.

Different technologies provide more cost effective support and so it is inevitable that CSPs will need to adopt a hybrid approach to their big data solutions.

Supporting each use case requires four major steps to be achieved.

- The acquisition of the appropriate data sources and the ingestion of that data.
- The storage of data. Most often the data will be stored, however where there is a real-time requirement this data may be analysed in-memory and then stored later.
- The data is then analysed through analytics techniques or business intelligence and the insights are passed to presentation tools.
- This presentation tool most often is a report, but in the case of many real-time use cases this needs to trigger a workflow.

The major components of the big data analytics solutions are outlined in the Figure 3.

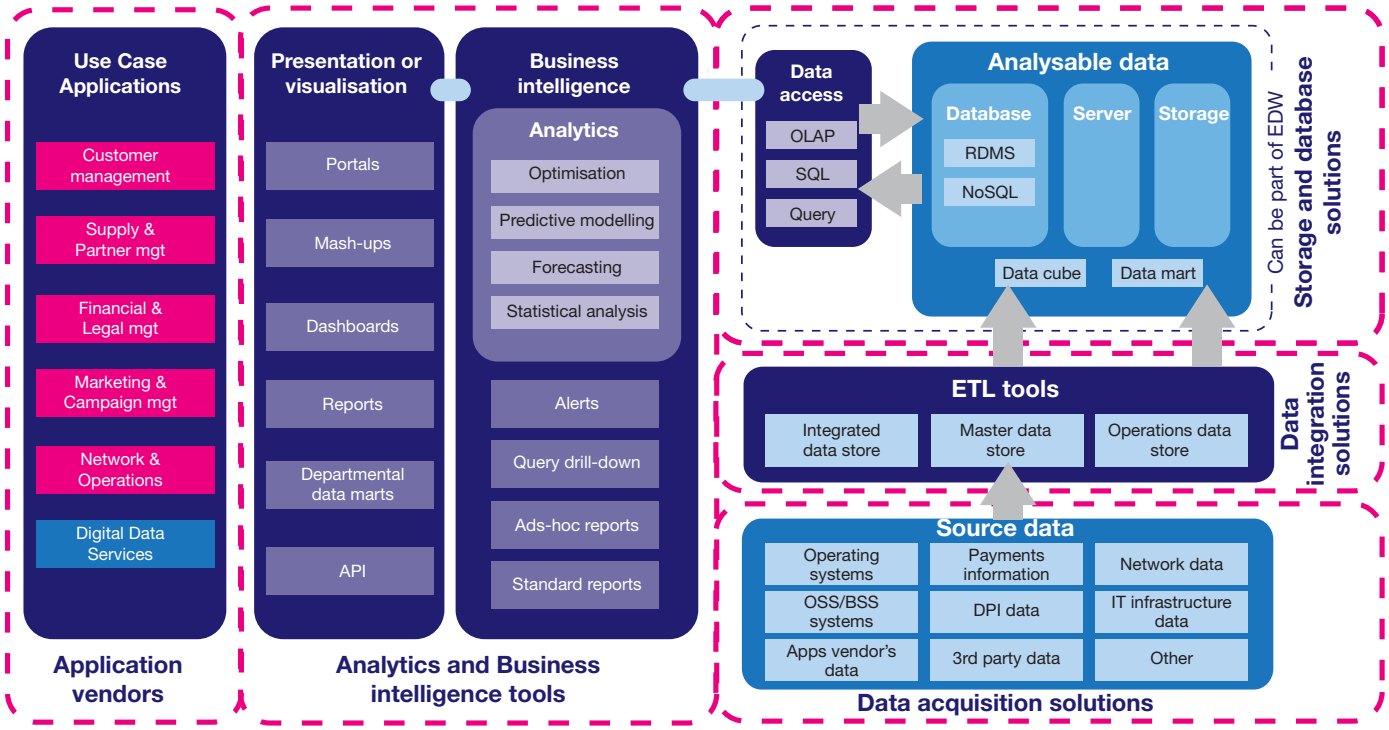

Figure 3: Key components within big data analytics solutions [Source: Analysys Mason, 2013]

One further component and potentially the most significant are application vendors. It is not necessary to build a platform approach to support every use case. Application vendors that need to support their specialist area often build this capability to their products, or hide the technology needed to deliver it. Ultimately CSPs do not buy technology for its own sake but to solve a business challenge. If the application vendors have created a solution that uses big data technology, such as the Hadoop's distributed framework, to solve a business issues there may be considerable advantages in having a complete application solution from a vendor who can then support the solution and turn industry knowledge into software, helping to reduce the time to market and the skill potentially needed.

Where an application is not available, or viable, CSPs have to utilise a big data platform and build the use case themselves or with a partner. It is inevitable that most BDA uses case become tailored for each CSP as their requirements, data and visualisation make for a unique environment. Where platform vendors can help to accelerate the time development and deployment effort is important, through the use of pre-defined models, dashboards, data sets and integration to business process management systems to deliver automations where needed.

Big data analytics components

This section looks briefly at some of the components of the architecture and provides some guidance on the solutions that are found within them.

Hardware

Hardware costs have steadily fallen over the past ten years, the use of massively parallel processing (MPP) has helped drive this, there have been significant changes within the market and vendors have added big data analytics capabilities to their products. Notable examples are EMC with Greenplum, HP with Vertica, Teradata with Aster data, IBM with Netezza and SAP with HANA. The alternative is to use a distributed framework and low cost commodity hardware with Apache Hadoop or Kognitio or others. The Hadoop-based approach is however not considered enterprise class by some and prefers to use the Cloudera, MapR or Hortonworks distributions that include support and services as well as other components is a more controlled release of the software. These companies also contribute to the open source community with software such as Apache ZooKeeper for high availability Hadoop support.

Hadoop based systems provide low cost storage and search capability for large data sets, but suffer more from latency than more tightly coupled systems, this has to be considered when selecting hardware platforms. A big data platform will often contain new Hadoop systems as well as more established data appliances.

Data management

These components are an integral part of the larger hardware solutions, with implementations of RDBMS (relational database management systems) for online transaction processing and include databases, data integration and data governance and

include vendors such as Informatica and IBM. Where data appliances are being use the MPP platform will have an associated MPP database that is tuned for best performance on the hardware, but often will support only structured data, newer technologies support unstructured data. Hadoop, for example uses HBase database and supports structured data and SAP HANA supports both unstructured and structured data. These databases are termed NoSQL (not only SQL) databases were created when RDBMS limitation where exposed when segmentation was driving vendors to support distributed hardware environments.

RDBMS are far from finished and will continue to compose the majority of where data is stored, however where RDBMS technology reaches its limits tightly coupled MPP database and enterprise data warehouse technology provides low latency for database for simple queries to about 100TB in size.

Determining the use cases that are to be supported will help drive the decision making on what databases are needed, but it is likely to be a complex hybrid environment supporting different technologies. Established vendors, such as Teradata, continue to provide CSPs with guidance and support in adopting new technologies, with an ability to support implementations to maintain the very high levels of reliability needed by CSPs.

Analytics and presentation

Analytics tools such as Tibco Spotfire, Tableau, IBM SPSS, SAP Business Objects, HP Autonomy, Oracle Microstrategies and others provide the tools to view data sources, create models and provide visualisation of the information. These tools use the underlying data sources accessed through real-time and batch data processing using interfaces to ODBC/ JDBC connectors to established systems and through the appropriate query interface to other the underlying systems.

The selection of analytics tools and visualisation tools needs to be able to work with the underlying infrastructure, beyond this other considerations may include the availability of resources to support the tool and do any of the systems provide expertise to support the required use cases, either as part of the software or within professional services.

COMPANY PROFILES

Guavus

Company summary

Guavus is a private company that was founded in 2006 by CEO Anukool Lakhina. The company's headquarters are in San Mateo, California with offices in the UK, Singapore, India and Canada. The company has built its reputation around its ability to provide near-real-time big data analytics applications for the telecoms sector. The company employs 400+ staff and has raised $87 million in equity funding. In January 2013, the company announced that they had acquired Neuralitic Systems, a provider of mobile data monetisation and marketing analytics. The company's big data solutions have been deployed at two of the top three mobile carriers in the USA, and three of the top five IP/MPLS US backbone carriers.

Big data analytics credentials

Guavus was founded to address big data analytics through an integrated software suite that delivers timely insights into business processes. Critically the company's patent-pending Reflex platform processes data as it receives it, not waiting for it to be stored and subsequently queried, slowing the process. This ability drives new business benefits to current processes and enables the creation of the new ones. The platform integrates with a number of Guavas applications that address different aspects of the CSP including:

- Network Operations: Network planning and optimisation intelligence for capacity planning, network peering optimisation and traffic engineering
- Service usage and analysis (that looks at over the top applications usage, product engagement across service types and application usage)
- Customer care (self-care portal, churn detection)
- Marketing: multi-dimensional customer segmentation, and targeting based on information from the network, device, content, subscriber and location
- Monetisation: profiling and contextual advertising for advertising networks

Key differentiation

Guavus provides complete big data solutions within the telecoms market that are based on its streaming analytics technology to apply solutions in near-real-time to solve business issues for CSPs. Guvaus's complete end-to-end approach provides CSPs with operational solutions, by providing software and professional services and hardware based solutions that are as reliable as CSP core networks. Its current size and telecoms focus helps provide an agile approach that enable customers to adopt solutions faster and at a lower cost.

Competitive pressures

Guavus is a focused vendor within the telecoms market, but it will increasingly run into competitors who are either: specialists within telecoms market that are rapidly adopting analytics tools to support their current product propositions, or generalist analytics companies that are able to bring skills from outside of the telecoms sector. Guavus' partnering strategy – as with its recent announcement with Teradata – will be important in maintaining growth in the mid and longer term.

Subex

Company summary

Subex is a provider of business support systems (BSS), based in India. The company was founded in 1992 as a telecoms hardware integrator and then changed direction in 1999 to become a fully-fledged telecoms software vendor. Its key solutions include revenue assurance, fraud management, partner interconnect and data integrity management.
Subex has offices in Australia, Dubai, India, Singapore, UK and USA and employs around 1,000 people. Subex has more than 300 installations of its products in 70 countries including at some tier one CSPs from developed North American and European markets. It has also partnered with several system integrators such as IBM, Infosys, Ericsson and Tata Consultancy Services besides technology partners such as Cisco, Hauwei, Oracle and QlikTech International.

Of late, Subex has shifted its focus towards a managed services revenue model rather than a software licensing model. Typical managed services contracts run for two to three years and bring in more predictable revenue.

Big data analytics credentials

Subex has a growing capability in analytics specific to CSPs, building on its core competencies that are based on a deep understanding of data found within CSPs' capabilities of working with large data sets and the development of the tools to provide modelling to deliver key insights into data. In a number of ways Subex has been offering specialist analytics solutions on its core Subex ROC portfolio of products that include ROCware since it was founded. These provide solutions that include: capacity management, data integrity management, propensity profiling and offer performance management. With the product portfolio and skills, it is well placed in the telecoms market to provide support for data analysis on related issues and offer innovative solutions.

As part of this move into new analytics use cases Subex has recently introduced ROC Asset Assurance to help CSPs track and manage their assets and reduce capital expenditure (CAPEX). The analytics solution monitors and optimises capital expenses throughout the asset lifecycle. It provides insights that can be used to enhance current business processes that control capex on network assets. The solution also tracks data quality indicators to improve the accuracy of data to ensure better capital decisions, using the network itself where possible.

Key differentiation

Subex has a significant customer base with a deep understanding of the telecoms data, its product set provides a set of tested tools that can be used as a basis to provide greater functionality with its current customers and approach new prospects.

Competitive pressures

Subex is a specialist vendor in the telecoms market within the fraud and revenue management space and will need to quickly establish itself in a wider market before more generalist vendors are able to provide solutions into its customer base, a move that the new ROC Asset Assurance offering will help drive.

Tibco

Company summary

Tibco Software is a public company that provides software on-premise or through its cloud services. Tibco provides solutions that capture data, and enable companies to act on it, which can include pre-empting future outcomes. Tibco has 4,000 customers worldwide to manage information across multiple industries.

In 2007 Tibco acquired Spotfire which is now run as a Tibco division. Its products offer insights through data visualisation and discovery tools. Spotfire customers include Global 2,000 companies and include telecoms customers such as AT&T, British Telecom, KPN, Portugal Telecom and Telia-Sonera.
The Tibco big data solution includes both Tibco infrastructure solutions and the Spotfire analytics product sets which work together to help organisations manage, analyse and act upon insights in large volumes of complex data.

Big data analytics credentials

Tibco's pedigree in working with large data volumes has continued with its various acquisitions including Spotfire. The ability to access transient and static data in real-time and perform analysis on it provides Tibco with a strong play within the market. Although Tibco was adopted initially by many companies in the financial markets, it was widely adopted as the data messaging bus for integrations in many telecoms operators. This heritage provides ready access to many of the static data sources, which can be supplemented with other data sources that include transient data such as web or location, from within the Spotfire platform. Insights that are found within the data can be applied to business processes in real-time through Tibco's complex event processing solution. This end-to-end data acquisition, analysis and action provide a capability only a few other vendors are able to achieve in their own product portfolios.

Typically big data analytics is used within marketing and finance but is also used within operations such as network capacity planning. Three areas where Spotfire has deeper knowledge are:

- **Operational effectiveness** – for network engineering and operations and it including capacity planning and forecasting based on network patterns.
- **Sales and Marketing** – ability to segment customer base and impact customer churn.
- **Digital advertising** – to provide contextual based marketing offers.

Key differentiation

The combination of Tibco infrastructure products and the Spotfire analytics platform provides an integrated data acquisition and analysis solution from a single vendor that can deliver automated actions in real-time based on business rules. The cross industry nature of the analytics platform ensures that there is a large user base that can help organisations using Spotfire with examples and implementations from both the telecoms and other industry sectors. A CSP who is interested in creating a centralised function for big data analytics can

leverage Tibco to support multiple use cases on a single integrated platform.

Competitive pressures

Tibco will need to build up expertise in specific use cases within the telecoms sector to enable it to support its customer detailed requirements and compete against specialist vendors within the market with deep knowledge in target areas.

Intersec

Company summary

Intersec is a privately-owned company with its headquarters in Paris-La Défense. It was founded in 2004 by CEO Yann Chevalier and supervisory board member Olivier Guillaumin, soon joined by CTO Jean-Marc Coïc. The company was set up to develop innovative products to provide location-based services, loyalty management, messaging and alerting solutions. Today , customers include mobile operators; Orange, Maroc Telecom, MTS, SFR, France Telecom, Telefónica, Portugal Telecom, and major network equipment vendors; Alcatel-Lucent, Nokia Siemens Networks and Ericsson, all of which utilise Intersec technology. This has helped drive growth for the company of more than 500% in the past five years.

Big data analytics credentials

Intersec was founded due to the idea of coping with the gap between hardware and software performance. Today, its high-performance software solutions enable CSPs to derive greater value from their network big data and to help drive services innovation. Three broad areas of innovation provide solutions to better utilise data to deliver real-time customer value management and scalable location based services. Intersec also has a messaging solution to optimise messaging costs.

Loyalty: Intersec big-data analytics solutions provide operators with micro-segmentation tools that enable better contextual marketing of offers in real-time to retain customers and optimise revenues. The Loyalty Management Suite (LMS) enables MNOs to collect a couple of billion subscriber events a day from multiples sources in real-time, target and launch micro-segmented marketing campaigns in minutes.

Multi-Channel Marketing Suite (MCMS): MCMS enables operators to automate the launch of marketing campaigns and measure their effectiveness in real time independently from the CRM system and provides easier execution for operator's services for third party campaigns.

Location Based Services: Solutions provide better location based monetisation for geo-fencing, location based mobile advertising and geo-marketing reports for ecosystem development. This is based on the Intersec's IGLOO technology that consolidates and exposes network data, including subscriber location, in real-time, enabling innovative location-based services to be created. Critical to the product is its ability to scale to capture the complete subscribers base. Some of the types of attributes it captures are:

- Status of mobile device
- Current location
- Device identification (model and serial number)
- Call profile for the data

The product generates pull and push mechanisms such as mobile advertising, social network, presence density, domestic and public safety and basic tracking.

Key differentiation

Intersec has grown a significant customer base based on location based information with a deep understanding of how to capture, analyse and expose the data needed to create value in new data service for third-parties as well as optimising internal processes. Its application approach provides a fast, tested and cost effective go to market proposition for operators.

Competitive pressures

Intersec is a specialist vendor within the telecoms market that will continue to be aware of other analytics vendors that are established, that take wider data sets and have significant installed bases within marketing groups within the telecoms markets.

Trendium

Company summary

Trendium is a private company founded in 1998 and head quartered in Boulder, Colorado, USA, and a provider of Customer Experience Assurance (CEA) and Analytics solutions for CSPs for broadband services. Since it was founded, Trendium has supplied its core technology to AT&T, Verizon, T-Mobile (USA), Hawaiian Telecom and CSX. Although founded as a network performance company with its ServicePATH data collection and PerforMAX performance management system, Trendium has evolved to address assurance challenges as they relate customer experience and to build on its capability of gathering large volumes of data with its data adapters to create its new data agents that can be used within its own products or provided big data feeds to other applications if required.

Big Data analytics credentials

Trendium's has built up its big data and analytics expertise from gathering huge volumes of data from network elements and provide analysis to help gain the insight that CSPs need to manage key performance indicators or manage service level agreements. With some of the most demanding carrier requirements in the world as customer this led to the creation of in-memory analysis in order to delivery near real-time insight.

The new portfolio is designed to address the needs of 4G/LTE and is comprised of ViewPORT and the Network Access Agents (NAA) product family. ViewPORT is a cloud-based Customer Experience Assurance Applications & Analytics portal that provides workflows with specific applications for fixed broadband, 4G/LTE, VoIP/MPLS and optical networks. The NAA family enables collection from different data sources: network traffic, infrastructure, devices, and subscribers. The

solution comprises of low-cost 1U rack-mount hardware probes with port speeds from 1GE to 100GE, interactive smart device agents that collect location-based perceived customer experience and network performance data, and adds to the set of over 300 adapters for collection from network elements, EMSs, NMSs, B/OSS applications and third party probes that Trendium has built up over the years.

Key differentiation

Trendium's solution provides real-time insights that enable CSPs to intelligently optimise their network and operational resources into where they most impact customer experience that utilises low-cost high performance probe and data agent technology. The near-real-time capability and its scalability of the solution that uses in-memory technology is critical to manage broadband services that include LTE, SON and SDN technology as they are deployed.

Other differentiators are based on:

- scalability of the solution and real-time analysis with in-memory computing
- ability to deal with structured and unstructured data and integrate data from third party sources
- advanced problem root cause analysis for assurance

Competitive pressures

Trendium will need to ensure that it is able to build on its current customer installations and ensure that network equipment vendors that are used for network build out are not used for assurance-based applications. Trendium will need to forge key partnerships with technology vendors to ensure that they can find users of big data generated by the NAA products.

Tektronix Communications

Company summary

Tektronix Communications has evolved out of its heritage in telecoms assurance and monitoring, into providing data, insights and actionable intelligence that gives network operators the ability to optimise network performance, improve quality of service and customer experience. Solutions cover four aspects of the service provider's environment: subscriber behaviour, the services and applications they consume, the network environments they occupy and the technologies that enable them.

Tektronix Communications is the leading supplier of probe systems worldwide and the second-largest supplier of service assurance products and services to the telecoms industry. It has a significant presence in the tier one CSP market, which includes fixed, mobile and converged/IP operators. The company was rapidly built through a series of acquisitions that included Arantech in 2009.

Tektronix Communications's comprehensive set of assurance, intelligence and test solutions and services support a range of architectures and applications such as LTE, HSPA, 3G, IMS, mobile broadband, VoIP, video and triple play. Tektronix Communications is headquartered in Plano, Texas
In 2007 Danaher acquired Tektronix for US$2.85 billion and defined Tektronix and Tektronix Communications as two separate operating companies.

Big data analytics credentials

Tektronix Communications's big data solutions provide data, analytical insights and workflow automation to deliver actionable intelligence. Tektronix Communications provides expertise within the service assurance, customer experience and can provide data to other assurance and monitoring solutions.

The touchpoint product provides insight into subscriber activity across devices, applications and services and enables CSPs to proactively manage the customer experience and identify problems that can otherwise go undetected.

The ProAction product automates workflows triggered by touchpoint insights for marketing, operations and customer care needs. This can include send SMSs for marketing campaigns, reconfiguration rule for phones misconfigurations or for bill shock warnings for roaming subscribers.

The Iris Suite of 'Network Intelligence' solutions focuses on real-time network monitoring, troubleshooting, traffic characterisation, analysis and enablement of OSS/BSS systems. The individual product components include user-friendly, interactive dashboards and drill-down capabilities aimed towards different departments within the operator. They include: G10 (high-bandwidth IP probe), Iris Performance Intelligence (IPI), Protocol Analyser, Iris Session Analyser, Iris Traffic Analyser and IrisView

Tektronix Communications provides its analytics engines with the source network data and subscriber analysis based on session analysis from data acquired through its passive probes in the network.

Textronix Communications has a rich set of solutions that provide network data through probes and analysis for assurance applications.

Key differentiation

Tektronix Communications is a leading provider of Telecoms Intelligence solutions covering the gathering of data from every aspect of the network, subscriber, device and content. It provides the analysis of the data and the workflows needed to act on this in the timescales needed. This enables a single company's solution to support the operational data, insights and workflows to connect between internal departments and organisations to optimise network performance, quality of service and optimised customer experience and enable CSPs to identifying new commercial opportunities.

Competitive pressures

Textronix Communications network will need to compete with other analytics vendors as it moves from providing network centric big data solution to other functions within the telecoms markets based on customer data.

About Analysys Mason

Knowing what's going on is one thing. Understanding how to take advantage of events is quite another. Our ability to understand the complex workings of telecoms, media and technology (TMT) industries and draw practical conclusions, based on the specialist knowledge of our people, is what sets Analysys Mason apart. We deliver our key services via two channels: consulting and research.

Consulting

- Our focus is exclusively on TMT.
- We support multi-billion dollar investments, advise clients on regulatory matters, provide spectrum valuation and auction support, and advise on operational performance, business planning and strategy.
- We have developed rigorous methodologies that deliver tangible results for clients around the world.

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www.analysysmason.com/consulting.

Research

- We analyse, track and forecast the different services accessed by consumers and enterprises, as well as the software, infrastructure and technology delivering those services.
- Research clients benefit from regular and timely intelligence in addition to direct access to our team of expert analysts.
- Our dedicated Custom Research team undertakes specialised and bespoke projects for clients.

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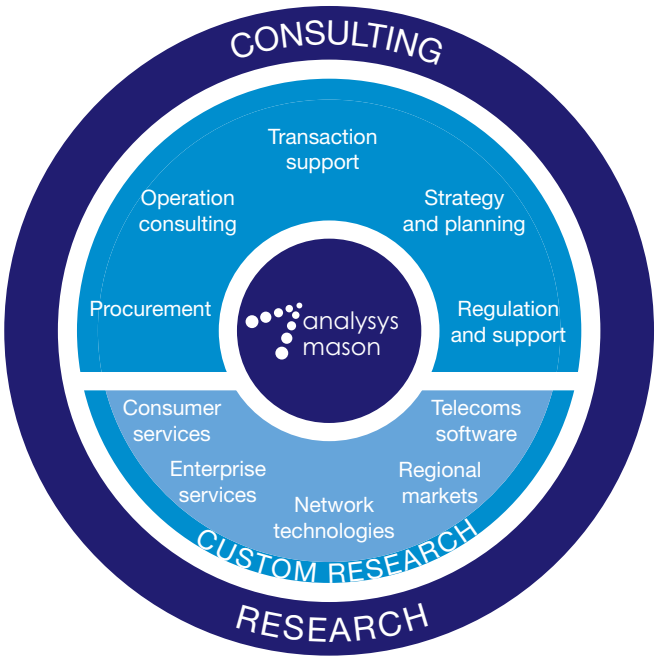


analysys mason

One of our value propositions is to help CSPs make or save money with mobile broadband

Lyn Cantor, the president of Tektronix Communications

Data is nothing but data until it's analysed for a purpose

Lyn Cantor is president of Tektronix Communications, the vendor of assurance and big data analytics systems that has emerged as the world's first Telecoms Intelligence Provider. Here, he tells VanillaPlus that amid all the big data hype, CSPs are generating real savings and new revenues from the intelligent application of big data analytics in specific workflows and use cases.

VanillaPlus: Big data analytics is surrounded by lots of hype and debate. What does it mean to Tektronix Communications?

Lyn Cantor: There certainly has been a lot of discussion about big data and analytics ranging from the practical to hype. Our point of view is that these discussions must focus on analytics with a purpose. There is so much data moving around in the network today that most discussions are technical – about databases. We believe these technologies are enablers but we make use of them to bring big data and analytics into the CSP's workflow.

Data is nothing but data until it is brought together in a usable way. Our view of analytics with a purpose describes how we organise data with right technologies into applications that bring specific users value.

Fundamentally you have to bring the data from the network but the application of the technology and how it enables the user to access it is different depending on the point of view of the user. Very few people are linking the technology to the practical applications of the user with the possible exception of IBM which, like us, has applied big data to the use cases of specific users.

VP: Can you give an example of a use case in which Tektronix Communications' approach delivers the analytics with purpose you describe?

LC: One of our value propositions is to help CSPs make or save money with mobile broadband. A lot of that revolves around the subscriber and how they are cared for effectively. A CSP such as AT&T Mobility handles around 2.5 million calls a month from subscribers. About 500,000 are technical in nature and once a call is triggered, agents have to pull data together from six, seven or eight sources to understand what is going on with the user.

This is where the use of analytics comes in, especially from the viewpoints we collect. We can take that data reduce the conversation down from 15 minutes to two or three because of the data we have that can isolate the problem and identify where it is. Once the existence of the problem has been identified, the trouble ticket is opened and big data is used all along the journey to solving the issue.

That journey may involve escalations to core operations of radio access network engineering functions, all of which will analyse big data to address the problem. This level of depth requires rapid visualisation or rapid analysis from a database perspective. In the core network you're dealing with ▶

My CTO and product lifecycle management team are very involved in the choice of technologies by the user and identifying which technologies allow you to scale and deliver the best cost advantage

really, really large data such as an Oracle ExaData database, for example. That's a switch to a different database approach where the data is originated differently and built for scale; a deep archive analysis. The GUI and tools are different here to the customer care database. If the problem escalates to the RAN, the database is different again.

The value we deliver is that we provide the workflow to make use of the data we collect. We have the ability to look at the four dimensions of the network, technology subscriber and service. We're able to identify the subscriber when they call and identify what they're using, then across those four dimensions we can apply big data to the workflow. That's what CSPs want so they can take waste out of this [care] workflow. This is the thoughtful use of big data to take care of a customer's problem.

VP: How is the user profile of big data analytics changing within CSPs?

LC: We capture the data with probing and data collection technologies and aggregate it for workflow so the data we collect, especially when we get closer to the radio domain, is very high value to lots of stakeholders. We then become a very important feed into many parts of the CSP business.

Others talk about big data from a data warehousing perspective. The dialogue with the CIO is about having an enterprise data warehouse where all the data is taken and put in the warehouse to be sifted for key learnings. We augment that by giving mobility information and that becomes very valuable for billing aspects – such as disputes – but most commonly within marketing organisations – they get the real-time information that can be used for campaign management.

VP: Does that mean the roles and responsibilities that big data analytics supports are changing?

LC: It feeds into a dynamic that is very subtle – the blurring of the CIO and the CTO strategy. The CIO continues to play an evolving and important role in terms of domain responsibility but the data we collect is all around the network and that gives the CTO a really good view of what's going on in the network.

We have a number of use cases here. We've seen the CTO's office drive churn mitigation because the data is so closely connected to the network, for example.

VP: How big is big when it comes to big data?

LC: To give an idea of the scale, we shipped about 17 petabytes of data last year. That's close to 20% of the overall volume of Facebook traffic and the equivalent to the capacity of every hard drive shipped globally in 1996. Our systems are pretty big.

We touch a lot of data and it's of high value but only when condensed and extracted to provide our customer with value?

VP: How do you see CSPs' approaches to big data changing as the telecoms value chain involves increased partnership and third parties? Is there a need for standardisation when it comes to big data analytics so insight can be integrated across multiple businesses?

LC: Standards are going to take a while to evolve because there are so many use cases. We're working with the TM Forum and we think standardisation could be developed in a way that follows a similar model to the Forum's ETOM. Standardisation of logical workflow would be a good example because we'll see the use of big data woven into a series of roles.

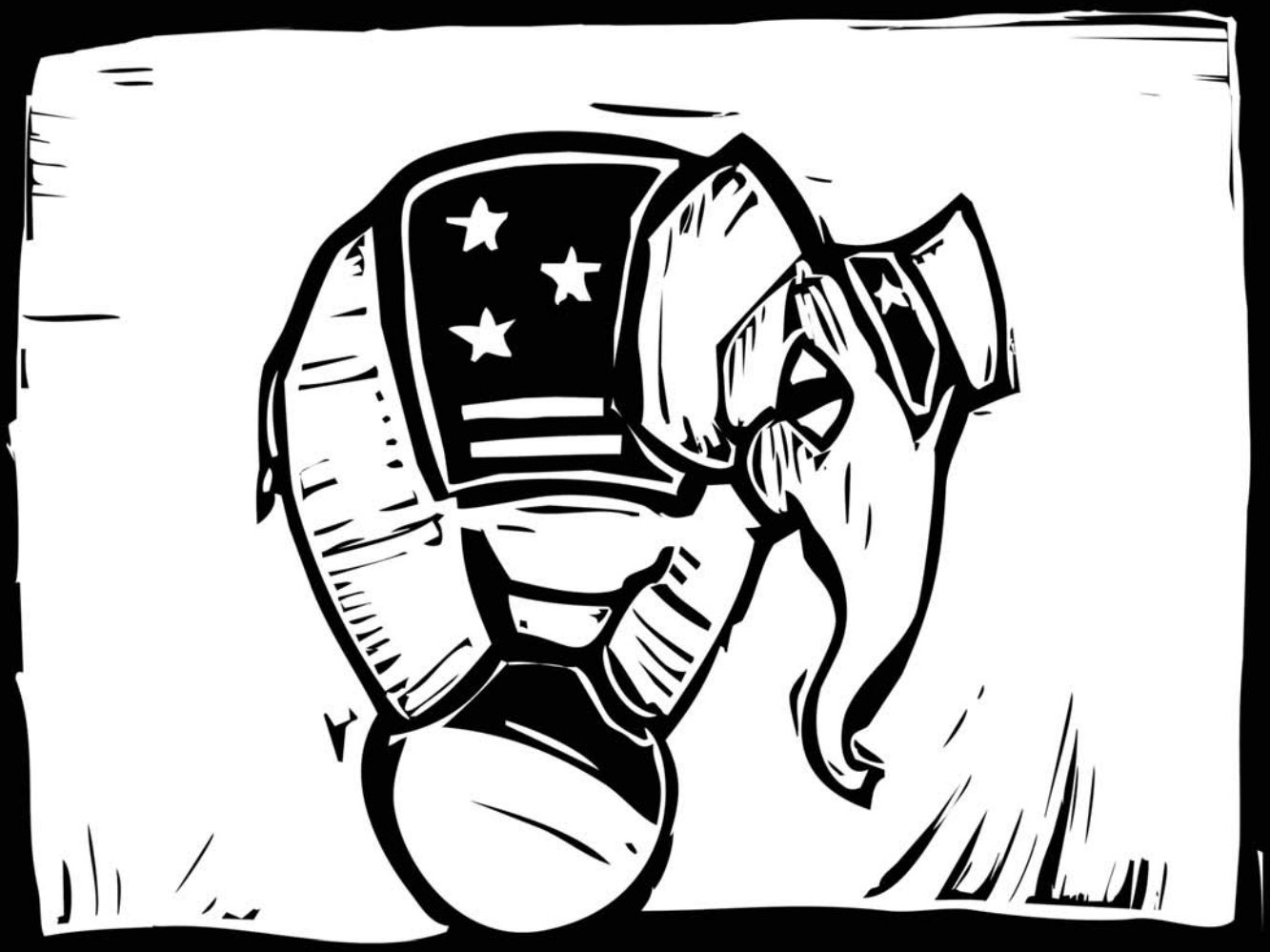
My CTO and product lifecycle management team are very involved in the choice of technologies by the user and identifying which technologies allow you to scale and deliver the best cost advantage. Our work in the TM Forum is really about giving our view about optimal workflows to get the best business results.

VP: You mentioned the cost advantages that big data analytics can deliver. Do you think CSPs have fully understood the benefits they can accrue through effective big data analytics?

LC: It is still early days and we're just now seeing new technologies in terms of databases that are applicable to web-based search but we are close to adoption of web-based technologies. Over time, the hype will burn away. The situation reminds me very much of the enterprise CRM market. The promise of SAP and Oracle was to redo the workflow and enable companies to become CRM oriented.

In transformations of this type, you can never boil the ocean and be effective. You have to take the tools and be very specific about the problems you solve. If it's just a big land grab, big projects could just create a lot of pain. Use-case specificity will be the answer and those who adopt that will get the greatest benefit of the data flowing through the network.

We're a big data company because we have the data – others just have the tools. We're applying our data to use cases that help CSPs make or save money.



Have you ever seen an elephant dance?

The vast volume and variety of big data that CSPs create provides the opportunity for operators to extract value in a series of ways. However, big data is so unwieldy that CSPs are having to consider carefully how to make their data elephants dance, writes George Malim

Robert Machin: Power, agility and tap-dancing elephants

The promise of big data analytics in telecoms is rich in potential rewards both in hard cash generation but also in softer benefits such as enhanced customer care or greater operational efficiency, both of which add value too. However, to achieve any of these benefits, CSPs must prepare their systems and their culture to maximise on the potential big data analytics offers. That won't be straightforward.

"Maximising the big data analytics opportunity really calls for a combination of power and agility – the proverbial and rarely seen tap-dancing elephant," says Robert Machin, director of product marketing EMEA at **CSG International**. "Power to process very high volumes of data – and to do it in close to real-time because there's neither the time nor the storage available to process it later – and agility to recognise and respond to the unexpected and to non-standard data inputs."

Dhananjay Pavgi, director of portfolio management - IT applications at **Tech Mahindra** sounds a note of caution pointing out this is very new ground for CSPs to break. "Right now, most CSPs are in the exploration phase and judging the value of big data as a technology domain for their business," he says. "Given this situation, if telecoms vendors are to sell their products and solutions, they need to position themselves as big data experts. One route which is being adopted by many operators is through free Proof of Concepts and a consultative sales approach, ▶

to increase the probability of winning business in this new technology domain."

Power and agility are fundamental to enabling value to be extracted from the big data CSPs generate and collect. “CSPs have data spread in silos across their entire network which needs to be aggregated to derive meaningful information out of,” points out Ganesh Jayadevan, vice president of messaging and business solutions at **Mahindra Comviva**, which uses the Actian Vectorwise database to power its analytics applications. “A warehousing solution with data federation and transformation capabilities that can filter, process and derive a 360 degree view of the subscriber is a necessity. However, to be able to derive meaning and value out of this view, a CSP requires an industry grade analytical real-time offer engine. This not only enables CSPs to achieve actionable insights into the big data, but also automate the process of creating closed-looped trigger based campaigns that can capture consumer actions and convert it in real-time to responses that create consumer delight.”

That speed of reaction is critical. “CSPs need sophisticated response loops too – responding weeks later to an unhappy customer or a shift in market buying patterns is no good in a highly competitive markets, so data analytics need to be tied in closely to alarms, dashboards and as far as possible with automated responses,” adds Machin. “There may be lessons to be learned from, for example, automated trading systems which can buy, sell and take other actions based on quite subtle shifts in the market.”

The good news is that technology is keeping up with these needs. “There have been several recent technology developments that can really help CSPs analyse and understand both structured and unstructured information in order to maximise the big data opportunity,” conforms Adrian Simpson, chief innovation officer at **SAP** UK and Ireland. “The success of this analysis – and how businesses should go about doing it – is primarily dependent on the accuracy and speed at which mass data volumes can be collated, analysed and presented in an easy to understand, accessible format.”

“Implementing in-memory technologies that don’t require data to be reformatted facilitates just this,” he adds. “Enabling businesses to focus on the business opportunity that the analysis can bring, such as gaining deep insights on customer behaviour to optimise each contact point to increase revenue and reduce churn, or helping to launching new offers at the right time and right price to create sustainable growth with profitable offers and bundles.”

Tapan Bhatt, senior director of product marketing at **Splunk** is also relaxed about the availability of technology to handle the big data analytics challenge. “From a technology standpoint, CSPs need to invest in solutions that can handle the exponentially growing volume, variety and velocity of data from the content delivery networks,” he says. “Equally important is the ability for the technology to provide rapid and real-time insights from this data so CSPs can make informed business decisions.”

For John Brooks, vice president of product management at **Subex**, being able to utilise big data effectively is based on several aspects. “Some are obvious,” he says, “but some are perhaps not only abstract, but elusive to most organisations.”

Unlock the hidden secrets

Brooks says operators need: resources to handle data, people that can extract value from the data, effective means to visualise the output and the ability to act. “Big data is good,” he explains. “Understanding how to use and transform it into something more meaningful and powerful for the business is better. But without an ability to affect change in the business based on that output intelligence, big data and its hidden secrets are effectively useless. Automation of methods, alerting, action drivers such as workflow and cases, measuring of results and learning, are all keys to success.”

Whether that success will enable CSPs to reinsert themselves at the heart of the digital value chain is yet to be established but most believe the effective usage of big data analytics provides CSPs with the greatest opportunity yet. “If they can demonstrate the flexibility to work with a variety of non-standardised propositions, with a variety of industries and agencies – to move from simply communications to ICT, CSPs will be able to do that,” says Machin. “They have the processing power, but do they have the mindset to provide that kind of input? It’s likely to require some diversification of key resources, or perhaps partnering with organisations that can provide more of those data processing smarts.”

Jayadevan adds that CSPs have the advantage because of the volume of data they create and collect. “CSPs have had very rich data from the very beginning with commercial transactions numbering more than a million per day generated by millions of customers spread across extremely diverse user segments,” he says. “The volume, variety and velocity of this data has grown by magnitudes in the past few years. However, surprisingly, the insight gathered from all this data has seldom been effective in terms of realization due to the lack of integration with the marketing processes.”

Bhatt at Splunk agrees: “The good thing is that CSPs already have the data – now they just need to figure out a way to make sense of it,” he says. “Innovations in software now truly make this possible and there are many examples of services providers taking advantage of this data.”

Ganesh Jayadevan: Meaningful information needs to be driven out of big data

Adrian Simpson: Accuracy and speed required

Dhananjay Pavgi: CSPs in the exploration phase

EXPERT OPINION

Telecoms industry, we have a problem

While the wireless industry has the components – especially with big data – to prevent disaster, it is reaching an Apollo 13 moment, writes Rob Chimsky

The author, **Rob Chimsky,** is vice president of insights at Guavus

In the classic film Apollo 13, there is a dramatic moment when the NASA engineers dump a collection of parts available on the spaceship from which they must create a life saving air scrubber in a matter of hours or the entire crew will die. As happens in Hollywood and occasionally in real life, the engineers succeed in the nick of time, enabling the crew to return safely to Earth.

We in the wireless industry have hit our Apollo 13 moment. The outcome may represent less personal danger, but has major implications for the health and vitality of future wireless business. Similarly to the movie, the wireless industry already has many of the components it needs to prevent disaster with big data providing the key-enabling element. So what is this deepening crisis that will have us on the edge of our seats?

The technology advances that we have traditionally been dependent on to solve the growing appetite for wireless capacity will simply not sustain us into the future. The industry will be impacted on two main fronts. First, spectrum availability, which has always been a scarce resource, is becoming even more challenging. Exponential growth in user data consumption is gobbling up large chunks of spectrum with regulatory challenges preventing much new spectrum allocation. Secondly, technology advances such as coding schemes and modulation techniques that have led us most recently from 2G to 3G to 4G are running into practical limits. Given that these two forces will not be coming to the rescue to save the impending wireless capacity crunch, the industry must turn to current capabilities such as big data, small cells, and self organising networks that can be leveraged in order to create a sustainable solution.

Spectrum supply is running thin

The wireless industry has never been spectrum rich, but never before have we faced such a shortage of supply with minimal prospects on the horizon. The time cycles for getting spectrum to market have always been counted in years verging on decades. However, spectrum has come into the market generally with sufficient lead-time to prevent any substantial crisis.

Most recently, digital dividend or 700MHz spectrum has provided a major boost in spectrum allocation. As we look out into the future, though, there are no significant blocks of spectrum that appear to be commercially usable over the next few years. Certainly regulatory agencies in mature markets worldwide, including the Federal Communications Commission in the US, have the best of intentions in getting spectrum into the market. But the choices of future blocks all come with incumbent inhabitants who believe their interests to be as vital as those of the wireless industry. The challenge is further magnified by the fact that viable spectrum for cellular fits into a finite range that is generally below 3GHz. This situation will surely be repeated throughout the world as usage grows exponentially and spectrum allocation choices become increasingly more difficult to find.

Technology reaches practical limits

The feats of technology advancements in the wireless industry have been truly exceptional, including GSM, CDMA, UMTS, EVDO, and LTE as some of the most ▶

significant developments. These technology improvements that have allowed better throughput and capacity have essentially come from two directions. The first has been to permit larger channels to support individual traffic. For example, the move of GSM from 200 KHz channels to UMTS with 5MHz channels to LTE with even larger potential channels. In future, for many of the same reasons mentioned in terms of spectrum challenges, the ability to just carve out larger channels has practical limitations that will result in minimal benefit coming in the form of larger channels.

Secondly, technological advancements have seen a focus on areas such as coding and modulation schemes to get the most capacity out of existing channels. These advances have been spectacular in the past, but as most experts would say, we are reaching the physical limits of how much data we can stuff into an existing pipe. Previously, we had CDMA that led to significant improvements over TDMA, and then OFDMA that has created yet another leap. However, there is not another step function that appears to be on the horizon using these types of advancements.

The Apollo 13 Solution

With all this, we have reached our Apollo 13 moment. Luckily, we have components at hand that can be manipulated to create solutions with big data acting as the duct tape binding the various pieces together. So what are the elements that big data will help make use of?

1. **Small Cells:** Since the beginning of the wireless industry, a standard approach to gaining capacity is cell splitting. However, the next evolution of splitting will take that concept and move it from hundreds of sites to potentially thousands or hundreds of thousands of sites. We are already seeing the beginning of this with the variety of small cells going by names such as femtocells, picocells, and microcells. The concept will also incorporate the use of multiple technologies such as Wi-Fi in order to offload the macro cellular network.

2. **Self Optimising Networks (SON):** Integral to the effective deployment of small cells is SON technology that will allow these thousands of sites to seamlessly interact. With these thousands of sites, it is clear that the traditional macro cellular methods for implementing and optimising sites requiring significant human intervention will not go down to the small scale level. SON will be the architecture technology that permits these small sites to go in and out of the network on a very dynamic basis with minimal human intervention.

3. **Cloud Networks/Virtualisation:** Cloud and virtualisation will permit capacity in the core network to be dynamically allocated where it is most needed. Operators will be able to manage capacity efficiently at a large scale level, which is not possible with traditional dedicated MSOs.

Each of these elements provides an aspect of the solution but without the right direction the improvement will be sub-optimal. In order to allow the prior three technologies to reach their full potential, the solution requires the use of real-time/near-real-time data analysis, also referred to as big data analytics. The key is effectively collecting and analysing several threads of information coming from the network, users, devices, and myriad other sources. The information analysed can then be used to look for various triggers or performance levels that will then be used to automatically initiate network actions, which will optimise the capacity environment.

The big data analysis of customer geographic usage will be used to accurately pin-point where small cells should be located. Further analysis of customer patterns and network impacts will enable SON configuration to occur more accurately. Near-real-time analytics will identify changing patterns and network issues, which can then automatically initiate alternate configurations based on pre-defined parameters and instructions. In addition, big data can effectively establish trends that can be used to proactively implement network changes to avert problems before they have an opportunity to be customer impacting.

The result is that the capacity advances for the next few years will be largely dependent on these technologies – although in some cases still very nascent – and combining them in new ways. Industry, we do have a problem, but the good news is that we have the ability to leverage big data to optimise other existing tools and engineer a sustaining solution.

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The big data analysis of customer geographic usage will be used to accurately pin-point where small cells should be located

Big Data Analytics: Uncovering actionable intelligence

The war on big data has to be fought tactically, with targeted raids and ambushes on the data as it streams through strategic points, writes Nick Booth

Lyn Cantor: Glitches will become inefficiencies

Oliver Finn: It's more important to have a wider perspective

As communications service providers (CSPs) battle to create better networks and services for their subscribers, there's been a gradual realisation that there's just too much information. The growth of structured data alone is difficult enough to cope with, given the diaspora of silos of clashing platforms and protocols. But the explosion of unstructured data makes the job even harder and the advent of M2M will generate another wave.

So the war of big data has to be fought tactically. Winnable battles have to be selected carefully and weapons sharpened for precise incisions. You can't take on the whole of big data, any more than a cheetah could confront a herd of wildebeest. If you are going to dine off big data, you need to isolate your target and ambush it as it goes by.

One of the big data crunch points for the CSP will be problems in the network, predicts Lyn Cantor, the president of **Tektronix Communications**. This is the area that CSPs should concentrate on, says Cantor. "With the heightened demand of LTE, glitches will become inefficiencies which will turn into complaints and lead to churn and lost revenue." Tektronix's strategy is to concentrate on LTE and network optimisation.

Astellia goes in for big processing, using high capacity IP probes to carry out deep packet inspection. It is the only way to get real time analytics across the five dimensions that matter, according to Bertrand Mizzi, director strategic marketing and innovation at Astellia. Those dimensions being the subscriber, terminal, application, location and the network.

"Big data has enormous potential but CSPs need to be clear about the subscriber's usage, their quality of experience and the impact on network resources and behaviour," says Mizzi. "If an operator knows which users and what applications are saturating a cell then they can act accordingly to guarantee the best quality of experience to critical subscribers."

By the time data is stored, it's unlikely to be worth acting on, according to **Guavus**, which argues that rapid analysis is the priority, which means there should be less emphasis on refining data sets. CSPs need to analyse data as soon as it comes in, according to Guavus CEO and founder Anukool Lakhina, who spent years learning from over ambitious deep-packet inspection while working for Sprint Labs.

You are better off panning a stream of data as it comes in, and separating out the valuable nuggets. This is also the approach taken by another data start up, **SQLStream**. Though it's a great idea, in theory, to see every little detail of how users and networks are ▶

interacting, in reality it's not practical. "We thought we'd know everything about our business," says Lakhina, "but the data couldn't really be harnessed quickly enough."

Lakhina founded Guavus in order to automate the collection of targeted data, so that CSPs could get immediate insights.

CSPs are better off sub-dividing the information areas they are targeting and then analysing them, says Oliver Finn, marketing vice president at **The Now Factory**, which offers this service to CSPs. It captures raw data and offers mediation platforms that partially break it down into something that the CSPs' software platforms can digest. The service provider categorises the three priority data 'food groups' as network operation and planning, customer care and marketing information.

"It's not about having a big data strategy so much as about specifics. You don't need a wider perspective, it's more important to have a narrow focus,' says Finn. "You can't cover everything so you need to ask very tightly defined questions."

The service that **Autonomy** offers uses a similar discipline – processing information – but its scope is possibly more ambitious, as it seeks to create the raw material for insights in the masses of unstructured data. "We enable telcos to dive into, say, what people are saying on Facebook," explains Fernando Lucini, Autonomy's CTO. There is a much more practical approach to gaining insights these days, with a tacit admission that IT is not yet sophisticated enough to make differentiate.

"Our technology can raise themes and topics to the surface, but it takes the human judgement of data scientists to join the dots and spot a pattern," adds Lucini. This is machine augmented intelligence, rather than crunching through big data and auto-tuning the network.

CSPs have been badly let down by the limitations of traditional data warehousing technologies, says analyst Matthew Aslett at The 451 Group. "Data warehousing promised a single version of the truth but failed to deliver as the approach was too rigid," says Aslett, "it was never going to work in a world of changing business requirements and mergers and acquisitions."

Event stream processing technologies can enable them to ingest and process data in real time. In the future **Hadoop** might give them a flexible platform for tackling large volumes of data from multiple sources, in multiple ways. But first CSPs must choose winnable battles.

Fernando Lucini: Practical approaches to gaining insights

"It's not about having a big data strategy so much as about specifics. You don't need a wider perspective, it's more important to have a narrow focus."

EXPERT OPINION

How can CSPs harness big data to improve customer value management?

The author, **Yann Chevalier,** is chief executive of big data telecoms software specialist Intersec

The mobile market is an increasingly competitive environment and the rise of new entrants such as OTT players is changing the rules of the game by bypassing the CSPs and striking up direct relationships with subscribers. The big data they hold provides CSPs with a means to fight back. Here, Yann Chevalier explains how they can use their data improve customer value management

Mobile Network Operators (MNOs) need to find their stance in this new mobile ecosystem and take a strategic position if they are to compete and find new and innovative ways to engage with customers, ensure ROI and reduce churn. Big data is quickly becoming a cost of entry to remain competitive, and is undoubtedly creating a competitive advantage among players who can efficiently extract value from it. Indeed, because of heavy infrastructure investments in a weak growth economy and in a more and more competitive market; MNOs must secure growth by unlocking new sources of revenue while optimising resources.

As a result, mobile operators have identified the need to secure and increase revenue by offering highly personalised and targeted offers, in real-time, based on subscribers' actual behaviour through customer knowledge enrichment. This highlights the importance of customer satisfaction, yet to measure this means tapping into the various customer touch points spanning diverse areas such as network operations, customer service and sales, to gain a full 360 degree picture of the customer's experience.

The three Vs of big data

As more and more data flows within the carriers' networks and the trend is set to maintain an upward curve with the advent of location-based services and M2M applications collecting ever greater volumes of data: the challenge is not only one of managing the **Volume** which is intrinsically related to the **Variety** of sources of data in different structures. These range from traditional CRM databases to information gleaned from the network itself – such as MSC, probes, IN, Wi-Fi, and femtocells – to customer services, marketing interactions and many more. The full extent of the challenge becomes clear, with the necessity of combining the **Velocity** at which the CSP needs to capture and process the information; a determining factor for competitive advantage.

Unless the data can be harnessed and become actionable then it has limited use. The question of customer privacy is also of paramount importance when it comes to providing a contextual and customer-centric service that requires the analysis of personal location information: the subscriber's permission is mandatory. On the other hand, when subscriber location data is collected on a mass-scale for the creation of internal and external geomarketing reports for example, the opt-in might be optional.

The creation of tailored advanced services requires moving beyond the traditional one-dimensional ▶

information such as gender, age, address and type of mobile device. The process requires the incorporation of contextual information regarding preferences, tastes and interests combined with powerful geolocation data; to target or anticipate future needs and actions, based on an analysis of past activities.

This combination offers myriad possibilities for contextual offers most likely to appeal to the consumer that can be delivered consistently regardless of the touchpoint whether it is on the web, through a customer service representative, or via an MMS. However timing is everything: any delay will impact on the success of the interaction and satisfaction can soon change to dissatisfaction if an offer is timed inappropriately.

Location-based marketing and geo-location

There has also been much discussion on the potential of location-based advertising but now the market is on the verge of really taking off. Not only has the technology come of age but the potential for location-based marketing goes beyond pure advertising and offers mobile operators in particular, the opportunity to earn substantial new revenue streams and help them fend off the offensive from the internet giants, mobile device manufacturers and content owners for the hearts and minds of the mobile user.

The recent initiative of Weve is a classic example of this phenomenon in action. The leading UK mobile operators: Everything Everywhere, O2 and Vodafone formed a joint-venture to offer marketers a single entity that offers location-based advertising services to all their opt-in subscribers. It is the first initiative of its kind in the world, but one whose success will be closely watched as advertisers and content providers now have a single point of entry to launch cross-operator LBA campaigns.

Mobile operators are in a unique position to capitalise on the fact that they have a unique ability to capture the users' consumption data, mobility between different cells, or changing their device altogether. Due to high penetration rates and large subscriber bases, MNOs have today the potential to provide valuable information to several verticals through GeoMarketing reports. This is an exclusive opportunity to become the core of an entire new ecosystem, by unlocking new revenue streams and relying less on declining traditional sources of revenue.

Let's take the example of the French Tier 1 operator SFR, a customer of Intersec, which has aggregated location based data from diverse scenarios such as the dispersal pattern of spectators leaving the Stade de France after a European football match, to anticipate future public transport services. Another example is the anonymised data from motorway visitors to a region in France that's been used by a government tourist organisation to identify the optimal places to promote visitor information. These external use cases were realized at much lower costs than traditional marketing studies, creating new sources of revenue for SFR by using resources already available in the network and by capturing in real-time factual events.

If marketing reports are not new, the possibility to capture valuable data instantly and generating margin so effectively is. Plus, these can be extrapolated to dozens of other internal usages to support decision-making and optimise internal resources and assets: new store opening and commercial planning based on density, real-time follow up of handset sales and smartphone penetration.

How does the CSP benefit?

By improving the targeting of information and services to better match the customer's individual needs, by reducing costs due to increased reactivity. MNOs can also benefit from big data collection and analysis by better targeting of information and by increasing ARPU and wallet share by offering relevant, contextual, real-time offers and services at the optimal time and place for each individual subscriber.

What's absolutely clear is that location-based services offer massive potential for new services; both commercial and non-commercial for the public, brand owners and government organisations. Through the gathering of all of this big data, MNOs can garner a treasure trove of useful information, obtained in real-time, about subscribers and as a result offer products and/or services that add value and place them in the forefront of the customers' mind. Today we are only witnessing the beginning of a new emerging technology that has immense potential for use in a huge range of situations from M-Health, to public communications in disaster situations, to M2M transactions for the enterprise. The mobile operator sits at the heart of this new eco-system and – provided they respect the privacy of the individual and use the knowledge both wisely and ethically – they hold the key to unlocking the true potential of the data, giving vital new revenue streams and the subscriber access to exciting new benefits.

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There has also been much discussion on the potential of location-based advertising but now the market is on the verge of really taking off

TalkTalk harnesses big data for better customer management

UK operator TalkTalk is using SAS to analyse, model and predict the propensity of customer churn, as well as optimise marketing programmes to improve cross and up-sell opportunities

TalkTalk is a broadband, home phone and mobile CSP for consumers and businesses in the UK, and in July 2012 was one of the founding partners in the launch of the YouView TV service. Through organic growth and acquisitions the company has grown significantly since it was founded, listing itself on the London Stock Exchange in 2010, and generating annual revenues in 2011 of £1.7bn.

TalkTalk has expanded rapidly since it was founded in 2003 as a fixed-line telecoms company to now incorporate additional services including broadband and mobile. The company has 4.8 million customers generating large amounts of varying types of data. To cope, the business has developed over the last few years a robust single customer view by integrating over 12 data sources including CRM, transactional, network and dynamic usage data. Making sense of all of this data has been important to manage customers both in terms of acquisition but more importantly in a saturated market, customer retention and cross- and up-sell opportunities. To do this effectively, TalkTalk has turned to SAS to help make the most of its data.

TalkTalk is a data heavy company with many sources and formats to deal with. Having a single customer view has always been the foundation of its data strategy, ensuring it has the right data, in the right place at the right time. Using SAS, the company is taking its data management framework to the next level in terms of identifying shifts and patterns in customer behaviour for more effective marketing and retention programmes.

Harnessing big data

Having established a strong data management framework, TalkTalk recognised that to enhance its customer experience, retain customers in a competitive marketplace and personalise offers for new services, it had to harness its data even more effectively. The business was aggregating 10 terabytes of data from multiple sources into a single dataset, but believed it had yet to unlock the full wealth of patterns, insights and trends that existed in the data. The customer lifetime value team at TalkTalk presented a proposal to senior management to embark on a major big data analytics initiative with SAS to enhance customer management and retention.

The depth and breadth of TalkTalk's data is enormous, and the company felt that it could play a greater role in helping the business deliver a better customer experience by tapping into its big data using SAS Analytics. The management team understood the value of big data and the benefits that better analysis and modelling could achieve for the business.

Transforming data with analytics

The big data analytics initiative commenced in the first half of 2012 with an initial focus on reducing customer churn and increasing customer lifetime value. While TalkTalk had been modelling its customer data for many years, it has started increasing the sophistication of the analytics and modelling using SAS Analytics. Working with SAS, the business is acquiring the necessary skills to better model and analyse the data.

TalkTalk is at the beginning of the journey in terms of transforming its data with SAS Analytics, but even in these relatively early stages it has seen the merit of the programme. According to TalkTalk, the company has already begun to see new trends and patterns that are informing customer retention efforts.

Over the years, TalkTalk had identified a number of trigger points and levers that pointed to the reasons behind customer churn and had successfully acted on those indicators. However, the SAS system has enabled the company to apply even more sophisticated models and segmentation techniques to the data to reveal new triggers, as well the impact of multiple levers of behaviour on customer churn. ▶

TalkTalk

A brighter home for everyone

Previously, TalkTalk was looking at single levers of churn, but SAS has helped it identify multiple levers in combination, as well as uncovering new triggers and levers that they did not know existed. This is a significant step not only in terms of improving customer retention, but also in improving marketing and promotional efforts. This early success has given the team at TalkTalk real optimism that as they work with SAS to apply even more advanced analytics to the data it will unearth powerful customer insights.

Understanding the customer

TalkTalk has begun a process to model and segment customers in a more granular way. This has resulted in being better able to segment high and low value, and high and low risk customers more specifically based on insights and triggers so that customer retention programmes, as well as opportunities to create more tailored promotional offers. The level of insight into customer trends and behaviour that SAS reveals will play a key role in helping to shape the marketing and customer experience efforts of the company.

As TalkTalk becomes more confident in its analytics and modelling it will look at how the product portfolios interact with each other to identify trends and patterns across broadband, telephone, mobile and in the future TV. Moreover, as the company continues on its big data journey, the analytics team expect the volume, velocity and variety of data to grow significantly as more data sources such as social media and unstructured data from TV are added including its sponsorship of The X Factor and partnership with YouView.

According to TalkTalk, it is very confident that it has the framework in place now to truly extrapolate more customer insights and behaviours from its data. This will help the company make better and faster decisions in the future, but also give it the platform in which to use SAS for predictive analytics, taking the understanding of customers up another level in terms of sophistication.

TalkTalk knows that in the highly competitive markets in which it operates it must continually find new ways to be more responsive, agile and customer centric than its competitors. The role of data now has senior management visibility – that is how important it is to the business – and working with SAS it will realise the potential of its big data.

The business issues

To harness the growing amount and variety of data to better understand customers; improve customer retention in saturated and new markets; and increase cross- and up-sell opportunities.

Solutions deployed

SAS Analytics including SAS Forecasting, SAS Predictive Analytics, SAS Enterprise Miner, SAS Text Miner; and Base SAS.

Benefits

TalkTalk has begun a journey to unlock the value of its big data by utilising big data analytics. The business has already seen improvements in its customer segmentation and modelling, including identifying new triggers and levers, as well as the impact on customer behaviour of multiple triggers and levers working in combination. The company will add more advanced analytics and predictive analytics capabilities to its growing amount of data as it seeks to gain even greater insights into its customers.

EXPERT OPINION

Asset Assurance:

Why is capex becoming a key focal point for operators today?

The impact of the global financial crisis and saturation of telecoms markets across the globe has compelled operators and investors to look into more profitable revenue streams such as mobile content and applications. Based on these market trends, investors are shifting their valuation criteria from revenue growth to return on investment. This calls for operators to chalk out new plans and manage their biggest investment line item – network capex, explains Vinod Kumar

The author, **Vinod Kumar,** is chief operating officer of Subex

CFOs and senior finance stakeholders are typically confronted with continuously shrinking margins which have a subsequent impact on budgets

Moderate to large carriers today have network investments after depreciation and amortisation in excess of US$50-100 billion. With constant changes in technology, these networks are expanding at a feverish pace. Annual network spending at these operators is commonly in the range US$0.5-2 billion. Such is the case with AT&T, which announced its 2013 budget of US$8 billion for wireless and US$6 billion for wireline network expansions; increasing its overall network capex spending by 16% over 2012.

According to a survey by PwC, more than half of the respondents at 78 fixed-line, mobile and cable telecoms operators with a collective annual capex of US$200 billion estimated that about 20% of their company's capex is spent on assets that don't recover their cost of capital.

While managing and allocating capital spend is heavily flawed, network capex management is considered to be among the most significant board-level issues for the majority of operators across the globe.

Why is the industry so inefficient with capex?

Today CSPs are spending huge sums of money on new network infrastructure which is not bringing in optimised returns. One of the main reason is insufficient visibility which includes lack of understanding asset dispositions, poor data integrity in source systems and failure to make use of intelligence directly from the network. Real need is often clouded by limited visibility of assets in the field and poor capacity planning. Gaps in accountability are another cause, where the accountability for an asset's contribution to the bottom line usually erodes after purchase.

Limited purchase controls and gates play a critical role, as much of the network spend is on auto-pilot, and is merely an attempt to stay ahead of the growth in traffic. A repeatable, sustainable and highly effective programme to reduce capex also requires asset lifecycle governance which is not implemented in most of the telecoms companies.

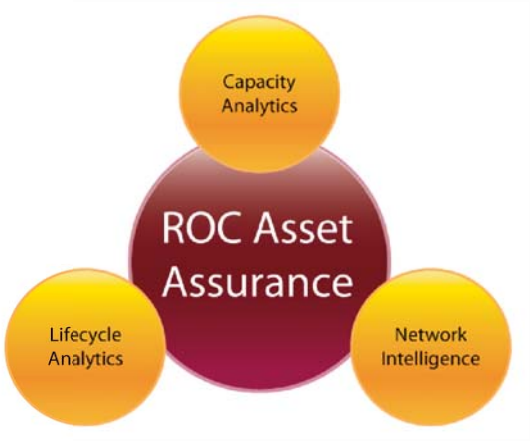
Business challenges for a CSP

CFOs and senior finance stakeholders are typically confronted with continuously shrinking margins which have a subsequent impact on budgets. Intense pressure from the marketplace to provide increasingly capital-intensive products and services – such as mobile broadband – mandates continuous network growth and technology evolution for operators. These challenges are ultimately owned by two groups: Finance and Network Operations. From the finance perspective, the business problem that needs to be addressed is: How can we preserve capital and grow free cash in the business? From the network operations perspective, the challenge is: How can we ensure we are using all available assets at the utmost efficiency?

The capex solution: Subex ROC Asset Assurance

In most CSPs today, attempts are being made to manage these challenges. For instance, network planning typically has significant traffic data and ▶

The ROC Asset Assurance architecture



statistics which are used for planning and budgeting. Similarly, supply chain commonly has systems that manage ordering, receiving, stocking and overall management of assets prior to deployment. What the operators lack, however, are monitoring and controls to help optimise the complete end-to-end asset lifecycle. For example, capacity management is required early in the asset lifecycle to monitor node resource consumption and resulting performance impacts. With this information, capital investment decisions can come off auto-pilot and become more targeted. After assets are deployed in the network, a view into stranded and unutilised assets which are candidates for re-deployment becomes essential.

Network analytics applied at each stage of the asset lifecycle can result in significant capital savings annually for the operator. The capex problem requires complete, holistic views into current assets as well as the consumption and placement of those assets. This problem also requires comprehensive analytics that are not only descriptive – to show current states and trending, but also predictive, to accurately predict asset exhaustion, procurement triggering, necessary asset warehouse levels, impacts of failure and growth rates on sparing levels and retirement strategies.

Asset Assurance is a new and exciting discipline which is garnering significant interest as CSPs turn their attention to managing and reducing capex. Subex's ROC Asset Assurance is a pioneering solution to manage telecoms network assets across all dimensions of the asset life cycle and reduce network capex substantially. A complete programme of Asset Assurance encompasses continual monitoring and process controls at each phase of the asset lifecycle.

From the finance perspective, the business problem that needs to be addressed is: How can we preserve capital and grow free cash in the business?

Why should CSPs care about asset assurance?

If CSPs are operating a legacy TDM network, migrating from 2.5/3G to 4G/LTE or even delivering IPTV and other services that require CPE, then ROC Asset Assurance should definitely be in their agenda for reducing capex significantly.

ROC Asset Assurance provides the CFO and finance stakeholders with a holistic, network-wide view of not only asset lifecycles, but also with an up-to- date tracking of capital spend versus budget, avoidance realized, and establishment of predicted capital needs based on network analytics.

As a comprehensive programme, ROC Asset Assurance provides CSPs with the ability to save millions of dollars in network capex along with helping discover, recapture and re-deploy stranded and unutilised assets. The solution enables the operator to track, manage and understand when assets will produce revenue. A comprehensive approach to Asset Assurance, factoring all these dimensions, will provide an operator with complete confidence that its network will grow to meet market demands while also guaranteeing that it receives optimal value for every dollar of capital budget spent.

How Subex ROC Asset Assurance has helped CSPs maximise the return on invested capital

- A CSP ordered over US$50 million in network equipment for a high priority growth project. Equipment was received and found to still be sitting in a warehouse six months later. Once the shelved assets were discovered, this prompted questions by the board of directors.
- A CSP employing Subex found US$25 million in stranded assets that were unknown to inventory in the network. This number is still growing.
- A CSP employing Subex found a large number of assets worth a huge amount, on the network that are carrying no services.
- A CSP employing Subex's ROC Asset Assurance found resource utilisation was at critical levels in certain network nodes, its internal traffic analysis did not reveal the problem.

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When it comes to big data, CSPs really do have special needs

Big data analytics is just the mining of collected data held within a database so why does the telecoms industry need specialised vendors to reap the benefits, asks George Malim

Manuel Stopnicki: Mining these domains takes specialist knowledge

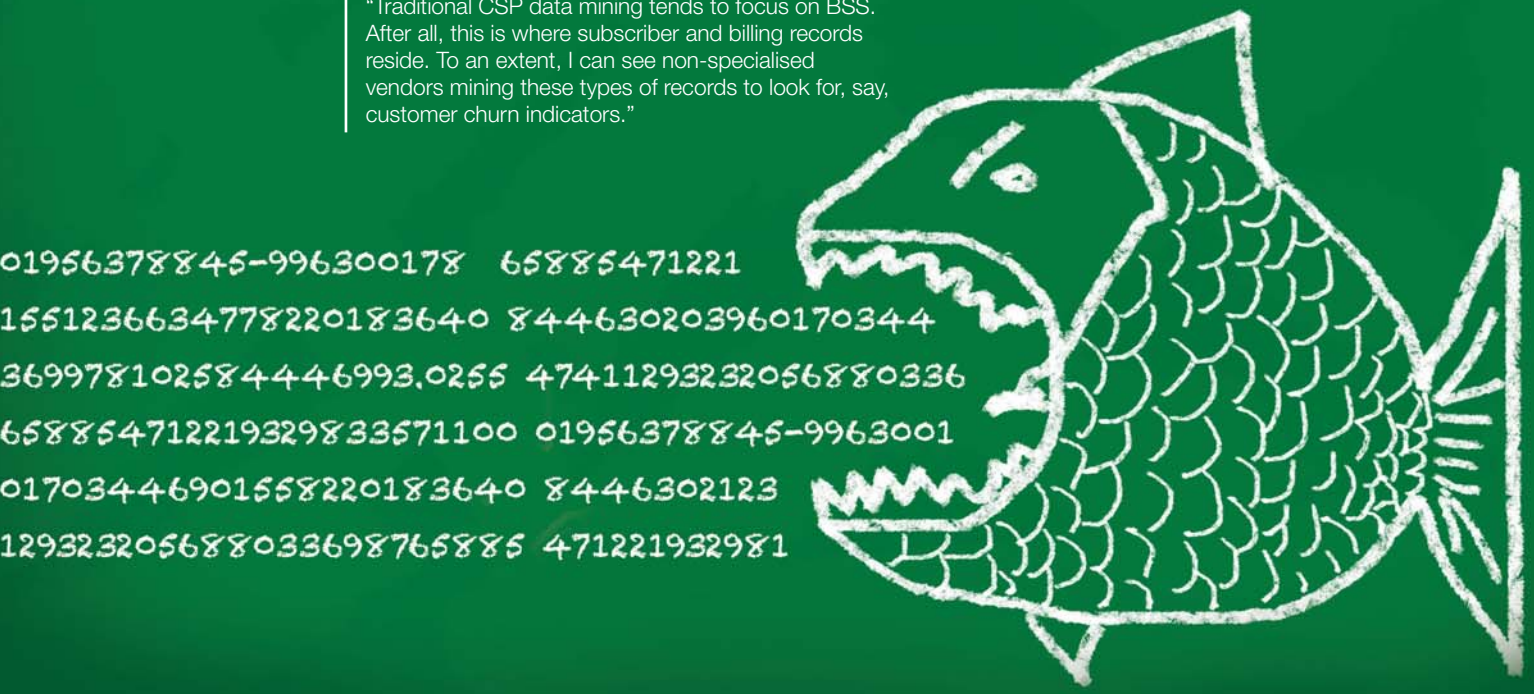
As always in telecoms, there's a tendency to think of CSP IT as different – somehow more complex or special – than it is in other industries. Big data analytics, at first, looks to be just another example of that, it's just about analysing the contents of a data warehouse, after all, isn't it?

No – for a start, there isn't just one data warehouse, there are a series of different databases, probably based on different technologies. Then add to that the vast volume of data a CSP creates and take into account the varied contexts that data is applied to and it starts to become clear an off-the-shelf, generic system won't enable CSPs to access the benefits big data analytics promises.

"In a CSP environment, there are three primary targets for so called big data mining: Business Support Systems (BSS), Operational Support Systems (OSS) and the network itself," explains Andrew Jacobs, global director of business development at **Subex**. "Traditional CSP data mining tends to focus on BSS. After all, this is where subscriber and billing records reside. To an extent, I can see non-specialised vendors mining these types of records to look for, say, customer churn indicators."

But that's where non-specialised concepts start to fall down, adds Jacobs. "Let's say a CSP is very concerned about EBITDA margin compression and wants to not just focus on revenue, but also on costs. The CSP may be quite interested, for example, in reducing its significant annual capex burden but this story cannot be told with BSS alone. The story is often incomplete unless it draws from all three domains: BSS, OSS and network. Mining these domains, and understanding which are best for sourcing different types of data, takes specialised knowledge – as anyone who has entered the lion's den of CSP data knows."

Steve Totman, data integration business unit executive at **Syncsort**, has done just that and highlights the scale of difference that exists within CSPs. "If you want to know why telco-specific expertise is critical, ask any group of three CSP executives to define how they measure and define active subscribers – this is a critical core metric which varies substantially across the industry," he says. "I've been asking this question ▶



for years, and it still amuses me the amount of full-scale arguments this discussion creates between executives that all sit and look at these numbers in reports every day. As you move into the big data analytics opportunity, you need to be sure that you have not only telco-specific expertise but also the freedom to ask new or different questions, so in the team it's always useful to have someone who hasn't been beaten into submission by IT – often called the 'Department of No' – when it comes to asking questions previously thought impossible but now easily achieved thanks to big data and technologies like Hadoop and MapReduce."

Chasing the value lying in their data involves a holistic approach. "Big data analytics is all the rage because it creates an unprecedented opportunity to extract value from the massive amount of data that communication service providers (CSPs) carry on their networks – even more when combined with data stored in their OSS/BSS/IT systems," says Manuel Stopnicki, the CTO of **Tektronix Communications**. "Armed with the right solutions, CSPs can not only can make use of their massive infrastructure investments, stop revenue leakage, and enhance their end-to-end user experience, but also can offer new services based on fine-grain customer segmentations."

Louis Brun, senior vice president of **Guavus**, sees two stages to big data analytics success. "You have to look at it in two ways," he says. "There's a big data framework and the different technical components that enable a CSP to put together a big data environment. In the end, it's about what you do with the data – you don't need telco-specific expertise if you're a tool provider because your tools have the capability to take a massive amount of data but, to put together a comprehensive big data solution, you need more than simply understanding Hadoop."

However, deployment of even telco-specific systems, is not without challenges, the greatest of which is the sheer volume of data involved. "A tier one CSP with 100 million subscribers can generate 30 billion data records in one day for that subscriber base," adds Stopnicki. "That's easily 20 terabytes of data in a day just from voice and messaging services. CSPs need big data solution platforms that can take advantage of cheaper commodity hardware and can linearly scale as the traffic growths."

"A greater challenge is the skills and domain expertise needed to select and interpret the relevant data for solving the critical business problems," explains Stopnicki. "This includes selecting the most relevant metrics (KPIs) and leveraging the best big data analytics methodologies. CSPs need trusted partners and advisors to augment their in-house talents."

There's a whole market of experts rising up to provide that augmentation but some of the marketing is adding a further layer of confusion to the selections process. "A host of options are open to a CSP today, which could be confusing at first, but provide viable complements and sometimes alternatives to the traditional relational database management system," acknowledges Stopnicki. "It is essential to understand the advantages and drawbacks of the main family of database products."

These include columnar databases such as Vertica or SybaseIQ InfoBright, in-memory databases such as VoltDB, BigMemory or Redis, distributed key-value stores such as Hbase, Cassandra or Riak, and search engines including Lucene, Solr or ElasticSearch. And there's more.

"Of course, we won't forget to add the much publicised open-source framework like Hadoop to the list of technologies that can provide powerful big data solutions," says Stopnicki. "Some databases will support the well-known SQL language, some won't and therefore limit the usage of existing reporting tools and skills, but are optimised for large data storage and retrievals. Hadoop is extremely efficient in batch processing huge amounts of unstructured data, but won't work for any kind of true real-time applications. As we previously stated, there is not a single solution that fit all use cases, especially at scale."

Totman picks up on the potential limitations of Hadoop in terms of applications. "Hadoop itself is just the operating system for big data – what's critical is the applications that can be built to run or utilise this new operating system," he says. "The current media hype around big data has clouded where the real opportunity is: software applications that exploit big data. The infrastructure and platform plays that are grabbing the headlines are critical, but they won't create the same long-term value as those entrepreneurs who figure out how to apply big data to the task of disrupting or accelerating a market."

"Frameworks like Hadoop enable processing of large data sets to become more efficient by distributing the workload among dozens or even thousands of servers," says Jacobs. "This helps to solve a plumbing problem, but does not inherently offer domain-specific tools to tell important and relevant stories from the data. The data sets can be vast so distributed frameworks like Hadoop can help make the data more accessible but consider that the average large CSP has between 500 and 1,000 software applications to support the business and operations. Which should be mined? Which should be trusted? Which objects and attributes should be considered in our analysis set? Is sampling OK? What variability in how services are delivered in each region will impact our sample? I could go on but, to summarise, Hadoop can help solve for plumbing, but it does not help solve for delivering insights."

Those insights should be the goal, argues Brun. "In recent years, big data has become a very good marketing word and companies are starting to position themselves as doing this in their branding," he says. "CSPs, though, need more than specific vendors, for example a CEM vendor, saying they handle a lot of data and therefore are a big data vendor. You need a holistic understanding in order to help a CSP."

Louis Brun: You need more than simply understanding Hadoop

Frameworks like Hadoop enable processing of large data sets to become more efficient by distributing the workload among dozens or even thousands of servers

EXPERT OPINION

Time to turn down the churn with big data analytics

It's no secret that competition among communications service providers (CSPs) has intensified. And customers have learned to churn, that is, blithely switch from one provider to another. That's revenue walking off the balance sheet and big data analytics can stop it, writes Syed Mahmood, senior product marketing manager – analytics for Tibco Spotfire

Even with all relevant data, managers soon find their analysis tools' limitations

Over the years, CSPs have responded to churn through strategies both trivial and thoughtful. Marketing teams scramble to keep up with evolving customer segments. The urgency is even greater in call centres, where customer service representatives want to know what offers to present to a customer while they're still on the phone. Over in network operations, managers try to decide where to invest in new capacity for the future.

Instinctively, organisations search for clues in their data, of which there's no shortage. Analysts scour customer behaviour and the concerns and needs expressed to customer service representatives. Call records, network data, social media as well as many other sources, internal and external also give clues. But even with all relevant data, managers soon find their analysis tools' limitations. They simply can't answer critical questions. Old assumptions have resulted in a rigid data structure and reconfigurations often require IT assistance.

Churn carries some serious threats but also opportunity:

Multiple service revenues are lost when today's bundled customer cancels. The frustration a customer may have with their phone service could mean lost revenue from canceled television, internet and other services.

Social media sets off a chain reaction that magnifies customer experiences. The one-to-one conversation between friends and acquaintances has ballooned into the hundreds or thousands on Twitter, Facebook and elsewhere.

Churning customers provide insight, if it can be captured. At the moment a customer closes an account, the CSP records reason codes. Though not always reliable, reasons to switch give clues to network weakness and vulnerability to the competition.

The soft stuff really counts

Trivial offers can be infuriating to anyone who has suffered a series of disappointments, and now only craves serious attention. Customers rate "customer service, honesty, and trust" just below ▶

strong network performance when it comes to brand allegiance, according to a 2012 study "Customer Loyalty" by PricewaterhouseCoopers. The trouble is that perceptions vary. What one segment perceives as attentive service, for example, may seem annoying or intrusive to another.

Much can vary by a customer's age group. Older users tend to value consistent customer support even more than younger customers do and are less impressed with incentives. They are also much less likely to switch than younger customers, viewing it as more of an inconvenience than an opportunity.

Fighting churn one caller at a time

Some of the most important battles against churn occur in call centers. There, each customer service representative makes immediate use of any knowledge – any that's available at a glance.

Those few moments are critical. Customers who call with a problem and hang up with a satisfactory solution are more loyal than those who've never had a problem at all. Satisfy the caller's need and the caller will keep coming back – but only if the representative has a full view of the customer and knows what can be offered.

Angel or demon? A delicate issue in this business is that some customers just aren't worth saving. The opposite of the highly profitable angels are the demons. The demons are not only less profitable than average, the provider actually loses money on them.

A 2011 Pitney-Bowes whitepaper, "Customer Centricity in the Telecommunications Industry," proposes estimating each segment's lifetime value. The formula involves ARPU (average revenue per user), churn and retention rates, CPGA (cost per gross add), revenue and other common data.

Both new and traditional metrics are ultimately just trivia unless they're actionable and such action usually takes place first in the call centre.

Recommendations

- **Make self-service data discovery a part of everyone's job.**
  Make it easy to use any source of data necessary without delay. Give them a tool for dragging and dropping sources into a data mashup, not a form for asking and waiting for IT.
- **Provide visualised data.**
  Help ordinary business users to intuitively grasp statistical significance without requiring deep knowledge of statistics.
- **Utilise the power of predictive analytics.**
  Advanced predictive models help to pinpoint opportunities and risks by uncovering hidden relationships, patterns and emerging trends that might be otherwise go undiscovered.
- **Encourage the proliferation of insights.**
  Most organisations contain enormous knowledge and insight within them, but much of it is stuck in silos. Contextual collaboration on an analytics platform extracts it and puts it to use throughout the organisation.

Real competitors don't wait for that fatal moment of customer defection. They look far into the data to spot triggers and events that warn of imminent churn, realizing real insight into the unknown. Analysts integrate the data they need, as they need it without help from IT.

The modern analytic platform propagates insights in role-based and secure views wherever they're needed, and wherever analysis might incite collaboration. The quality of interaction rises and loyalty grows when the company shows it truly knows what each customer needs.

Much can vary by a customer's age group. Older users tend to value consistent customer support even more than younger customers do and are less impressed with incentives

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Brazilian CSP applies social network data to SME campaign

When Vivo, Telefónica's brand in Brazil wanted to target decision makers within small to medium sized enterprises (SMEs) more effectively it turned to Real Impact Analytics to provide it with a system to analyse social network data to identify those with purchasing responsibility. Deployment challenges included collecting the data, establishing an algorithm to enable identification of senior personnel and a means to measure the accuracy of the programme. Here, Marcelo Lobato Pimenta, the manager of champion challenger results and strategies for CRM at Vivo, tells VanillaPlus how the project extracted value from 40 million call detail records each day and data retained in the CSP's data warehouse.

VanillaPlus: Please can you explain the business need you identified for using data analytics to target SMEs?

Marcelo Lobato Pimenta: In Brazil, when we service an SME client, there isn't a dedicated account manager who is in charge of collecting information and building a personal relationship. Generally, we don't know how many departments exist or who are the decision makers. We wanted to change this because we believe that our promotions' conversion rates will be higher if we target the right person in an SME.

Concretely, the project was targeted at improving our SME customer insights and then optimising our campaign execution.

VP: Why did you choose to use social network analysis as a means to identify the decision makers?

MLP: From a social perspective, business departments have very similar patterns compared to communities of friends. Indeed, most of our calls happen with our close contacts such as colleagues and people from the same department. Decision makers have the same traits as social leaders: they are central to a community and connect to a lot of people.

As our objective was to understand an SME's structure based on its call details only, social network analysis was really the best analytics approach to extract the information and insights we were looking for.

VP: What have been the challenges associated with turning the data you collect and hold into something that provides actionable insights within your business?

MLP: We faced three big challenges: the first was data collection. We had to collect and treat ▶

information from 40 million call detail records (CDRs) a day from mobile lines then, we had to merge it with a huge set of data from our data warehouse. Since bad data results in bad insights, we really invested a lot of time to ensure the highest quality of data .

The second challenge was the algorithm. we didn't find any reference or academic research on the right social network variables or B2B variables that would be valuable in our analysis. The result was that we needed to explore the data from scratch and innovate. The most important and interesting chapter was definitely the creation of a decision maker algorithm, where we developed new scripts to detect leaders based on their call patterns.

The third and final challenge was to test the effectiveness. We had to do this in the absence of learning sets. As we didn't have visibility into our client's structure and decision makers, we decided to test it in our company and the result was really good. 90% of the people we predicted as decisions makers matched – i.e. those with greater than 80% probability to be a decision maker were identified.

VP: What did Real Impact Analytics provide?

MLP: Real Impact Analytics supported us during the whole project. First, during the RFP, they demonstrated their capabilities in an agile demo – they were very proactive in showing how they work, and more importantly, how they deliver. In the project, Real Impact Analytics provided us with a very complete set of tools that they materialised into a datamart of 900 variables, including systems network architecture and mobility variables, and provided training to our teams to ensure that we were using their results at their full potential. We were impressed by their agile development method, the outstanding team and the focus to deliver a solution completely tailored to us.

VP: What have been the results of the project so far?

MLP: I can't provide too many details for obvious reasons, but I can confirm that we achieved a clear improvement on telemarketing contact effectiveness and better lifts in predictive models for communities products.

VP: What further plans do you have?

MLP: We are going to continue to invest in this application for SMEs. We already see the results in improved sales and better relationships with our SME customers. Furthermore, we're going to go one step further and identify decision makers in our competitor's clients – hopefully, convincing them to try our quality of service. Finally, if the approach works, there is no doubt it will be applied throughout the organisation – potentially to large corporate or B2C business lines.

EXPERT OPINION

The big gear you are missing:

Real-time intelligence

The author, **Edoardo Rizzi,** is vice president of product management, marketing and business development at Trendium

Big data in telecoms should not be a nightmare. It's an opportunity. For instance, in the financial industry the pursuit of innovation will allow transactions to be completed 5 milliseconds faster – now that's real time. Here, Edoardo Rizzi explains how CSPs can embrace a new paradigm and gear up to capture and manage this new, real-time opportunity

The excitement today in the world of mobile communications is unsurpassed, and the ecosystem is more vibrant than ever. Smart devices are released at a fast pace and loaded with more innovation and features. Applications flood the market daily, although only a small percentage quickly becomes a vital part of our daily life, while the majority disappears unnoticed. OTT providers quietly enter the market but quickly gain attention, adoption and market share, thanks to their agility, customer focus and degree of innovation.

From traditional CSPs however, we mainly hear about declining revenues, profits and customer loyalty, and increasing churn and customer dissatisfaction. We also hear about cost cutting measures, the threat and impact of OTT providers and a need for further consolidation. All this happens at a time when network traffic is increasing at a staggering pace and the incumbent CSPs are left bearing the whole weight while getting little to no benefit from it. As a result, some CSPs will succumb or become utility providers, but for the others, the majority, the future presents unlimited opportunities. However, this will only be possible if they adopt a systematic approach focused on substantially increasing innovation, differentiation and customer experience, while drastically reducing costs. CSPs that embrace this discipline are more likely to achieve above-average profits and higher market share.

In this new, real-time big data world intelligence becomes history within seconds and history is practically irrelevant. The ability to see and understand what happens now becomes paramount

Stuck in neutral

The leading CSPs have already realised what lies ahead. They have started to make investments and changes to pave the way for what will be a major transformation. Over the last two years we have witnessed a steady increase in momentum around LTE and the converged architecture. Many CSPs have already launched LTE and some, arguably, have done so before deciding what to do differently with it, beyond merely delivering more bits at a lower price. The investment towards other enabling technologies have also gained significant momentum, those being SDN, SON, M2M, offloading, CEM, policy management and more. These will unquestionably deliver significant benefits and enable a whole new set of opportunities. LTE in particular is a major discontinuity and a departure from the traditional way of doing things. LTE drives telecoms to merge with IT and as a result IT principles start to be applied to telecoms.

Truth be told, CSPs have at best, barely scratched the surface of what is the full potential of these enabling technologies. There is also no indication that this is going to change soon. The question is why. What impedes this? Recently we met several CSPs and to our surprise, the vast majority of them acknowledge that they are facing new challenges and dealing with radically new technologies that require new solutions and concepts, yet when it comes to making decisions they are doing it the old way. We see a tendency that CSPs are moving forward with business as usual, partly because the current established vendors are not providing any alternative paths. As a result, CSPs are still wrestling with spiraling costs and seem to have fallen victim to big data instead of looking for new innovative ways to deal with it. We strongly believe that the industry is at an inflection point and CSPs should look further, demand more innovation, and challenge the current assumptions, both internal and external. ▶

Real-time intelligence is key

When it comes to exploiting the full potential of the enabling technologies mentioned above, a fundamental shift has to happen in the mindset, culture and the way things are done inside the CSPs. These new enabling technologies drive new requirements, which if not properly addressed, as is the case today, will jeopardise the large investments being made and the business strategies that rely on them. Fundamentally, we believe that CSPs need to develop the ability to gain access to actionable insights in true real-time, at a much lower cost, more easily, and in a way that makes use of the broad variety and increasing amount of continuously-changing data that they have available.

The reason is quite simple: LTE, SDN, SON, and policy management, in particular, promise to make assets more usable, efficient, and scalable, and to put CSPs in a position to innovate faster and at a much lower cost, in order to capture the short-lived monetisation opportunities that characterise future mobile communications services and networks and deliver a superior customer experience. In such an environment, real-time context awareness becomes key for the purpose of proactive Customer Experience Assurance and effective Asset Monetisation. In fact, in this new, real-time big data world where it becomes more difficult to predict what customers will do, where, when and how, intelligence becomes history within seconds and history is practically irrelevant. The ability to see and understand what happens now becomes paramount in order to detect key events as they happen and uncover correlations between events that are only visible during that time span or that are of much less value if detected later.

CSPs are quickly realising that traditional tools used for extracting intelligence from traffic and other data sources, and for collecting, mediating, correlating and analysing that intelligence are no longer scalable or financially viable, impede productivity, and provide less value as they lack true real-time capabilities. This is why we believe that CSPs need to look for, demand and embrace more innovation. Letting go of some of the established practices and being open to embracing a new paradigm is necessary. As L. Gordon Crovitz said in a recent Wall Street Journal article in reference to big data, “society will need to shed some of its obsessions for causality in exchange for simple correlation: not knowing why but only what.” In other words, it’s less about explaining the science behind the observed data, it’s about quickly identifying patterns and events that, statistically, are significantly relevant.

Revamp the engines

The good news is that there are vendors out there, Trendium being one of them, that are ready today to enable CSPs to address the new challenges in new innovative ways. CSPs that have, rightfully so, identified Customer Experience Assurance and Asset Monetisation as their top priorities, need to know that in this new big data world it is possible, financially and technically, to gain real-time access to actionable intelligence and insights about network, services and customers, in a way that is scalable, improves productivity, and with a fraction of the complexity, footprint and cost of traditional solutions. Based on our experience, we advise CSPs that are selecting their future real-time intelligence partners and solutions to assess them against the following criteria:

- cost
- real-time analysis capabilities and in-memory computing
- scalability and distributed computing
- ability to deal with structured and unstructured data
- ability to deal with large variety of data
- proven ability to integrate data from existing and third party sources
- ability to quickly adapt to changing data structures
- ability and willingness to feed real-time intelligence to third party applications
- advanced root-cause analysis capabilities
- visualisation effectiveness and flexibility

Fundamentally, we believe that CSPs need to develop the ability to gain access to actionable insights in true real-time, at a much lower cost

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Silo smashing takes more than money

Analysis of the big data that CSPs hold can be used in multiple directions to enable new products, services and revenue streams. One critical aspect, though, is using big data insights to improve and differentiate the customer experience. Here, Jonny Evans examines how CSPs are applying big data analytics to the customer experience

Heath Podvesker: Big data will take CRM to the next level

Big data is big news across multiple industries as enterprises look to releasing the value locked inside the information their businesses already collect. CSPs hope to harness real-time data analytics to guide improvements in CEM, monitor service quality, boost retention rates and to evolve and monetise new services. However, successful implementation challenges existing organisational and technological boundaries.

One of the biggest drives towards deploying more intelligence on the networks is the changing competitive environment. "With continuous innovation and new propositions from the likes of Google, Facebook, Viber, WhatsApp and many other digital insurgents, CSPs can no longer assume that customers, even if they are retained, will continue to use their services," explains Robert Machin, EMEA director of product marketing at **CSG International.**

CSPs need to understand usage trends, get immediate feedback on the adoption or non-adoption of new services and need access to, "other less predictable metrics that can provide insight into success and failure and help to guide future strategy," adds Machin.

Beyond quality of service and network monitoring, some CSPs are using their increasingly accurate and segmented data-driven views to drive marketing.

To boost adoption of mobile TV services among existing subscribers, vendor **Guavus** worked with an unnamed CSP using big data analytics to identify users equipped with the best devices for mobile TV. It then segmented these by content interest. This helped the CSP recommend the most appropriate channels effectively: Acquisition take up rate multiplied by five and overall viewing time climbed 16%.

That example shows how big data can enable CSPs to "better segment customers based on usage patterns, device types and data plans and upsell them based on content interest, tweaking programmes as necessary to achieve the highest ROI," explains Anukool Lakhina, founder and CEO at Guavus.

Heath Podvesker, executive vice president of **MarketShare**, sees further value. "Big data will also take CRM to the next level of activity in which offers or bundles can be dynamic on a per person or household level," he says.

We're not there yet. **Amdocs** research shows 96% of subscribers expect CSPs to proactively warn them about major service issues, but that two thirds of subscribers don't feel their needs have been identified. "By anticipating customer need, monitoring customer events in real time and configuring an action plan for each customer, CSPs can generate opportunities to increase loyalty and reduce churn," notes the company's Yossi Zohar.

Challenges exist

Technological challenges include the need to deliver real-time metrics aggregated from numerous data points as quickly as possible. "Passive network probes embedding DPI (deep packet inspection) are needed since they are the only ones that can capture the whole voice and data traffic passing through the network," says Bertrand Mizzie, strategic marketing innovation director at **Astellia**.

Such technology lets CSPs grab data on subscribers, services, handsets and the network. It also provides clear understanding of the mobile applications used on the network, such Facebook, Twitter or YouTube. Solutions must be scalable in order that they can in future be extended to monitor new metrics, services and infrastructure. Then there's storage, data is a stream and its quantity is growing and analytics need to be actively responded to in real time. And what about the regulatory environment for customer data retention?

"In future there's going to be so much data passing through the networks that whoever thinks it's possible to collect, store and then analyse that data hasn't got what big data is all about. Because there's so much data, the cost of storing it will be really high, then there's bandwidth costs to get the data there and more," explains **Trendium**'s Edoardo Rizzi.

Data analysis needs to be active in real-time in order to deliver useful insights. Self-optimising networks require such real-time contextual awareness and prompt response to identified network events – any delay means those changes later enforced by the system will no longer be relevant to what's happening on the network at that time.

There's also a need to challenge existing organisational structure. "Until recently each department within a CSP could survive as an independent silo," Rizzi adds. "I don't think they can afford to do that in future. If you want a holistic view of what's happening on the network, you need intra-departmental harmonisation in terms of how you handle and understand the data. I think these barriers will quickly be lowered."

Podvesker warns that success is dependent on cultural as well as technological development. "If the people parts are not addressed, the advances in big data will be nothing more than a technical exercise," he observes.

In spite of the scale of the challenge, CSPs appear willing to move with the times. "We're seeing a real shift in Europe. They have realised that if they don't bring real innovation to their customer base they may lose their relationship with the subscriber," says Gary Buchwald, the chief commercial officer of **Intersec**.

Changing organisational structure seems essential. When showing one of his company's analytics solutions to a CSP's operations executive, Trendium's Rizzi was told: "But I'm core". The silo-based mentality limited understanding of the opportunity.

"I don't think in future these silos can exist. While CSPs understand something needs to change they are still tied to their comfort zone and the way they've operated for decades," he warns.

Data analysis needs to be active in real-time in order to deliver useful insights.

Yossi Zohar: Opportunities to generate loyalty

Edoardo Rizzi: Siloes can't exist in future

Bertrand Mizzie: Passive probes are needed

Useful data delivers meaningful value

Big data analytics is maturing as CSPs recognise its capability to improve customer lifetime value. Here, Bertrand Mizzi, director of strategic marketing and innovation at Astellia, tells VanillaPlus how CSPs will extract value and explains the challenges involved

VanillaPlus: What does big data mean to Astellia?

Bertrand Mizzi: There's still some debate on the definition of big data. We consider that the role of big data analytics spans across the four Vs of big data – volume, variety, velocity and value. These are all points where Astellia has been present for some time. We manage a whole set of information generated from different parts of the network in huge volumes. We are talking terabytes per day.

VP: What is driving CSPs' interest in big data analytics?

BM: The trend now is to get information in real-time. The roots of our company are in network-based monitoring and that wouldn't be there if there wasn't value in it. However, monitoring used to be a cost and big data analytics is starting to change that perspective. The new trend is to move from cost of ownership to return on investment – essentially achieving more value from the information we gather. Monitoring solutions are no longer in the cost column, they are moving to the revenue column now.

VP: Which big data analytics opportunities do you see as having the most potential for CSPs?

BM: The TM Forum recently did some research asking 17 CSPs what they see as the biggest opportunities. The top four – reduced cycle time and faster problem resolution, CEM, network and service management, and improving marketing effectiveness – are all at the roots of what Astellia is doing, we're right on target.

Nova Analytics for iPad

When it comes to reducing cycle time, probe-based solutions such as ours are the only way to get the deep dive troubleshooting capabilities across the network and across multi-vendor environments that CSPs need. Our Nova solution enables CSPs to quickly pinpoint an issue and isolate the problem whether it is related to a network issue, the handset, high traffic load or bad configuration – the typical sources of most problems. We've oriented our tools to make it easy to save time and enable fast turnaround of issue resolution.

VP: How do you see the big data for CEM opportunity developing in the mobile market?

BM: With the introduction of LTE and 3G we have seen many smartphone issues. We're able to isolate those, find work-arounds and then deploy a fix. That has a real impact on the customer experience and it's critical that the CSP knows which people are getting the worst experience. You can measure the quality of experience and assess what is your most impacted population. For example, thanks to the deep packet inspection embedded in our high capacity IP probes, we know that 50% of subscribers abandon web browsing if it takes more than ten seconds to load a page. If you can measure that from the network, you can optimise the network and ensure you deliver the best experience.

VP: What impact does big data analytics have on network and service management?

BM: Network and service management are the roots of our business. Network monitoring's initial value was in helping CSPs monitor, troubleshoot and show the performance of the network and services. The new trend is to evolve from measuring the performance of the network to using big data because troubleshooting and optimisation has to be done not only per network segment but per service and application as well as per user and per handset. That requires you to go deeper into each service and ensure your network is optimised for each effectively.

VP: Why should mobile be looked at as a specific case?

BM: We tend to forget that the specificity is the mobility. I see a lot of companies doing quality of experience based on core network segments only but we're convinced that the access network is also critical. The bottleneck is the spectrum and the technical hassle is in the handover. The access ▶

network is therefore a critical and highly technical aspect that must be taken into account. Astellia's engineers have unique expertise in Radio Access Network (RAN) where most of the quality degradations are coming from.

VP: In what ways can big data analytics be used by marketing departments?

BM: CSPs' are interested in improving their marketing effectiveness and that's probably the newest trend we're seeing. Tons of information can be produced from within the network itself per service, per subscriber and per location. Over time this becomes critical information for marketing to understand users' behaviour and build attractive propositions.

Marketing departments today suffer from a lack of information so, when they see all the information Nova can bring to them, they are very happy and very creative about how they can make use of it.

VP: Please can you give an example?

BM: A European CSP wanted to know what volume of its six terabytes of data traffic Google advertisement represented. Thanks to deep packet inspection embedded in our Neptune probes we were able to give them the answer very easily. That was helpful information that they used to negotiate with Google on revenue share.

VP: What do you see as the greatest challenges facing big data analytics?

BM: Big data is not without a series of challenges. The volume of data involved is certainly the greatest. For example, when you probe the 10Gb line interface of a mid-sized mobile operator you are generating billions of CDRs per day – that's two terabytes of data a day and most CSPs have several 10Gb line interfaces. To be able to handle all of this information requires advanced technologies and we have put a lot of innovation into this area to be able to present the information in real-time.

Being able to process the information in real-time within the data flow is important because you can't store it for processing later if you want to use it in real-time.

Another challenge is the quality of the data itself. With this volume of data, you'd better have good quality data to justify the investment involved. The data has to be very useful and meaningful to deliver value.

VP: What do you see as the most important factors for successful big data analytics utilisation?

BM: Big data analytics is essentially a lot of processes brought together. It benefits from new technical capability which is now here that wasn't five or ten years ago. The business rationale for it is now here but the solutions presented need to be adapted from day to day to reflect the needs of CSPs. We work across the four dimensions of big data to get the best utilisation of the network resources and optimise the experience. Ultimately the big data analytics Astellia provides becomes the solution CSPs use to increase customer lifetime value.

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Bertrand Mizzi: The sheer volume of data involved is the greatest challenge

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