

# Design for digital

A business vision to prepare communications  
service providers for the cognitive era



IBM®

## Contents

### Executive summary

### Guide to this paper

**1**

Digital disruption

**2**

Innovation: video focus

**3**

Digital consumer

- 3.1 New propositions
- 3.2 Big Data analytics
  - 3.2.1 Building customer focus
  - 3.2.2 Enhancing operational effectiveness
  - 3.2.3 Generating new revenues
  - 3.3 Digital advertising
- 3.4 Network enabled monetary transactions
- 3.5 "Less digital" segments

**4**

Business models

**5**

- Operational models
  - 5.1 Customers are "out of control"
  - 5.2 Simplify how products are bought and consumed instead of just "managing suppliers"
  - 5.3 "Work with partners" instead of just "managing suppliers"
  - 5.4 New approach to architecture

**6**

- Transformational opportunities
  - 6.1 Your cognitive future
  - 6.2 Cloud for Telecommunications
  - 6.3 Network-related challenges
    - 6.3.1 Transition
    - 6.3.2 Benefits and design aspects of full cloud networking adoption
    - 6.3.3 Strategies for carry-on or decommissioning of present services.
    - 6.3.4 Changes in cost structure
  - 6.4 Securing the future

**7**

- Making it Happen
  - 7.1 The need for a fresh approach
  - 7.2 Skills transformation
  - 7.3 Design thinking methods
  - 7.4 Agile development and DevOps
  - 7.5 IBM Interactive Experience

**8**

What next?

### Appendix

## Executive Summary

The business models that Communications Service Providers (CSPs) have worked with for decades are proving insufficient to deal with the new “all IP” world. This new world is characterized by a fundamental shift in customer expectations, rapid developments of new products that are not entirely under the CSP’s control, and disruptive competitive threats that can undermine the entire value chain.

IBM faces similar disruptions in our own markets and these have led us to re-examine and radically change most aspects of our business. These changes have impacted, and continue to impact, our business models, organizational structure, products, skill profiles, partnering strategy, competitive positioning and many other areas. Digital disruption is not an academic topic for us. We can share from our direct experience of what it takes to transform in the face of rapidly evolving challenges. We provide a couple of examples in this document: how we became the largest global digital agency and how we are developing a completely new line of business —Watson.

Digital disruption presents CSPs with some immediate decision points. Continuing with a business-as-usual approach will result in being reduced to a “utility” business model in the next 5 - 10 years. In many cases we expect to see CSPs failing to stay in business, either because of consolidation or due to outright business failure. CSPs must change rapidly, or they risk becoming a “dumb pipe” utility, or they may even face extinction. The key question is: What change is required?

The digitization of the world requires businesses not only to transform, but to be continuously transforming. This doesn’t mean replacing systems constantly; rather it means having the ability to constantly understand customers, predict their needs and be able to satisfy those needs rapidly. This has to be done across channels that are mature and need updating—and some that are just in infancy today. Successful companies will be those that best understand the evolving value chain and the agility with which they can extract value in new ways to drive the revenue mix and growth required.

This is easy to say but difficult to achieve without transforming existing capabilities - including people, process, technology and ways of working — and adding new capabilities. This is a business transformation that will be supported, but not driven, by network and IT transformations.

In this paper, we share our point of view about how the communications industry is evolving globally to meet the challenges and opportunities of digital transformation. Every CSP is different but our experience in working for many CSPs worldwide leads to many consistent trends. Here we present an overall assessment of the areas that most CSPs will need to focus on in order to be successful in the digital era.

We would welcome the opportunity to discuss these issues in more detail, and we expect to update this paper regularly to reflect changes in the market and feedback from readers in the industry.

### IBM in the Communications industry

Communications is one of IBM’s largest industries. 85% of Telecom firms in the Forbes 1000 are our clients. We work with AT&T, Bell Canada, Bharti, Idea, KPN, MTN, Orange, Sprint, Telefonica, Telstra, TELUS, T-Mobile, Verizon, and Vodafone —to name a few. As well as serving the giants of the industry, we also have built a strong track record of working with some of the smaller, innovative companies in the communications business —some of which, like Bharti, have become major players.

Communications is the number 1 industry for our research organisation. Our think tank, the IBM Institute for Business Value, regularly publishes research on your industry, including regular consumer surveys.

In 2014 we surveyed consumers in 35 countries worldwide. In the appendix, we have included links to some more recent publications. You can find more at [the IBV website](#) or by downloading our IBV app from Apple App Store or Google Play.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	3
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	---

## Guide to this paper

In **Section 1** we look at how **digital disruption** is affecting CSPs. There are challenges as trusted revenue sources dry up and new agile competitors emerge. At the same time there are **tremendous opportunities** for CSPs to use their central position in all things digital, arising from their networks and their experience managing millions of customers. We believe that putting **customer experience** at the centre of how CSPs operate is the key to unlocking future value.



**Section 2** addresses one of the most disruptive factors for the medium term – the explosive **growth of video**. We look at the challenges this creates and present some of the exciting work we are doing with CSP clients. This includes using analytics to drive business growth and improved **quality of experience**; delivering video from the cloud; and creating exciting new ways to consume video at sports events through our digital agency IBM Interactive.



**Section 3** examines new opportunities arising from **technological change**. We look at the exciting developments in **Big Data and Analytics** that allow for increased customer focus, enhanced operational effectiveness and new sources of revenue growth.



We then discuss new developments in **digital advertising** that save cost and increase revenues by more effective targeting. **Mobile money** is a fast developing opportunity

for CSPs and there is an opportunity to learn from experiences in the developing world where poor existing financial infrastructures have led to the rapid development of mobile payment solutions. We discuss how CSPs can work with other industries and highlight some truly ground-breaking developments in healthcare with IBM Watson Health.



We then turn to how the CSP **business model** must adapt in the “all IP” world. **Section 4** identifies the challenges as CSPs aim to make life easy and enjoyable for their customers and partners while, at the same time, increasing revenues and driving down costs. We look at why we believe there is no contradiction in a new model that combines increased effectiveness with dramatically reduced cost.

When everything is changing at once, it is hard to know what to focus on first. In **Section 5** we make some suggestions about **operational models**. We recommend looking closely at the way you work with your **customers**, design your **products** and collaborate with your **partners**. These three areas go to the heart of the difference between a traditional CSP and a Digital Services Provider.

**Section 6** is all about the opportunities – and challenges – created by technology. First, we examine how we think **cognitive computing** will fundamentally change the telecommunications industry and why 89% of C-suite executives in telecommunications believe it will have a critical impact on the future of their business.



We then look at the opportunity for CSPs to embrace **cloud computing** to transform their business and operating models.

Disruptive developments in **network technology** is the next topic. We examine the impact of Software Defined Networks (SDN) and Network Function Virtualization (NFV), as well as the importance of cloud technology to network delivery. We highlight opportunities for capital expenditure reduction and dramatic improvements in network operations agility. Finally, we suggest how CSPs should build a comprehensive **security strategy** to underpin these opportunities.

In Section 7 we look at **new methods for implementation**. Rapid change requires rapid response and the old methods of delivering IT and network infrastructure are inadequate. We examine the application of **design thinking**, **agile development** and **DevOps** with illustrations from our practical experience of both delivering results with our CSP clients, and more widely with our journey to becoming a design centric company.

Finally we have included an **appendix** summarising some of the white papers, survey results and studies that document our continued work on digital disruption and its effect on CSPs.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	4
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	---

## 1. Digital disruption— Good news and bad news

Digital disruption is being felt across industries as diverse as retail, air travel, consumer electronics, entertainment, tourism and transportation. Until recently CSPs have been relatively protected from this disruption but that is no longer the case—and the pace of change is accelerating.

The most obvious examples of disruption are where an existing competitor adopts a new business model or where a completely new entrant changes the look and feel of an entire industry.

Companies failing to react quickly enough go out of business or are seriously damaged by these disruptive events. They include household names such as Kodak, Nokia, Radio Shack, Borders, Blockbuster, BlackBerry, Tesco and Sears.

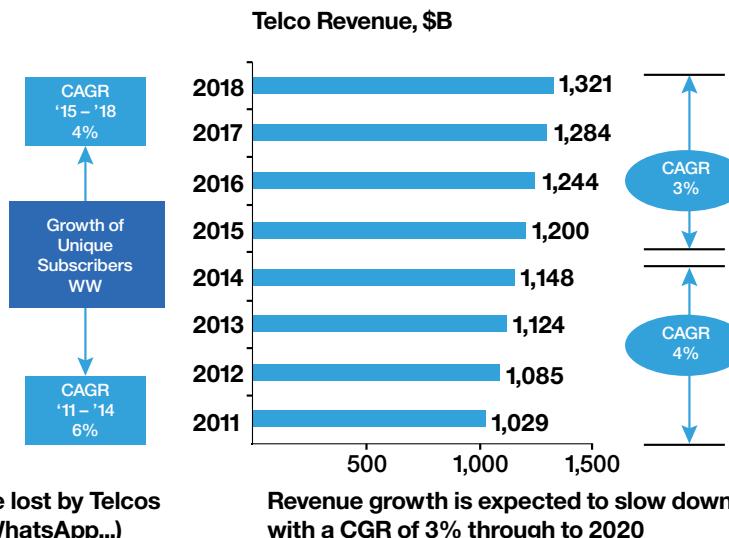
The unifying theme that links the companies that are successfully disrupting their industries is that each of them made fundamental changes to the customer experience. Collectively these companies have changed customer expectations for all industries.

	From mail order video rental business to an on-demand internet streaming service
	Revolutionized taxi dispatch with an incredibly user-friendly mobile app
	Leveraged the sharing economy and disrupted the hotel industry
	Airline with a “burning platform” forced to radically transform - they went totally online
	Developed data-driven technologies pushing the boundaries of how best to do business online
	Keeps product choices limited and has reinvented the retail business space
	Free instant messaging that disrupted CSPs’ text messaging business
	Requires its customers to get service and support from each other online
	Free disrupted the mobile landscape in France with unlimited voice and data plans

There are serious consequences for CSPs who have typically underperformed other industries when it comes to customer experience. This maybe didn’t matter too much when the only competition was from other CSPs and the challenge was to be better than, or at least no worse than the others. When customer expectations are being set by Apple and Amazon then CSPs can no longer hide in their “walled garden”. Worse still, the “all IP” economy has dramatically reduced the cost of entry into the communications market so competition comes from unexpected sources at unexpected times.

The emergence of WhatsApp is a great example. CSPs have had a healthy revenue stream from messaging for several years with a worldwide market worth tens of billions of dollars annually. Then along comes WhatsApp and essentially offers the same service for free. WhatsApp didn’t take some revenue away from CSPs; it destroyed the revenue stream. This is similar to the way services such as Skype and FaceTime have not taken away revenue from international calling. Instead, they have largely destroyed it as a source of revenue.

## Communications Tech Firms



\*By 2020, \$479B of revenue will be lost by Telcos because of OTT players (Skype, WhatsApp...)

Source: \*\*Ovum, \*\*GSMA report - The Mobile Economy, 2015

It is not difficult to imagine a future where individual consumers and enterprises do not need a contractual relationship with a CSP, except maybe for broadband access. Imagine a world where Wi-Fi connectivity is ubiquitous.

Consumers will need a broadband connection to their own home or premises, and smart devices for voice, messaging and data. However, the underlying network carrier will be

as irrelevant to them as the providers of electrical power are today. Already, provision of free Wi-Fi is a cost of doing business for many enterprises, from coffee shops to airports. It is taken for granted and is as unremarkable as the provision of heating and lighting.

## Cisco boss says half of service providers will be “irrelevant” within a decade

John Chambers, chief executive of tech-giant Cisco, said he expected sweeping changes in the operator landscape, with 50 percent of today's service providers becoming irrelevant in ten year's time as they fail to adapt in a fast-moving digital world.

*Mobile World Live, March 3, 2015*

This will spread in the next few years with most retail spaces, and indeed whole municipalities, becoming Wi-Fi zones. So what place does a CSP have in this world other than to be the supplier of the digital pipe?

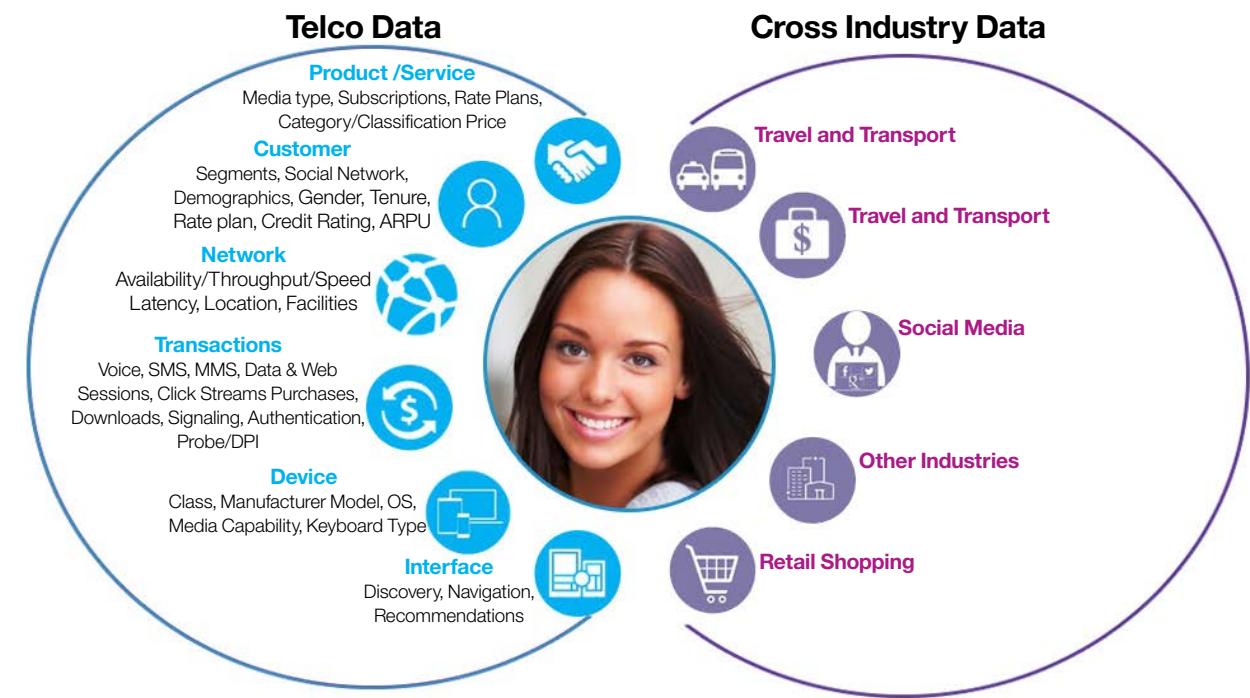
A similar fate is staring in the face of media service providers. Consumers have a fast diminishing need to take on expensive contracts with cable companies, or IPTV providers, to gain access to the TV shows and movies they watch. Over the top providers - Apple, Netflix, Amazon, Hulu and many others have invaded this space and threaten to make the traditional providers irrelevant. As a result many CSPs; triple and quad play strategies of bundling IPTV with their broadband, VoIP and mobile offerings look like too little, too late.

*“Excuse me, but didn’t you say there was some good news?”*

The really good news about digital disruption is that one way or another CSPs will play a critical role. In the worst case it will be as utility providers, but it can be much more than that. This is not a trivial point. Not all businesses are guaranteed a place in the digital economy, as thousands of book stores and music stores have already found out the hard way.

CSPs have millions of existing customers. They have access to massive amounts of customer data and they have the systems and operational processes to manage their customers, including ordering, provisioning, customer service, billing and payments. Most of all, they have efficient and secure networks that are at the heart of most things digital.

There is a wide variety of companies, and whole industries, that are working out how to get in on the digital economy – banks, healthcare providers, security firms, retailers, transportation and logistics companies, automobile manufacturers and many more. One thing they all need



is access to a secure, robust network. In addition, many of them also need access to the mass customer management solutions that CSPs take for granted.

For the most part, CSPs have been in reactive mode to the digital revolution, trying to respond to Google, Amazon, Apple, Facebook and others as they innovate and set the pace. The big challenge is, how do CSPs transform themselves to become leaders in this new world?

We believe that in an environment that is more and more commoditized and price-driven, differentiation based on superior customer experience will be key. A fresh approach to transformation should be driven by the following design principles:

**Put customer experience at the centre of everything you do:** Invest in service innovations based on tightly coupled smart network capabilities and digital services to deliver unrivalled digital experiences. This should help your customers to form an emotional engagement with your company and turn them into advocates. Use Design Thinking methodology to design all customer interactions.

**Personalize every interaction:** Tailor interactions in all phases of the customer lifecycle to the individual and focus on the relationship rather than the transactions. Capitalize on aspects of personalization customers control while enabling where they cannot.

**Leverage analytics as a differentiator:** Employ disruptive data analytics to better understand customers so you can meet their wants and needs. Enable more real-time data capture and analysis that support decision making at the 'point of impact'.

**Automate the ordinary to deliver the extraordinary:** Dramatically simplify support functions and business processes to drive out cost and enable staff to focus on service excellence. Simplify interactions without intervention. Integrate presence and services seamlessly across channels and devices using lean principles.

**Turn social business into serious business:** Get in tune with today's digital consumer by listening to the digital dialogue and becoming part of it; find real influencers and use social tools to collaborate and innovate with customers and partners.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	8
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	---

## 2. Medium-term innovation trends: focus on video

New services are all about data. But in reality data is increasingly all about video. Video is now the most pervasive and growing form of traffic over fixed and mobile networks. In client projects, we often find that video traffic represents 40% of the overall volume or even more.

Video is here to stay and will continue to grow. According to the Cisco Visual Networking Index 2014-2019, video alone (made up of TV everywhere, Video-On-Demand and social/P2P video) will comprise 90% of global consumer Internet traffic by 2019. This scenario will become a reality as several industries are engaged in preparing the perfect storm. CSPs are introducing 4G (which we believe will approximately double video consumption compared to 3G) and they are preparing for 5G. The media industry is reaching maturity with HD content distribution and is now moving to Ultra-HD (UHD). Meanwhile, the consumer electronics industry is working hard to differentiate its products on larger, higher resolution screens.

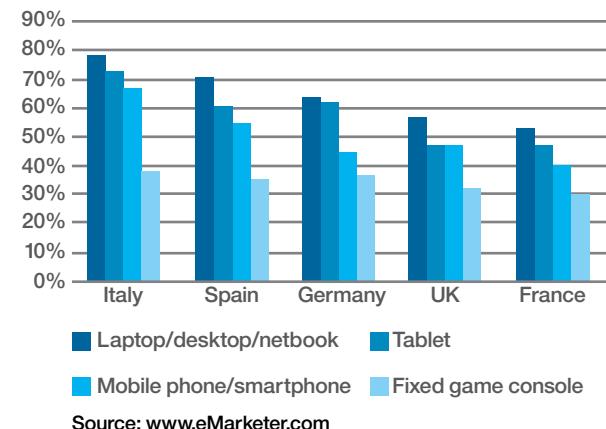
Above and beyond the sheer volume of data consumption, an essential aspect of video is customer experience. Consumers have their current expectations for services like web or email, but video is a different beast. Video comes with very specific KPIs like time to start a video, or video resolution. The quality of experience (QoE) with OTT video is becoming a key parameter for comparing CSPs. Netflix has already introduced its own (controversial) benchmarks of North American cable operators and regulators in Europe are

designing new metrics to compare CSPs beyond just coverage and bandwidth. The impact of video QoE on consumers is already apparent. In some engagements, we are already noticing a correlation in specific high-value data-hungry consumer segments between video QoE and key business metrics such as Net Promoter Score (NPS).

We are witnessing a new evolutionary phase of the Internet: it is gradually morphing into a video distribution network for both digital entertainment and social media, where the definition of consumer experience is rapidly changing from what we know today.

CSPs are adapting to this new phase and experimenting with a spectrum of business models. Some are buying rights to exclusive content (sports being a popular option with for example Telefonica and BT).

Others are aligning with OTT service providers as much as possible, by integrating the OTT app into a consistent and unified user experience (a typical example is the tight integration of Deezer music and Netflix video apps with telecom services on an IPTV set top box, or on tablets). Still others are rushing to create innovative mobile data plans where data consumption is partly paid by the consumer and partly by the OTT.



To be successful in this transformation, CSPs can rely on several enabling technologies. Analytics is critical in helping tactically to drive more revenue today and strategically to make informed decision on the optimal business model for years to come. Cloud will be essential to help lower the cost of video services delivery and to provide the required flexibility and agility.

These examples of the use of these technologies are drawn from our recent experience working with CSPs:

### **Using analytics to optimize products, increase quality of experience and generate new B2B revenue streams**

As the market leader in analytics, IBM is making significant investments specifically focused on unlocking valuable insight from video services. With video, understanding the real consumer experience is essential. This allows network planning and investment to be driven by the reality of what consumers are experiencing and allows for the definition of innovative data plans that will be attractive in the market and generate more revenue. This innovation in data plans can come in different ways. It can involve creating data plans in partnership with OTT video service providers. It may focus on enabling different QoE with video. Informed decisions require an understanding of how people are consuming video, what and where it is being consumed, and with which devices.

In addition, analytics can help to create new business models focused on selling insight (anonymized and respecting local privacy laws) to third parties. For example we are working with CSPs to create the capability to insert video ads within a nationwide Media-Telecom ecosystem designed to increase the value of linear and non-linear TV advertising for all parties.

### **Cloud video delivery**

Video delivery over IP initially started with proprietary technologies that had to be deployed on the operator's network, often distributed in point-of-presence, for latency and scalability reasons. Introduction of a new generation of video streaming capabilities, such as progressive download and Adaptive Bit Rate, is changing that picture and makes cloud-based delivery possible.

As the cloud market leader, and committed to helping its clients succeed in video, IBM acquired Clearleap Inc. on December 5, 2015. Clearleap offers a cloud video platform with an API framework, subscription and monetization services, and device specific player support. The combination of IBM and Clearleap creates an industry-leading cloud based platform that can manage, monetize and grow the user video experience across the globe. Together, we address the requirements, across all industries, necessitated by embracing video, such as changes in core infrastructure, networks, management processes, and application architectures. IBM with Clearleap will offer a comprehensive cloud video solution to clients that will be secure and have access to APIs and video processing tools.

### **Video interactive experience**

Beyond the consumer experience with video quality, there is a broader opportunity to transform how people are consuming video. Our digital agency, IBM Interactive Experience, is working with CSPs to redefine what video can make possible. KPN in the Netherlands is exploring the many new video experience options that LTE Broadcast will allow in venues like stadiums and concert halls. B2B partnerships with broadcasters to deliver premium video QoE by offloading TV everywhere traffic onto LTE Broadcast are also on the agenda. Our teams worked with KPN to define and implement such a new experience: IBM and KPN bring the stadium experience from the field to the second screen for football fans



## 3. Total connectivity and the digital consumer

### 3.1 New propositions

The digital consumer will use multiple channels and multiple devices and expect a consistent and an excellent experience across all channels and all devices. However, the dominant channel will be online and the dominant device will be mobile, specifically the smartphone. Digital products and services must be designed from the customer experience viewpoint but design should start from an assumption of online, mobile first. In future many products and services will be essentially online and mobile only.

This is a challenge for many CSPs, who hold on to the belief that their customers still prefer ‘personal’ service through call centres and retail stores. Their failure to design an effective online experience is why CSPs often have online transaction levels below 10 percent. It is not due to customer preference. We believe there will be some back office requirement for call centres but it will be a greatly reduced role. There will also be a role for the retail store of the future, but to be effective it should be an extension of the online channel acting predominantly as a physical showcase for digital products. This applies just as much to enterprise customers as it does to consumers.

### 3.2 Big Data analytics

Clearly solutions for Big Data and advanced analytics are developed in many industries. As our recent study shows, 52 percent of the 65 CSPs studied had Big Data-related projects in 2014 in either pilot or production status. This is a significant increase compared to 33 percent in 2012. Still, there are few examples where companies have truly monetized data and used it effectively to change their business.

In general, there are three main sources of benefit from Big Data and analytics. They are: data-driven customer-centricity, operational effectiveness and new sources of revenue. They are summarized in the figure below. We describe them in more detail in the following sections.

#### 3.2.1 Building customer focus

Improving customer relationships requires an understanding of customer preferences, behaviours and sentiment. Each phase in the customer lifecycle can be supported by analytics methods or models, from acquiring customers, through managing customers, expanding relationships/selling, retaining customers and risk analytics, to “voice of the customer” analytics, such as sentiment analysis.



##### Building customer focus

- Customer lifecycle and value
- Customer experience
- Advocacy metrics
- Social and competitive monitoring
- Cognitive analytics



##### Enhancing operational effectiveness

- Digital interaction
- Process transformation
- Data driven business decisions
- Third-party social media
- Mobile powered by analytics



##### Generating new revenues

- Data-driven revenue streams
- Data/analytics as a Service
- Data exposure via APIs
- Managed environments for ecosystems
- Internet of Things

By leveraging both company-owned and external data, CSPs can make business decisions that better anticipate consumer needs. External data includes that from third-party ecosystems, such as Twitter and Facebook, to generate richer insights in the context of customer issues and sentiments. However, only 21 percent of CSPs we studied collect and analyse social media today. As the demand for real-time support in business decision-making intensifies, cognitive analytics will become increasingly crucial. It will help to understand information, interpret context and learn based on experience. It will also help to engage customers consistently across all channels to provide instant Omni channel readiness 24/7. In the medium term, areas to focus on should include: building rich customer profiles (using structured and unstructured data both internal and external) and investing in building predictive and prescriptive capabilities. The diagram below summarizes the phases.

### 3.2.2 Enhancing operational effectiveness

As revenue growth slows and profit margins decrease, CSPs have to aim for dramatic cost reductions and more efficient operations. Analytics can play an important role here.

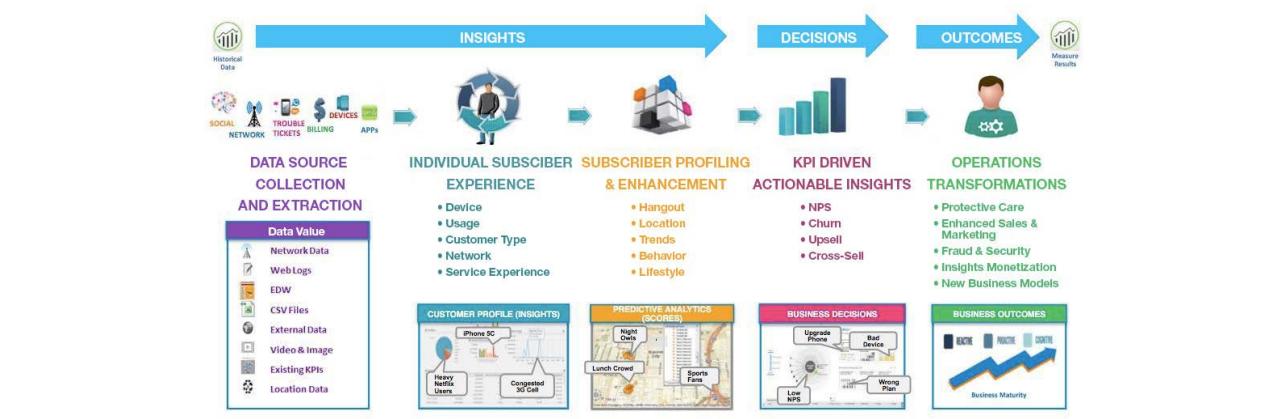
Enhancing operational effectiveness can be approached in at least two ways:

- Through digital interaction: re-imagine the ways people connect, transact and engage with companies, institutions and governments, as well as how these new interactions can create mutual value
- Through process re-invention: use embedded analytics to continuously monitor, measure and refine decisions related to organizational operations. This can help transform organizations for greater agility and precision that enable new growth.

Leading CSPs are combining both of these approaches. They create end-to-end transformation by integrating data into business processes.

Our medium term recommendations are:

- Embed analytics within business processes to automate, drive or inform key business processes within the organization by forecasting outcomes and empowering employees to act quickly and precisely in each situation.
- Enrich internal data streams with third-party social media (for example, Twitter) to create a set of new enterprise applications to improve understanding of your markets. Use these to learn about problems with new products or services, and to predict long-term trends.
- Create a mobile strategy, empowering employees to access insights from analytics anytime, anywhere by making enterprise assets accessible from mobile devices. Bring intelligence to as many actions as possible, in the moment.



Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	12
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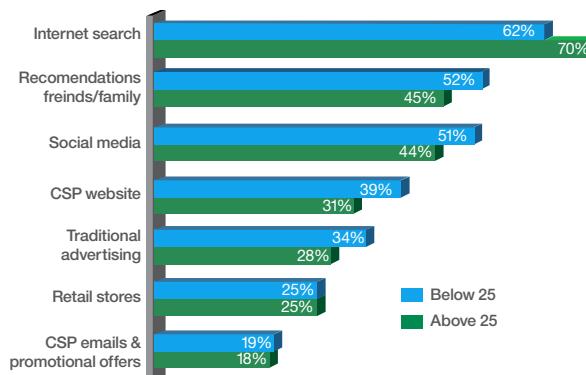
### 3.2.3 Generating new revenues

Possibly the most valuable asset CSPs can exploit is Big Data as they have access to a wealth of information about their customers' behaviours, preferences and movements. A number of CSPs (Telefónica, Sprint, and Verizon) are already taking expansive steps with Big Data to create entirely new revenue streams from "upstream" partners – such as retailers, advertisers and car manufacturers – to add to the revenue they already obtain from "downstream" end-users, such as consumers and enterprise customers. Big Data and analytics solutions open an array of opportunities for CSPs to offer services in multiple ecosystems, such as connected cars, clinical remote monitoring and pay-as-you-drive car insurance.

Being able to offer business-to-business (B2B) data and analytics services represents a fast-growing secondary revenue stream. This is especially true in ecosystems where connectivity plays an important role. For examples CSPs can provide solutions based on iBeacons or Wi-Fi technologies to help retailers better understand the customer behaviour in the store and provide a more seamless integration between online and offline. This service can be provided together with general connectivity.

It should be recognized, however; that there have been few examples of CSPs monetizing their internal data on a large scale. We've, a joint-venture set up by the three largest UK mobile operators, did not achieve significant financial results despite having access to a majority of (anonymized) customer accounts. It was recently bought out by O2.

However, the key learning is that there is no one established business model that could be replicated. CSPs need to innovate with their partners, rather than wait for the next moves from the global internet giants, Apple, Google and Amazon.



### 3.3 Digital advertising

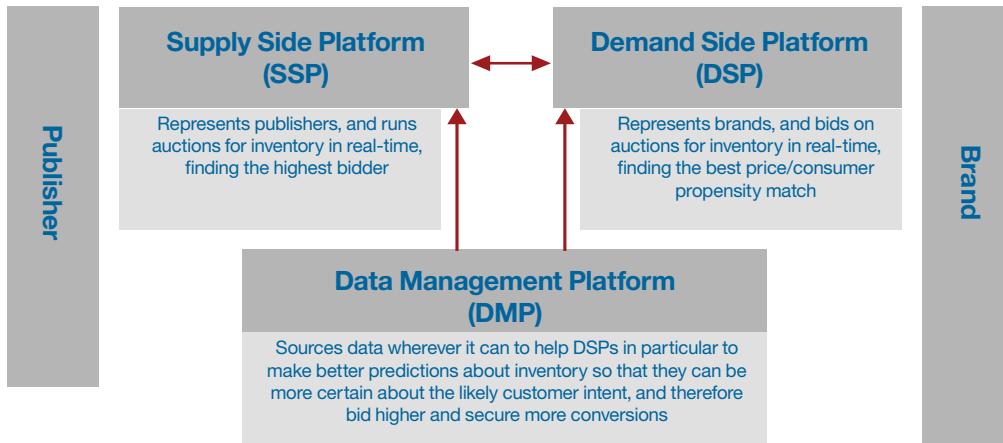
Digital advertising is increasingly used in telecommunications and other industries as well. According to [eMarketer](#), digital formats will account for 41.4% of global advertising spend by 2019. This is driven by many factors, including improved targeting, ability to react in real-time, and greater personalisation.

This is in line with the trends on the consumer side. In our 2014 survey, we asked consumers in 35 countries how they find information about CSPs. The main sources (irrespective of age group) are internet search, friends and family recommendations and social media. Operator websites, traditional advertising and stores are no longer the most popular.

To respond to these trends will require an even greater focus on communication using digital media rather than traditional advertising. CSPs need to ensure that they are part of the conversations in places where they actually happen, whether that be social, search, video or other digital channels.

At the same time, the evolution of the digital advertising ecosystem creates a significant opportunity to materially increase value in buying ads, either directly on behalf of the CSP's marketing group, or supporting the buying process of third party advertisers with Big Data. Programmatic advertising is an open data and media-buying market and now powers 60-70 percent of online display advertising (by impression). CSPs can play a role in this new ecosystem. Implementing ad technology and automating digital advertising, you can now integrate Big Data into digital campaigns.

For the CSP's marketing group, this can lead to substantial improvements in customer acquisition. The idea is to bring insights of your own customer data to prospects.

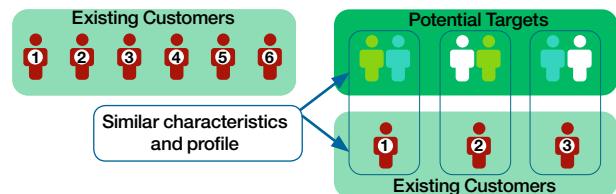


This can enable CSPs to:

- achieve 6-12% reduction in digital ad spend for the same results (assuming 30% market share)
- better identify new high-value prospects and improve campaign conversion up to 10 times by leveraging your own data
- target prospects where they are listening – leveraging segmentation to create effective social, native and search campaigns

How can you achieve this? CSPs can optimize digital media spend by leveraging their own data to exclude existing customers from the acquisition campaigns (if you use only third-party based segmentation for acquisition marketing, you may end up advertising to your own customers). You can also engage everyone aggressively online, through behavioural look-alike modelling, cookies, apps and other technology. You can now profile people who aren't your customers. You already know what your "perfect customers" look like – now find similar people in the digital ecosystem.

Existing first-party profiling and modelling helps drive highly personalised and effective cross-sell and up-sell campaigns. The data sets to help you create a better, more timely and more relevant communication with your clients now also include URLs visited, psychographic profile from Twitter, geotagging of locations, comparators considered, behavioural profile, social network connections, key decision levers, propensity to churn and moments of truth. Leveraging existing profiles, you can now target new customers who share those profiles, using similar campaigns and offers. This is illustrated by the figure below.



Thanks to our unique partnerships with major social networks (Facebook, Twitter) and leading digital advertising ecosystems (LiveRamp, the Trade Desk, Krux, Xaxis, MediaMath, shoutlet), combined with our innovative marketing, Big Data and advanced analytics solutions, IBM can help you develop market changing capabilities in the digital marketing space.

### 3.4 Network enabled monetary transactions

CSPs are looking to position themselves in every part of the supply chain and earn return from the millions of monetary transactions between customers and companies that are happening via their network. It makes sense for operators to offer monetary services as people start using their mobile phones as payment devices. There is an opportunity to take control of the mobile wallet on the phone as a platform for monetary services.

Mobile monetary services promise many new benefits for users, and are undoubtedly going to shape the telecommunications, technology and financial services industries. Technology innovation and new transaction types are changing the monetary services landscape, and opening up opportunities for telecommunication providers. Monetary services are also seen as key enablers for other value-add services in mobile commerce, like loyalty services or couponing.

The first success of mobile monetary services is found in developing countries where a large proportion of the population has little or no access to traditional financial services. M-PESA is very successful in Kenya and other African countries for money transfers from person to person and customer to business. IBM was involved in the development of M-PESA. Vodafone India has also rolled-out M-PESA as its mobile money transfer and payment service.

Mobile payments are now also becoming increasingly popular in developed countries, amongst others in mobile commerce as a replacement for cash or payments cards, and as innovative and convenient payment means for new mobile services like mobile ticketing or mobile pre-order services.

Furthermore, mobile wallets have the potential to consolidate several payment services, and even other trusted services like mobile IDs, car keys, or tickets. There are diverse perceptions about what a mobile wallet is, the different flavours it might have and how it can be used—not to mention the challenges related to its design, the complexity of its ecosystems and the business forces behind it.

Mobile wallets can be divided into two major groups: Proximity mobile wallets are based on NFC technology, and UICC cards could be used as the secure elements. For CSPs, this is a strategic opportunity to position UICC cards as the future core enabler platform for trusted mobile services like payments. Remote mobile wallets, also called Digital Wallet or E-Wallet, are used for payments services in remote ("card-not-present") environments. Monetary services like M-PESA belong to this group. The CSP can become a financial service provider and provide its own payment method with a Remote (Digital) Wallet offering. There are major distinctions between both wallet types in design, technology, usage scenarios, business model and position in the ecosystem. Understanding these differences between proximity and remote mobile wallets is fundamental for any further discussion.

The five major types of mobile wallet services and functions are payments, coupons, ticketing, access and identity. A wallet with no services is useless. The value of a mobile wallet depends upon the services it is made for—including not just payments but also loyalty programs, transportation and ticketing capabilities, access keys and important identifying information. The combination of these mobile wallet services adds greater significance to the wallet concept.

Mobile wallets provide essential customer data that can be collected and analysed to the advantage of users and vendors. Further business value is hidden in the data. Sharing data of separate services through the wallet can open up a variety of new opportunities for the business. Mobile wallet analytics allows CSPs to capture data, engage customers and execute personalized offers.

Developing a monetary services strategy is a highly complex task. IBM has the expertise and experience to help CSPs in developing and implementing monetary services.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	15
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

### 3.5 “Less digital” segments

Digital technology is increasingly pervasive through all industries and professions. In a sense there are unlikely to be significant ‘non-digital’ segments. For CSPs this provides an opportunity to design solutions for specific areas such as education, health, finance, automotive — indeed for almost any sector. While the Telco can be the data pipe for all industries, designing effective digital products for specialized areas is more difficult and will require working with customers and partners to generate innovative solutions that meet the needs of the specialism. This is an emerging area and CSPs have not yet met their potential, though many are experimenting with building digital ecosystems, funding incubation facilities and testing the waters with new digital business units.



**IBM is turning Watson technology into a cloud service, Watson Health Cloud. It will sell to doctors, hospitals, insurers and patients. That offering will be the centerpiece of our new dedicated, Boston-area business unit, IBM Watson Health.**

Last year we opened IBM Watson Global Headquarters in the heart of New York City's Silicon Alley and we are building academic partnerships and relationship with innovative developers and entrepreneurs.

Read the story at: <http://bit.ly/ZcxKh2>

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	16
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

## 4. New business models for CSPs

There are many different views on what a “business model” is, but at its simplest it is a description of how a business makes money.

For CSPs for over a hundred years this was actually a relatively simple model. CSPs controlled networks that cost a lot to build. They sold the ability to make telephone calls. The marginal cost of the calls was almost zero, so CSPs made a lot of money selling telephone calls that enabled them to make good profits, some of which they invested in the next generation of networks. From the customer point of view it was pretty simple too. The customer wanted to make telephone calls so needed to buy the service from the CSP. Typically this was either a monopoly provider or one of a small number of competitive operators. The customer did not have a lot of choices to make.

Many CSPs are still stuck in the same mind-set but the digital environment has brought radical changes. Perhaps the biggest change is that CSPs no longer sell exactly what customers are buying. In the original model CSPs sold the ability to make calls. Customers bought the ability to make calls. In the digital environment CSPs sell data. But customers don't buy data. Customers do not wake up in the morning and think “After I've had my first cup of coffee I am going to consume some data”. What customers buy are movies, video clips, games, healthcare monitoring, home security monitoring, and the ability to buy and sell shares and manage bank accounts. To do all these things they need a

data pipe that they buy from the CSPs just like they need electricity to power the many devices they consume these services on.

One of the impacts for CSPs is that they have lost the link between the volume of what they sell, in other words the number of megabytes of data, and the money they receive from the customer. As a result the volume of megabytes sold can double or treble in a year while revenues remain flat or fall. Worse still, CSPs are still carrying the load when it comes to the high cost of building out networks without any certainty that those costs can be recovered. Worst of all, they are rapidly losing their emotional connection with their customers.

The first choice CSPs must make is whether they want to be primarily a utility provider of network services, or a provider of digital services. Those that choose to be utility providers will need a “lean and mean” business model focused on driving cost out of operations and promoting maximum efficiency in delivery of service. For those that choose to be digital services providers there are three main challenges:

- Finding new sources of revenue to replace falling revenues from traditional voice, messaging and data
- Providing a customer experience that matches or exceeds their customers' increased demands
- Doing the first two things while dramatically cutting operating costs

In addition, CSPs must figure out how to manage the legacy products and processes (and underlying systems) that have brought revenues in for many years and will continue to do so at a reduced rate for some years to come.

### So what will be the main characteristics of the DSP business model?

There is no established model for the digital service provider. Most CSPs are experimenting with different approaches, some radical and some evolutionary. IBM believes certain themes are emerging that are starting to answer the three challenges:



**New sources of revenue:** digital products have certain things in common. They require some form of network connectivity and they usually have a significant non-Telecom component. Mobile health monitoring requires the network but it also requires a healthcare component; mobile banking requires a financial industry component, and so on. Digital products also tend to have a much shorter lifecycle than traditional products. Time to market is critical and the pace of innovation is accelerating. It is hard for a CSP to know where to focus. Many are adding TV service as they seek to draw customers in through product bundling via triple-play and quad-play offers. This can be successful but it is really just an extension of the traditional way of doing business – making the pipe bigger to handle more services. It is as vulnerable as other services to becoming a utility business in the medium term.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	17
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

More interesting developments are where digital service providers (DSPs) are seeking to develop broad ecosystems to 'capture' a definable chunk of the digital market such as the connected home or the connected car. The aim here is to become the supplier of choice in these domains. It involves a significant change in brand image but if successful it allows the DSP to own a market in much the same way as Amazon owns a significant share of the online retail market. For example, if the aim is to "own" the connected home then the ecosystem can include security companies, home appliance manufacturers, heating and air conditioning vendors and a whole emerging range of items in the home that have one thing in common – they can be controlled by a single mobile device. Once the market position is established then it becomes reasonable to expect consumers to buy household items, normally unrelated to Telco, from a DSP – probably through an app on their mobile device.

It is relatively easy to imagine DSPs becoming dominant in the connected home because there is no obvious rival for the position. It is more difficult in other areas such as the connected car, mobile finance or healthcare. Automobile manufacturers will compete for dominance of the connected car and banks or healthcare providers will do so in finance and healthcare. In these markets branding becomes critical. Will consumers prefer to buy mobile services from the DSP or from the providers of the underlying service? This is a critical question since the dominant brand will be in a position to extract the most value from the customer.



**A new approach to customer experience:** the new business model has to be designed from the customer point of view with the aim of creating an environment where it is easy and enjoyable for the customer to do business with

the DSP. As such, the model has itself to be agile and innovative so as to be able to adapt to ever changing customer demands. A few things are clear though. The customer experience should be online, mobile, personalized and real -time. This requires a new approach to products and processes that are currently call centre/retail store focused and emphasize the efficient batch processing of bulk customer transactions. This new approach is discussed in more detail in the next section.



**New operating models with dramatically lower operating costs:** one of the characteristics of many companies with high levels of customer satisfaction and customer advocacy is that they are low-cost operators. For example, two of the highest rated retailers in the USA, Costco and Trader Joe's, are renowned for their different approaches to low cost operations. An excellent customer experience is not achieved simply by throwing money at customer service. If the existing processes and systems are not designed from the customer point of view, then simply spending money on them will not improve customer experience. This is at the heart of why so many IT driven 'transformations' of CRM systems or billing systems have failed to deliver expected business benefits. Doing

the wrong thing more efficiently is not a recipe for success. Designing operations so that customers can self-serve in an easy, enjoyable way can have the double benefit of increased customer satisfaction and lower operating costs. This is a lesson most CSPs have yet to learn.

### The legacy world

What to do about legacy products, processes and systems is a challenge facing most CSPs. There is no single way of approaching this but IBM strongly recommends that whatever approach is taken, the new agile customer oriented DSP business is protected somehow from the legacy world. We recommend that legacy be managed separately with a focus on cost reduction and operational efficiency. One way of achieving this separation is to adopt a Mobile Virtual Network Operator (MVNO) model for the launch of digital products. In this way back office legacy systems for functions such as provisioning or trouble ticketing can be kept in place, while customer facing functions such as commerce and campaigns can be redesigned for the digital market.

The MVNO model separates network infrastructure from sales. Operators may need to consider whether the traditional vertically integrated model will be most effective for tomorrow's digital service provider. In Australia, for instance, the National Broadband Network (NBN) is developing a national, open access data network that will sell its capacity to retailers who then sell on to businesses and consumers. Could this model be adopted elsewhere or are other new models possible?

## 5. Impact on operational models

Many things are changing, so what should CSPs focus on as they look to transform themselves into Digital Services Providers (DSPs)? IBM believes there are three critical areas of change – customers, products and partners.

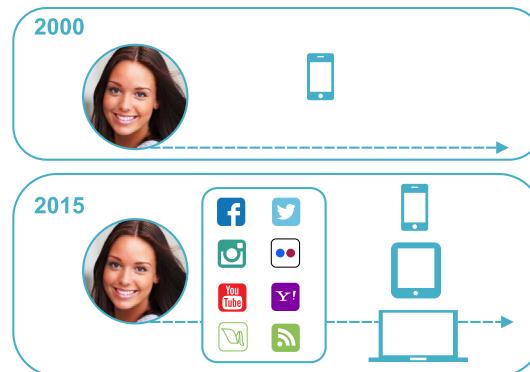
### 5.1 Customers are “out of control”

The traditional CSP business model is essentially a “control” model, particularly for customer management. CSPs have determined when, where and how customers interact with them. Their preference has been for call centre and retail store interactions. Customers are seen as units to be handled efficiently from the point of view of a CSP’s internal processes. Typical key performance indicators focus on call handling time and single-touch interactions. These may be incidentally beneficial to the customer but the main driver is operational efficiency and keeping down costs.

The control model starts with the call centre, where customer service representatives (CSRs) are ideally given a holistic 360° view of the customer and access to every possible transaction. It progresses to the retail store, where slightly less information and slightly fewer transactions are typically available, then to the dealership where still less is made available because dealers are not under the same degree of control by the CSP. Finally the CSP has an online presence, where the absolute minimum amount of information and transactional capability is made available to the customer. Finally all of these channels are managed separately with conflicting incentive programs. The control model is at the heart of CSPs’ difficulties in establishing a harmonized cross-channel experience for customers.

The problem is that the number of customers who enjoy interacting with call centres is approximately zero. Customer preference is for online transactions without a call centre or even a retail store - and this trend is growing. With their expectations based on experiences with Amazon, Apple and others, customers expect to buy, consume and service products when and where **they** want.

centres on the phone itself rather than the carrier. They feel they are buying a product from, say, Apple or Samsung. Their primary focus is probably on features that have nothing to do with the CSP - the camera, the screen resolution, the app store. The “utility” Telco is often selected as a necessity with the choice being determined almost entirely on price. This is a dangerous development for CSPs because, if the emotional connection is lost with the customer, it becomes harder to extract the lion’s share of value from the transaction.



One of the results of this mismatch between CSP and customer preferences is that CSPs are losing control of perhaps the single most important touch point with their customers – the point of customer acquisition. Increasingly, customers prefer to buy phones online and their main choice

### 5.2 Simplify how products are bought and consumed

Digital products have to be designed to be simple, easy and enjoyable for the customer to buy, consume and service. In other words they have to be designed from the customer’s point of view rather than from the CSPs.

Many CSPs have, or have had, product simplification projects, but these have rarely if ever been focused on the customer experience. More often they are focused on reducing the number of products from tens of thousands down to a few hundred (housekeeping) or on product standardization or modularization (internal process improvement). These are not bad things to do, but they are not enough to turn a CSP into a DSP.

Design based on how products are experienced by the customer is critical. There is no fixed answer to what this will mean, but certain things are clear for now. Products have to be designed for online consumption first, servicing the

way empowered customers want to be dealt with. If customers can self-serve at all stages of the customer lifecycle, the DSP has designed the products well.

This online first mentality also provides the key to multi-channel harmonization. It reverses the current order by giving the online customer the maximum amount of information and control to achieve everything needed. It is then relatively easy to provide this same experience to dealers, retail stores and call centres. There will always be some transactions that the DSP will keep in its control - unlimited customer credits spring to mind — but these should be treated as the exception and relegated to the back office rather than determining the whole process.

### **5.3 “Work with partners” instead of just “managing suppliers”**

As part of the control business model, CSPs traditionally had end to end control of the value chain. They might buy components from suppliers but essentially the products they sold were entirely their own. This is definitely not true for DSPs. Digital products are primarily applications that use the network as an enabler but they have features that are brought in from other industries. So a DSP sells mobile security, mobile healthcare, mobile finance, M2M logistics and an increasingly wide variety of multi-disciplinary products.

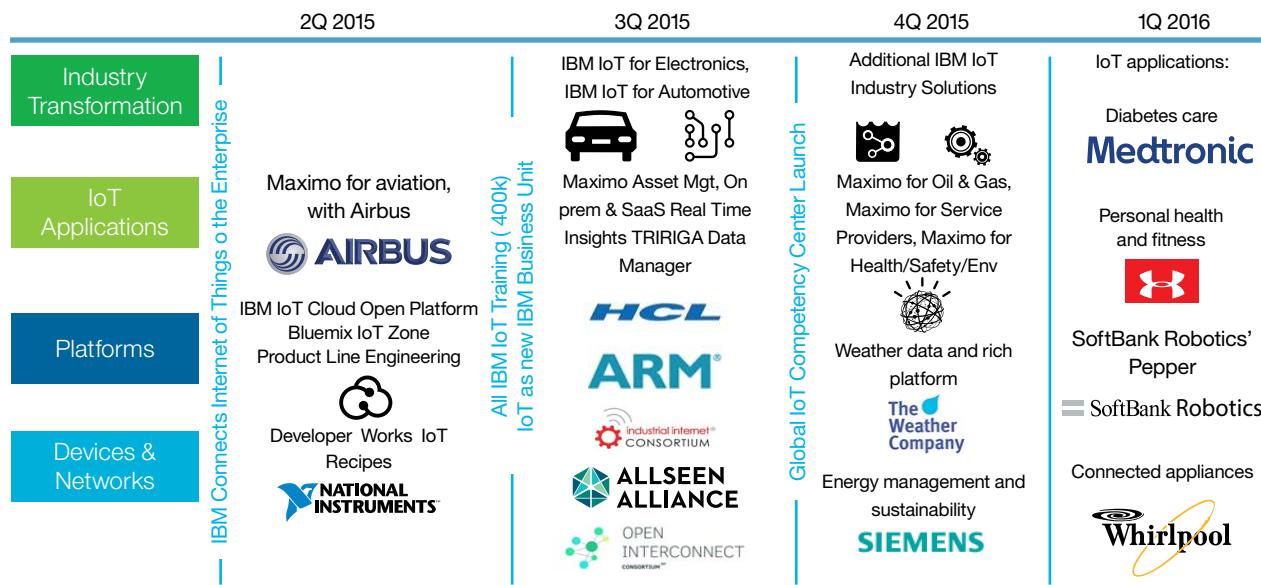
These new products require active partners such as banks, healthcare providers, automobile manufacturers and security companies. These partners will compete for ownership of the customer relationship. Do you buy mobile health monitoring from the doctor or the mobile carrier? There is no single answer, but whoever owns the customer relationship will usually extract the most value.

The partners themselves need a network for their products but they have a choice. A successful DSP needs to be attractive to potential partners and make onboarding and servicing a partner easy and fast.



IBM formed an alliance with Japanese telecommunication giant SoftBank, in February, 2015. As part of the alliance, IBM is teaching Watson to speak, and think, in Japanese, one of most difficult languages for a computer to navigate. Together with SoftBank, we will explore new ways to deliver Watson's cognitive and natural language capabilities, including through mobile, tablet, and robots.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	20
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----



The new IBM Watson Internet of Things Center in Munich is the first European Watson innovation center and represents IBM's largest investment in Europe in more than two decades. In another example of IBM's continuous transformation, we are now developing the emerging Internet of Things (IoT) opportunity into a real business based upon an ecosystem of partners.

In the second quarter of 2015, IBM announced a \$3 billion investment in a new business unit that will make

IoT a truly relevant component of digital disruption. The steps we have taken to develop this include:

- Opening the global headquarters for Watson Internet of Things (IoT) and launching along with ecosystem partners a series of new offerings and capabilities designed to extend the power of cognitive computing to the billions of connected devices, sensors and systems that comprise the IoT. These new offerings will be available through the IBM Watson IoT Cloud, the company's global platform for IoT business and developers.

- Launching eight new IoT Client Experience Centers worldwide
- Introducing Watson API Services for IoT on the IBM Cloud
- Acquiring The Weather Company's B2B, mobile and cloud-based web properties.
- Teaming with Siemens Building Technologies in the digitalization of buildings for energy management and sustainability.
- Highlighting Watson innovation, including diabetes care with Medtronic, personal health and fitness with Under Armour, robotics with SoftBank Robotics' Pepper; and connected appliances with Whirlpool.
- Opening the new IBM Watson IOT Center in Munich, which will drive collaborative innovation with clients, partners and IBM researchers and data scientists to create new opportunities for growth in IoT.

The campus environment will bring together 1,000 IBM developers, consultants, researchers and designers to drive deeper engagement with clients and partners, and will also serve as an innovation lab for data scientists, engineers and programmers building a new class of connected solutions at the intersection of cognitive computing and the IoT.

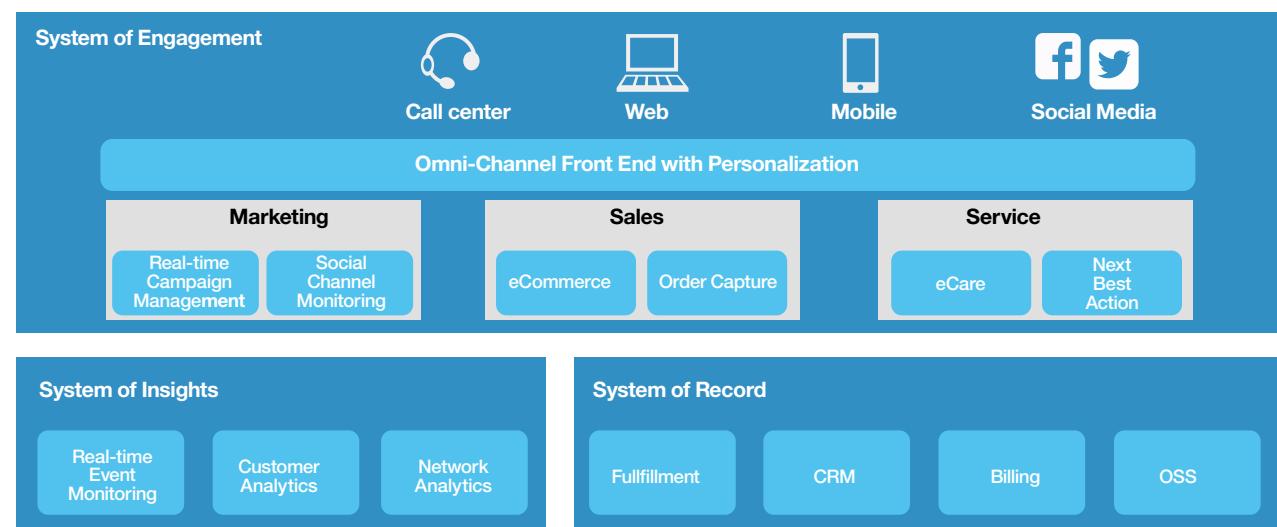
## 5.4 New approach to architecture

Transformation to a customer-centric organisation also requires a new way of thinking about the traditional technology architecture. We identify three major components of the new IT systems paradigm:

**Systems of Engagement** are user-centric systems for the customer, employee or partner, and are geared to enable collaboration and focused on providing convenience to the user

**Systems of Record** are data-centric systems providing business support

**Systems of Insight** are analytics based systems resulting from the integration of systems of record and systems of engagement.



## 6. Transformational opportunities and challenges

### 6.1 Your cognitive future

Data is the new natural resource. Yet 80 percent of data — the unstructured data that encodes language — is largely invisible to computers and has therefore been useless to us.

But IBM Watson applies cognitive technologies to help change how we approach and understand this information. It can ingest this unstructured data and not only understand it, but also reason about it, combine it with structured data and learn from it. Now, products, services and processes can, in a sense, think.

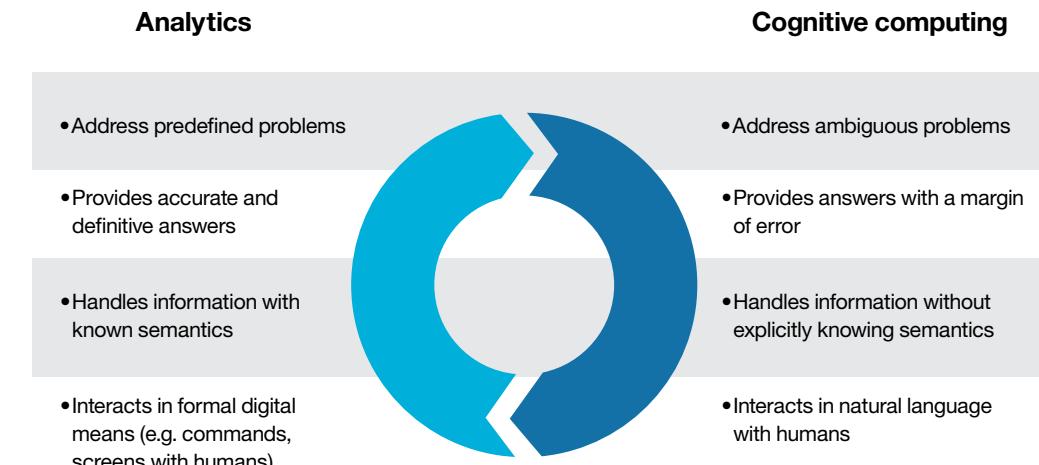
Welcome to the age of cognitive computing, where intelligent machines simulate human brain capabilities to help solve society's most vexing problems. For the communications industry, cognitive computing has indeed arrived, and its potential to transform the industry is enormous.

In the world of ICT, there is often talk of "the next big thing." Today many of these conversations are broadening, as cognitive computing is touted as revolutionary for ICT, many industries and, indeed, society in general.

For the communications industry in particular, the timing for this game changer couldn't have been better. The industry has been facing a broad range of unprecedented disrupted forces, including evolving customer

expectations, growing competition from non-traditional players, explosive growth of video traffic, rising cost pressure and increasingly sophisticated privacy and security threats.

**Cognitive computing complements traditional analytics by creating a value continuum for the industry.**



At the same time, CSPs have to manage massively increasing volumes of data, from a wider range of sources, brimming with latent insights that could potentially redress some of these issues. Unfortunately, they are unable to unlock the full value of the data at their disposal. As the potential for insight increases with additional data, so, too, does the challenge in managing this data.

Advances in cognitive computing can help CSPs manage this increasing volume of data while exploiting it for greater insights. Cognitive-based systems can build knowledge, understand natural language and provide confidence-weighted responses. And they can quickly locate the proverbial needle in a haystack, identifying new patterns and insights—something particularly relevant for activities in the fast-changing communications industry. Indeed, cognitive capabilities could help CSPs optimize value from data already within their reach, giving them a leg up on new market entrants that don't have access to the same data.

Our research indicates that communications industry leaders are poised to embrace this ground-breaking technology and invest in cognitive capabilities to spark a renaissance in the industry. Indeed, 85 percent of executives familiar with cognitive computing believe it will play a disruptive role in the communications industry.

Some leading CSPs are beginning to develop use cases for cognitive computing. Examples include answering customers' questions, supporting call centre agents and retail store associates, improving predictive network maintenance via

machine learning, and analyzing people related trends such as skills and employee engagement. Furthermore, CSPs could develop new revenue streams by using cognitive computing to offer new services to businesses in areas as diverse as healthcare, banking, insurance and smarter cities.

## 6.2 Cloud for Telecommunications

Our experience with cloud computing underscores its power to fundamentally shift competitive landscapes by providing a new platform for creating and delivering business value.<sup>1</sup> To take advantage of cloud's potential to transform internal operations, customer relationships and industry value chains, organizations across industries must determine how best to employ cloud-enabled business models to drive sustained competitive advantage.

CSPs have a unique opportunity to capitalize on cloud computing, both as providers and users. As providers, they are the backbone of cloud technologies, helping all other industries translate capital expense into operational expense, reducing total cost of ownership and enhancing performance. With cloud, CSPs can radically change their positioning in the value chain and create new monetization avenues as digital service providers offering enterprise and consumer cloud-based services.

As users of cloud technology, CSPs can transform internal IT and data center operations. Moreover, the industry is transitioning to cloud-based networking, in which functions previously delivered as appliances are delivered as software

components running on a cloud infrastructure. The emergence of software defined networking (SDN) and network function virtualization (NFV) is crucial for CSPs, enabling significant cost take-out, greater agility and faster time-to-market.

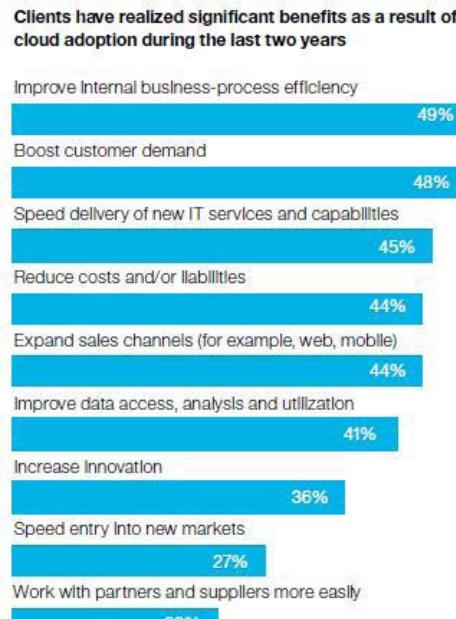
### Cloud is transforming the business of telecom

For the telecom industry, cloud computing offers the potential for significant improvements. Cloud can help CSPs create new businesses, redefine customer relationships, transform and optimize operations, and expand business agility and capability.

Leading CSPs leverage cloud for:

- Operational innovation – Simpler and faster processes drive internal efficiency; reduced complexity enables better governance and expanded access to more and broader data to manage risk; and IT capacity is better aligned to business volumes.
- Revenue model innovation – Customer relationships, data and other assets are monetized more readily; time-to-market is enhanced; and relevant partner services are incorporated more easily.
- Business model innovation – Third-party services extend into the telecom ecosystem; open collaboration and sharing are expanded; new types of business can be pursued; and innovation is introduced systematically.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	24
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----



Source: "Mapping the cloud maturity curve" by EIU, March 2015.  
Question: "What business benefits has your company realized as a result of using cloud technologies?" n=100

As part of the "Mapping the cloud maturity curve" survey by the Economist Intelligence Unit (EIU) in March 2015, 100

CSP executives were asked to identify their organizations' top business drivers behind cloud adoption. The top-three drivers cited were to improve data access, analysis and utilization (cited by 43 percent); expand sales channels (36 percent); and boost customer demand (36 percent).

In addition to seeking the motivations behind cloud adoption, the survey also asked telecom executives which benefits their organizations have realized as a result of cloud. Forty-nine percent of the same industry executives said cloud has improved internal business-process efficiency, while 48 percent indicated that it boosted customer demand, followed by 45 percent who said it sped delivery of new IT services and capabilities.

As cloud adoption by CSPs matures, other benefits will also accrue. CSPs and their customers will be able to design, prototype and deploy applications quickly. Organizations will benefit from new user-driven, mobile and cloud-centric information technology. Cloud will support transformation of enterprise IT functions, roles and responsibilities. And business managers will increasingly use cloud for application development to enhance agility.

Along with benefits for the enterprise, cloud brings increased customer benefits. Cloud can facilitate new and expanded channels, as well as improve access to client data, allowing for better tailored products and services. Cloud also enables CSPs to transform and redefine how people consume video. By fostering more integrated, compelling customer experiences, cloud helps strengthen customer loyalty.

To succeed with cloud, CSPs have to assess its impact on the operating model and determine what actions are required.

- **Source and manage partnerships and alliances efficiently.** Automate procurement and sourcing functions. Define service-level agreements to secure customer data in a shared environment.
- **Proactively redesign business architecture and processes.** Integrate legacy processes into new cloud-enabled, dynamic processes. Establish available and reliable cloud-based platforms.
- **Change organizational design and governance.** Prepare to mitigate data privacy and compliance risks with strong risk management systems.
- **Evaluate existing performance management.** Develop strategy and metrics that address new levels of reporting complexity. Build performance metrics into contracts for cloud-based services.
- **Develop critical new cloud capabilities.** Foster skills in customer and service orientation; virtualization and network technologies; and relationship management. Build deeper analytic and operational capabilities.
- **Increase adoption of emerging technologies.** Update IT strategy to support new business strategy and cloud enablement. Adjust budgets to cover costs of legacy systems and new network bandwidth.
- **Reassess location strategies for optimal cloud adoption and to enhance the customer experience.** Decommission or consolidate technology assets.
- **Promote organizational culture changes.** Educate employees about organizational changes, addressing resistance by IT and other functions.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	25
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

IBM Cloud is designed for the enterprise and is well suited for the emerging hybrid cloud era – an era that is already upon us, with Garner predicting that nearly half of large enterprises will have hybrid cloud deployments by the end of 2017.

By seamlessly marrying a company's systems of record with new and emerging systems of engagement, IBM can help clients mine data as the new natural resource while protecting privacy and security; quickly integrate existing and new services and data to drive new innovations; and easily control, manage and secure where data and apps reside.

With SoftLayer as the foundation for IBM's expansive cloud portfolio, IBM has announced numerous acquisitions in this area, including in 2015: Gravitant, StrongLoop, Cleversafe, Compose, and Blue Box.

IBM launched the Bluemix cloud computing platform with a \$1 billion investment in 2014, and since then it has grown rapidly to become the largest Cloud Foundry deployment in the world. The open-standards-based Bluemix catalog includes over 120 tools and services spanning categories of big data, mobile, Watson, analytics, integration, DevOps, security and Internet of Things.

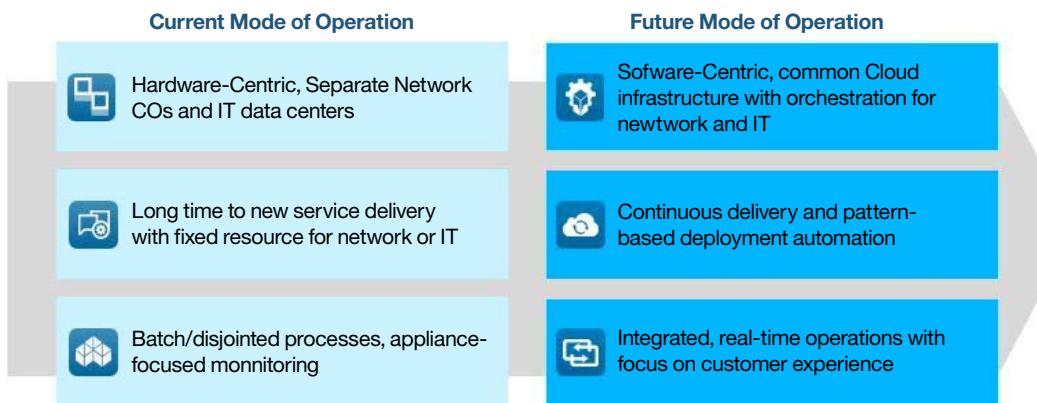
## 6.3 Network-related challenges

### 6.3.1 Transition

The industry is in the midst of a transition to software based networking, where functions that were previously delivered as appliances will in future be delivered as software components running on a cloud infrastructure. The emergence of software defined networks (SDN), network function virtualisation (NFV) and cloud radio access network (C-RAN) demonstrate that we are now in the middle of this transition. Infonetics forecasts that the carrier SDN and NFV market will reach \$11 billion by 2018.

The speed of the transition will challenge many operators. We believe that the transition will be consolidated into a matured trend by 2020, and while this matches the timescale for 5G, cloud based networking applies equally well to fixed networks and earlier mobile technologies.

The transition to cloud based networking will disrupt the existing industry supply chains, as new vendors emerge to create virtual network functions, and in parallel to provide the required cloud infrastructure. Existing vendors will need to consider whether to continue their current product strategies or to adapt.



Today, networks are built using standard components defined in industry groups such as 3GPP (SMS-SC, HSS etc.). The transition to cloud based networking will see a period of innovation as vendors implement new virtual network functions. This will require operators to take end-to-end responsibility for the architecture of the network, going beyond vendor selection for well-defined network elements.

In addition, during this transition period operators will face a new challenge: how to assemble a complex set of virtual network functions (VNFs) into a network. We believe that this will give rise to a new role in the CSP ecosystem — the network system integrator. Not all operators will have in-house skills to integrate and test a complex set of VNFs from multiple vendors. They can choose to outsource the entire process to a single vendor, as often happens in emerging markets. An alternative is to engage a systems integrator, who will take the prime responsibility for delivering a working solution. Some tier 1 operators may choose to perform this role in-house. In all cases a key decision is around governance and the retained design authority.

The skills required to design, deploy and operate a cloud based network will affect all operators. New skills such as cloud, SDN, NFV will be needed across different parts of the operator such as design and operations. These skills are not widespread and require an understanding of distributed software and cloud in addition to telecommunications.

The operations (tools, process and technology) will need to transform from reactive to real-time in order to deal with a network that can be enabled in real time. This will then require the development of predictive capabilities. In future it will also bring about the need for cognitive operations. We illustrate this trend in the diagram below.

The changes will also put pressure on billing and mediation systems to adapt quickly to new offerings and capabilities that come from outside the telecommunications industry.

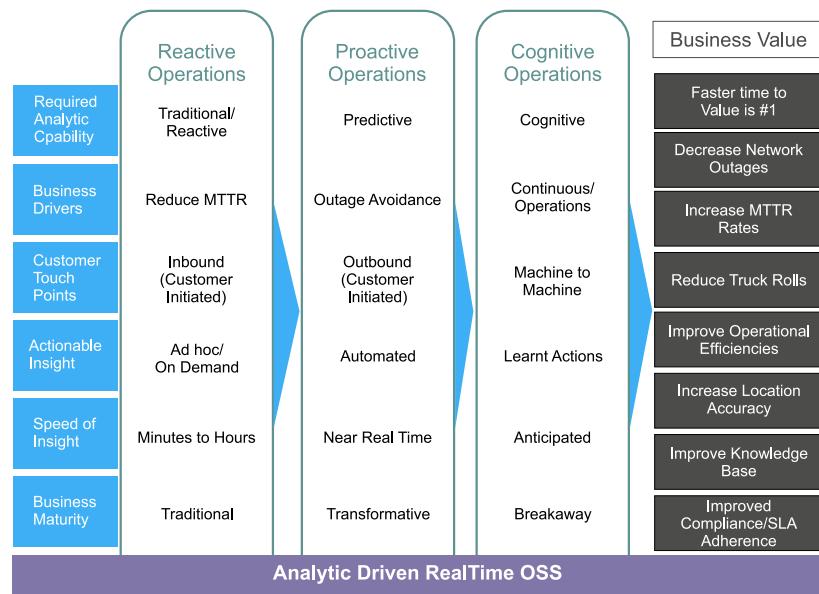
### 6.3.2 Benefits and design aspects of full cloud networking adoption

The implementation of a next generation cloud based network can lead to the following quantitative benefits, only in the network domain:

- Capital expenditures reduced and return on assets improved by up to 30-50%
- Network capacity and performance improved by 50%
- Monetization of the network platform
- Improving time to market of new network based capabilities and capacity by several orders of magnitude

To achieve time to market improvements, the future Digital Service Provider will need to complement the 'cloudification' of the network with other capabilities like Agile Network DevOps (see [section 7.3.1](#))

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	27
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### Cloud based network and the Internet of Things

The flexibility of cloud based networks means that operators can adopt new product and service strategies. An operator may choose to deploy multiple virtual IEPs to enable Internet of Things business units, where different customers (utility meter, automotive) have entirely separate infrastructure.

### Design aspects

The assumption of a cloud infrastructure as a fundamental base to implement a new “All-IP” network requires operators to consider different approaches in the design of cloud networking:

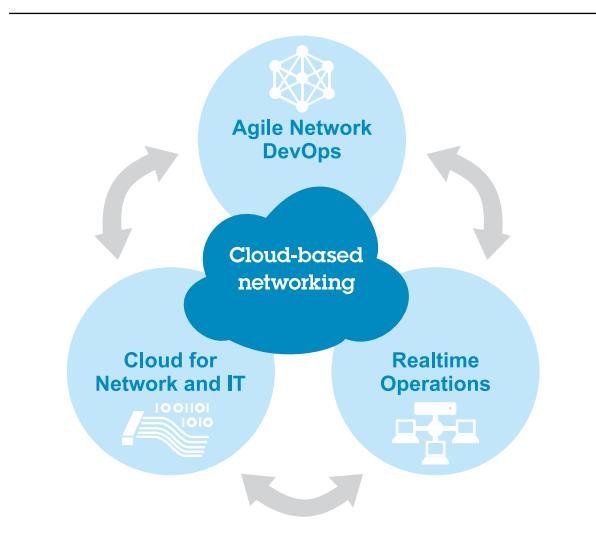
- How many cloud data centres are required to deliver all the service? There are arguments for centralization to a small number of cloud centres in a country; equally there are arguments for distribution, and moving capabilities to the edge of the network. Both models are currently being explored by operators around the world.
- Implementing a cloud based network requires the ability to deploy a complex set of virtual network functions which are interconnected by a complex virtual network. Cloud orchestration enables this deployment to be completely automated, according to a set of templates defining the topology. Orchestration, and its interaction with the existing Operational Support Systems, is a key enabler for operators.
- Much cloud technology is being developed in the open source community, for instance Linux, OpenStack and CloudFoundry. Operators will need to understand how these communities work, and also the governance processes around taking products from the community and deploying into production.
- Telecommunications networks are critical national infrastructure and require a high degree of security and integrity. Cloud based networking does not change the underlying security requirements, but does require reconsidering how they are achieved. The implementation of cloud based networking changes the security threat model, since the underlying cloud infrastructure is now a very attractive target. Again skilled staff, revised design principles, and strong governance will be essential to securing the new infrastructure.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	28
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

### A case study on cloud networking of the future implemented today for...IBM.

IBM operates 7.4M square feet of infrastructure for global enterprises in over 430 data centres. One common scenario is provisioning a web server cluster, load balancer, firewall, and virtual network. Our data indicates that provisioning computer infrastructure usually takes less than one day. In contrast, processing the network and appliance service requests takes 6-10 days on average, and is dominated by the complexity of network configuration and firewall rules. The automation of network functions using SDN has the potential to reduce the elapsed time to hours.

Deployment of a virtual network function in production will involve multiple sets of virtual machine images each deployed in multiple virtual machines (e.g. load balancers, CSCFs, HSS servers and database servers in a virtual IMS). Configuring a complex cluster of virtual machines without automation is slow and error-prone. Templates, which define both the configuration of the individual virtual machine images and the connectivity between virtual machines, are essential components of a network automation strategy. The IBM Cloud Orchestrator supports HEAT and TOSCA templates.

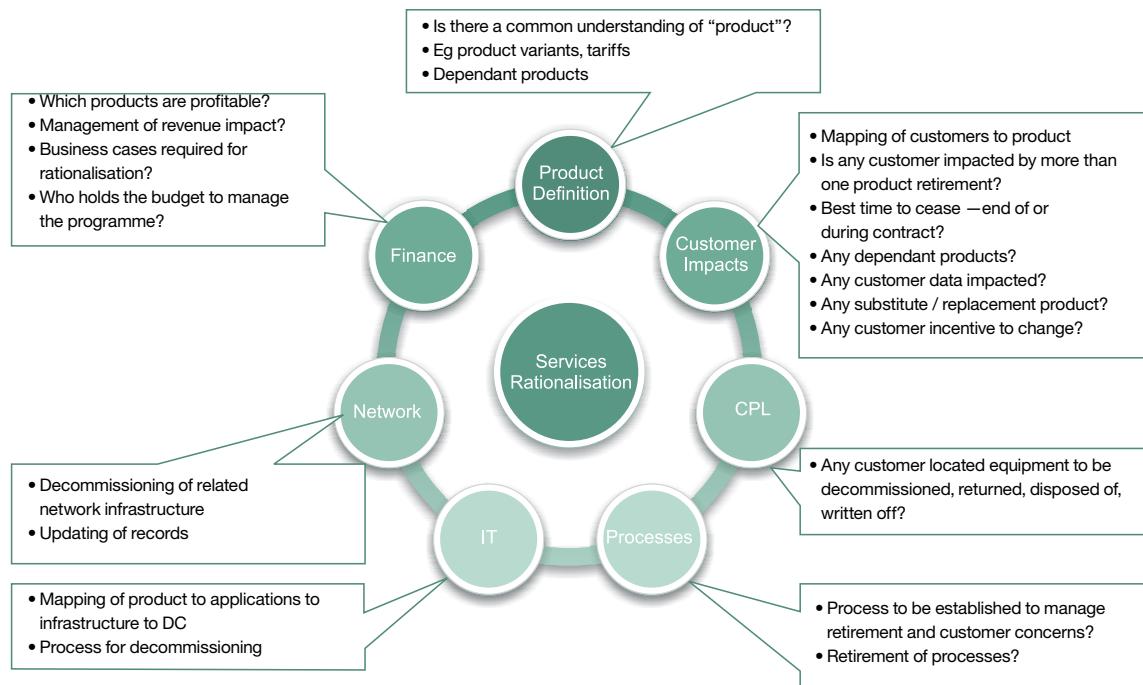


### 6.3.3 Strategies for carry-on or decommissioning of present services.

Strategies to apply in the decommissioning of legacy services are addressed by a practice we call ‘Products and Services Rationalization’. The decommissioning of legacy services and all the coupled elements associated to each of them is not an easy task. In the following diagram you can find an overview of different steps to be considered as part of the decommissioning of a service.

On the journey to become Digital Service Provider, there will be certain costs of decommissioning:

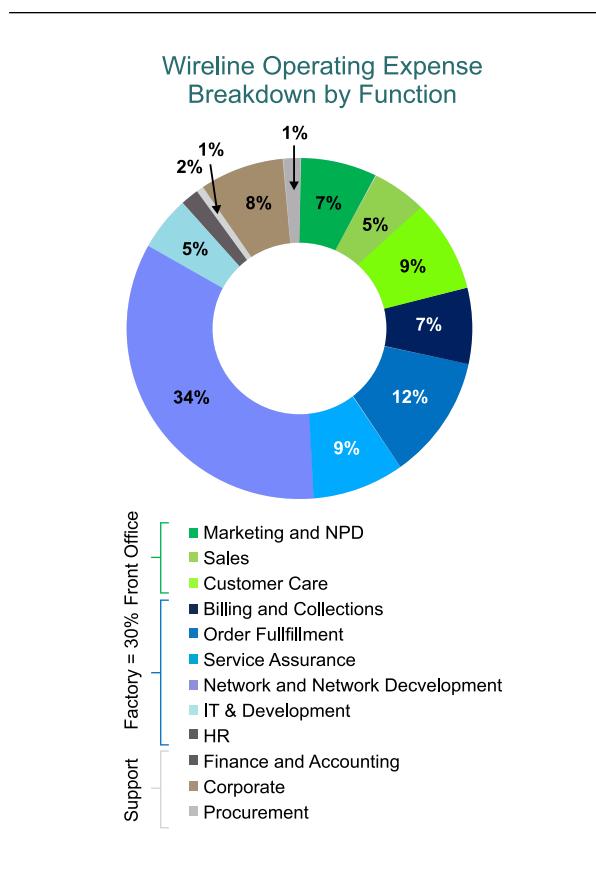
- Required investments to perform the migration of customers, including the cost associated to specific commercial migration campaigns, but also the investment required for the physical decommissioning and retirement of associated network elements and other forms of services infrastructures
- The short term degradation of revenue that is likely to arise when you engage with customers to change their services. This may result in additional churn or bundling which may increase the stickiness of the offering, but in the short term could reduce ARPU.



### 6.3.4 Changes in cost structure

The journey to become a Digital Service Provider will also require substantial changes in the cost structure of a typical CSP. Based on our benchmarking study, at the moment around 60% of the operating expenses cover what we call "Factory": network, IT, service assurance, order fulfilment and billing (see diagram on the right).

In the future, a higher proportion of the overall operating expenses will be associated with "Front office" — marketing, product development, sales and customer care. However, there will still be a need to maintain high quality of service and customer experience whilst ensuring high levels of end-to-end security.



### 6.4 Securing the future

Over the last decade, the pervasiveness of technology has driven change throughout nearly every facet of social interaction, commerce, business and entertainment. The impact of this shift can be found within evolving enterprise IT models, as well in the way products and services are designed and delivered to increasingly web — and mobile — centric consumers.

As technology plays a critical role in how organizations deliver value to their customers, IT security has become a challenge that represents significant organizational risk. Sophisticated attackers, cybercriminals and malicious insiders are using Internet-driven attacks to deny or disrupt service, steal sensitive business data and intellectual property, perpetrate fraud and identity theft, and gain long-term access to strategically significant networks.

Designed to gain continuous access to critical business information, targeted threats are the new reality. These attacks are well-researched, utilize cutting-edge tactics and involve custom malware that can run undetected for long periods of time. These attacks have eroded the effectiveness of traditional IT defences including firewalls and anti-virus solutions — even bypassing these controls completely in some cases.

Communication service providers play a critical role in protecting businesses and consumers from security threats including corruption, removal, disclosure, interruption and destruction of data. The critical function of network operators and the fact that they also host data on behalf of their customers means that a security breach in a CSP can create a significant ripple effect. This is reflected in security standards like ITU x.805.

For CSPs, significant changes in the mix of IT workloads are driving potential security exposure. Systems of engagement are more volatile, network workloads are being integrated and orchestrated for agility, and data has become the operator's core asset – provided it is protected from misuse and exposure.

The trend towards cloud based IT solutions that depend upon big data and are delivered to mobile devices creates a much more complex and dynamic security environment than has traditionally been the case. This gives rise to a number of current security concerns for a CSP, where the need for strict policy enforcement gives rise to requirements including:

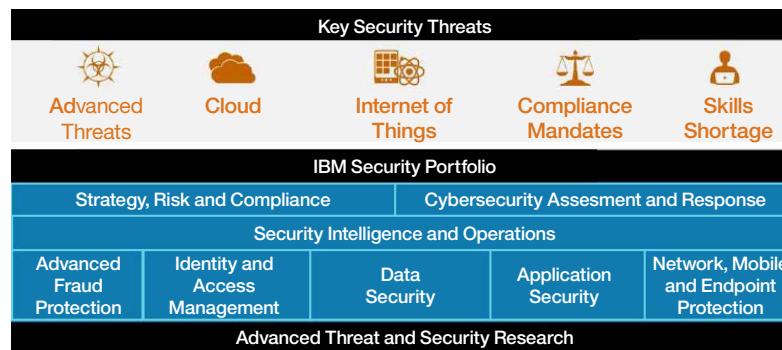
- The ability to detect, connect and protect cloud based services that are being used in the organization, with or without the knowledge of the IT department
- An over-arching intelligence platform to provide oversight and early warnings
- Identity and access management solutions to govern and administer users and their access

- Endpoint protection for mobile users to address the “mobile blind spot” that may arise from employees using their own devices with a mixture of company and personal local apps, cloud apps, data and sign-ons.

However, there is a potential upside for CSPs. In addition to managing their own defenses, CSPs looking to deliver value-added services to enterprise clients have the opportunity to offer security services. Cloud could drive acceleration through solutions as a services in areas such as identity and access management, application security, anti-malware, security information and event management (SIEM) and data security.

In this environment, IBM believes that a fundamentally different approach to security is required—one that more completely understands and embraces the dynamic nature of attacks and the need for more integration across tools, teams and processes. The IBM approach moves beyond point products and static controls to manage a hard perimeter. It is based on dynamic technologies that approach defence through the lens of behavioural analysis.

IBM's security strategy is built on three core tenets—intelligence, integration and expertise. The result is a comprehensive security framework that spans hardware, software and services expertise, working together to provide integrated security solutions customized to meet unique needs and deliver a low cost of ownership.



## 7. Making it happen: implementation approaches

### 7.1 The need for a fresh approach

Traditional transformations usually adopted traditional, waterfall methods. Defining a long list of detailed requirements was based on an assumption that users knew exactly what they wanted. This was followed by design and development with very limited user participation. The final stage was testing against the contractual set of requirements. In many cases, this drove more focus on reaching a milestone than on delivering a quality product for the business. The process was expensive, slow and frequently led to limited business outcomes.

We believe that technology should not be a barrier to market innovation. New and improved features can be built, tested and made available for operational use within days and weeks, not months and years. Operating models designed for large waterfall project delivery constrain business innovation and impede organisations from maximising the benefit of agile transformation.

We are helping a number of large CSPs to transform themselves into more agile organisations. The results are remarkable. We supported a major US CSP to build an agile delivery centre in Dallas. Our joint team managed to reduce the average time from order capture to service activation from 5 weeks to 5 days for large enterprise customers.



IBM helped a major European operator to set up their Digital Lab, by providing coaching on IBM Design Thinking, agile delivery and DevOps. The project is part of “Full Digital Programme” aiming to accelerate the shift to digital channels. The operator was able to deliver the first digital apps for “Home move” in less than ten weeks. Now we are supporting the operator to scale the digital lab approach across their entire organization.

### 7.2 Skills transformation

CSPs will face the challenge of how to encourage staff to adapt their skills to the new business reality. It is an important element of the transformation.

IBM is going through a similar transformation at the moment. New skills around mobile, cloud, analytics and design are required in a short period of time. Internally, we have created the Think Academy program to encourage all our staff to gain new skills. Think Academy uses a mix of social technology and on-line learning to enable this transformation, with an emphasis on experiential learning.

## THINK ACADEMY

337 000+ IBMers  
participated in 2014

42K IBMers have used  
the Mobile App

43 569 comments  
and stories shared

5.54M  
video views

### 7.3 Design thinking methods

In our view, any transformation should use some form of design thinking to ensure customer centricity. We use IBM Design Thinking as the overall approach to design vision and customer strategy. It is based on the principles of design from Stanford D-School to create empathy with users and drive user-centred strategy. It keeps the customer at the centre of everything we do while creating a powerful vision (commanders intent), collaboratively prioritising outcomes, and identifying quick 'try and test' opportunities.

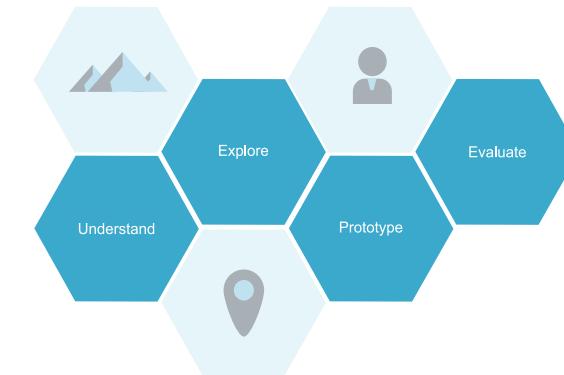
Design thinking is ultimately **Experience Focused**. It is a powerful way to define and solve problems, diverging on many possible solutions, organizing and remixing choices to help decide and converge on a focused direction.

#### Design a vase

*Product or Task Focused*

Design a better way for people to enjoy flowers in their home

*Experience Focused*



There are many aspects of design thinking, and many different ways to implement it, depending on which university or consultant you ask. IBM's approach is built on four basic steps, or mental spaces, to be pursued iteratively, not linearly. They are : understand, explore, prototype and evaluate. An important part of the approach is three core practices: hills, sponsor users and playbacks. Hills help to align the team around major market-driven goals. Sponsor users are select clients who work alongside the team and with whom we have legal agreements that clear the way for deep collaboration.

The design and development work is iterative; teams use any number of techniques to share their work with one another. IBM Design Thinking formalizes these sessions into iconic playback milestones that align teams, stakeholders, and clients around the value of your offering.

Design Thinking is a great approach for multiple stakeholders:

- for leaders to guide their teams to achieve market outcomes
- for project teams (business, design, & technology) to develop exemplary solutions
- to transform companies into becoming client-centred

### 7.4 Agile development and DevOps

1 (Design Thinking) + 1 (Agile development) + 1 (DevOps) > 3

Design thinking methods are closely linked with agile delivery methods. The outcomes of design thinking – valuable customer experiences – can now be implemented rapidly using agile development and DevOps. The three elements, if used in conjunction, create substantial value:

We have radically improved our application development and delivery through the use of Agile around the globe, yielding significant results and setting new benchmarks in execution and outcomes:

- Reduced cycle-time for projects by >30%
- Increased asset reuse by >50%
- Delivered >20%+ defect reductions / 100 FP and delivered 33% YTY component cost reductions

Cloud based networking opens up the ability to use a similar approach for software-based networking to help rapidly invent new services, update services as well as remediate services.

Previously, it could take weeks and months just to enable new services, test them and deploy them for operational use. In the software development environment that is available with the cloud today, software is composed rapidly, tested and moved to production and ready for deployment through agile development methods and tools. Agile Network DevOps can help to improve and speed the return on investment in the network. Combining Agile Network DevOps with Real-time OSS creates a whole new end-to-end ability for network operations through OSS for Cloud based networking.

Agile Network DevOps help take innovation of a new service from concept to reality. Using agile methods and tools, network services and functions can be composed instead of hardwired. Network services can be tested using the same virtual environment to allow for rapid deployment of a test environment and traffic at scale, and then when the service has been tested the resources used can be commissioned for other purposes.

Agile Network DevOps also help in bringing together the new software integration environment brought on by NFV and SDN in Cloud based networking. The power of the cloud can be used for software development to manage the various levels of network software, enable the compatibility and confirm the viability of network function combinations that make up the services enabled on the cloud based network.

Agile Network DevOps can also be used when combined with cloud innovation to allow for exposing new network services to an emerging cloud development environment. Network services created can be exposed to a cloud innovation environment for new areas of innovation for mobile applications, Internet of Things and enterprise enablement. Services can be exposed and integrated with these new areas of innovation rapidly, enabling a new speed of innovation by providers and their customers. Using Agile Network DevOps helps reduce the cost and the time that is required to enable new services while maintaining the governance to enable the service levels expected.

In a carrier or service provider environment, it is essential to verify the operation of new virtual network functions before deployment in production. IBM has developed patent-pending technology for automating the deployment of virtual network functions and the corresponding test functions on a cloud infrastructure, and once testing is complete for using SDN to move the functions into production.

## 7.5 IBM Interactive Experience



As part of our own digital transformation we have created IBM Interactive Experience. This is a new breed of digital agency, bringing together strategy, analytics, design and technology to create engaging customer experiences that deliver growth for our clients. The practice leverages IBM's

major investment in research, as well as expertise in data analytics, social, cloud and experience design to create, implement and manage digital experiences at scale.

In 2014, IBM Interactive Experience was ranked as the largest digital agency worldwide by AdAge. It is this scale that will be useful for CSPs as we understand the dynamics of people (consumers, SOHO, SMEs and large corporates) as well as the dynamics of experience and data.

We also bring to bear a myriad of partnerships, such as those with Apple, Twitter, Microsoft and Adobe, to drive innovation and thought leadership for our clients.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	35
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## 8. What next?

We hope we have demonstrated that digital disruption has well and truly arrived in the telecommunications industry, and that this is creating challenges and opportunities for operators.

Changing customer behaviours and needs, the explosive growth of video, exciting developments in Big Data and Analytics and cognitive computing, the emergence of digital advertising, and new opportunities in wider areas such as mobile money, healthcare and the Internet of Things are combining to reshape this industry.

In response, we believe that CSPs must adapt their business models and their operational models in order to become Digital Services Providers. Disruptive

developments in network technology offer opportunities to reduce capital expenditure and dramatically improve network agility. CSPs have the opportunity to embrace cloud computing to transform their business and operating models. All will need to implement a comprehensive security strategy to underpin these opportunities.

Rapid change requires rapid response and the old methods of delivering IT and network infrastructure are inadequate. The application of design thinking, agile development and DevOps should help to deliver results more quickly and with a higher success rate.

We hope you found our point of view on the business vision of the Digital Service Provider useful and enjoyable. We would welcome the opportunity to continue this discussion in face-to-face meetings.

We know what it takes to transform a large organization at the time of accelerated change – we are transforming ourselves as well. We are happy to share our journey with you as well as the work we do with our telecommunications industry clients worldwide.

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	36
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## Appendix: IBM Telecommunication industry papers, research studies, articles and videos

### [Dialing in a new frequency: Your cognitive future in the communications industry](#)

Cognitive computing can help communications service providers unleash a new era of innovation and growth.

### [Why CSPs should re-invent themselves as retailers](#)

Digital service providers are embracing next-generation BSS for an improved customer experience

### [The Digital Service Provider: The transformation of the telecommunications industry](#)

Over the past 10 to 15 years, the telecommunications industry in general enjoyed rapid growth through new customer acquisition and geographic expansion. However, today's telecommunications market is virtually saturated, and competition is intense as the hyper growth phase draws to an end. After a decade of impressive growth, are communication service providers (CSPs) facing the end of an era? Or, as we believe, could they be on the verge of a new age — one in which they reinvent themselves as digital service providers?

### [The CSP's roadmap to becoming a Digital Service Provider](#)

Explore the steps you can take today to begin evolving your business into a true DSP and learn how other CSPs are facing this transformation challenge.

### [Keeping Telecom on target: how CSPs tap the transformative power of data and analytics](#)

Today, the potential value of mining internal telecommunications (telecom) data – particularly when combined with external third-party data – is indisputable. Our research shows that leading organizations with clear analytics strategies and capabilities have enjoyed a significant positive impact on revenues and business outcomes. Twenty-three percent of communications service providers (CSPs) consider themselves to be analytics leaders, implying that more than three-quarters of the CSPs surveyed are not targeting analytics for greater competitive advantage. To stay relevant in a rapidly changing market, CSPs will need to develop and execute analytics plans that focus on customer objectives, business operations and building new platforms to create new revenue streams.

### [Restoring connections: How telecommunications providers can reboot the customer experience](#)

Few industries have commoditized themselves more than telecommunications. Communications service providers (CSPs) risk becoming mere utilities and, at the same time, face the disintermediation of the customer relationship. Today's consumers have a plethora of product and service choices, including those offered by over-the-top (OTT) providers, whose popularity continues. How can CSPs escape commoditization and differentiate themselves? We believe the next competitive battle will be won by CSPs that can deliver an exceptional customer experience and build brand loyalty through innovative, compelling services tailored to customers' needs.

### [The influence of social: New views from the 2014 IBM Global Telecommunications Consumer Survey](#)

The IBM Institute for Business Value conducted a survey of over 22,000 consumers in 35 countries in both mature and emerging markets. The survey covered a wide variety of topics, including consumers' spending priorities, usage and perceptions of products and services, information sources for products and services, the impact of social disruption, attitudes toward communications service providers (CSPs) and consumers' trust in CSPs

Executive summary	Guide to this paper	1. Digital disruption	2. Innovation: video focus	3. Digital consumer	4. Business models	5. Operational models	6. Transformational opportunities	7. Making it happen	8. What next?	Appendix	37
-------------------	---------------------	-----------------------	----------------------------	---------------------	--------------------	-----------------------	-----------------------------------	---------------------	---------------	----------	----

## [Cloud Based Networking](#)

Market demands and new technologies drive service providers to continuously evolve network infrastructure

## [Digital disruption](#)

Dramatic market and technological shifts have introduced big challenges for the telecommunications industry — and created the need for digital transformation.

## ***Business Analytics for Telecommunications Service Providers***

This book provides insights into the analytics and metrics used in practice by telecommunications service providers. The book is heavily weighted towards business analytics as opposed to operational metrics. It uses industry standard nomenclature from TM Forum to organize the analytic metrics and KPIs. Published in association with tmforum. The IBM authors are Craig Farrell, VP and CTO of Global Telecom Industry at IBM and Piyush Sarwal, CTO Smarter Networks at IBM.

## ***tmforum blog posts***

Craig Farrell, CTO of Global Telecom Industry at IBM, publishes a series of blogs on the [tmforum Website](#).

## **Videos**

[Cablevision Argentina](#) proactive customer care

[Celcom Axiata](#) targeted marketing

[XO Comms](#) customer insight

[Sprint](#) customer experience

[C Spire](#) predictive analytics

[TELUS](#) customer experience



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