



$$f(x) = \frac{1}{2}(9-x^2)^{-\frac{1}{2}}(-2x)$$

From big data to knowledge: analytic use cases for CSPs



Executive summary

Big data is an opportunity for communications service providers (CSPs) to create the intelligence for operating network more efficiently, to analyze the success of the services that they are offering, and to create a better personal experience for their customers. Chief Marketing Officer, Vice-President Network Operations, and Line of Business Managers are equally eager to exploit the large amount of information to achieve better business decision. They also expect their Chief Marketing Officer to provide analytic end-to-end solutions based on the data available in their IT and network infrastructure. Following the description of the complete value chain that can transform CSPs data to knowledge (refer to the **“From big data to knowledge: value chain for CSPs white paper”**), in this white paper we cover four use cases that demonstrate the potential of an analytic database implementation such as HP Vertica: detail records (CDRs)/IP detail records (IPDRs), HP Mobile Experience Personalization, HP Ad Experience Personalization, and machine to machine.

Introduction

Communications service providers (CSPs) know an inordinate amount of personal information about their customers, such as who their contacts are and their phone numbers, addresses (home, work, email), Internet usage, applications downloaded, travel history, even how long it takes them to commute to work each morning. A customer’s smartphone usage becomes a snapshot of their daily lives—data that any social media company would love to possess. Over the years, your large communication network and their associated switches, billing systems, and service departments may have generated hundreds of millions of individual CDRs daily. Terabytes of dynamic customer data will continue to grow exponentially as carriers add new services and as IP-based traffic increases.

However, according to a survey over 140 senior telco managers, just 54 percent of operators says that big data was a current strategic priority in their organizations, 24 percent said they did not know and 22 percent said it definitely wasn’t.¹ That’s mean that a short majority of CSPs are ready to embrace big data as more of the executives understand the possibilities it provided.

So why are big data and analytics tools so important for CSPs?

Analytics improves multiple aspects of CSPs’ operations such as:

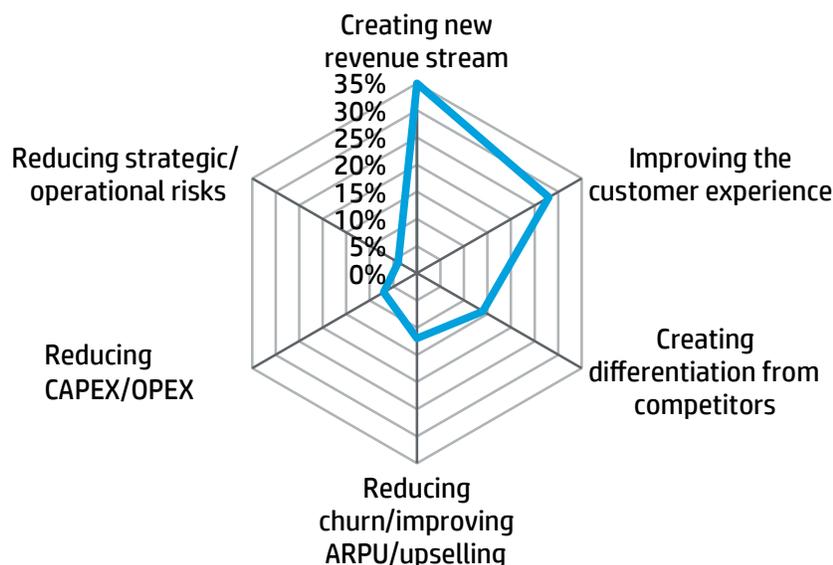
- Enable new business model as CSPs are starting to realize that the information they have is an untapped asset. Choose the

potential offered new revenues stream as the biggest opportunity (see figure 1).

- Provides business optimization capability that helps to increase revenue through more-targeted marketing and to reduce expenses by identifying cost and revenue leakages
- Improve the customer experience, by launching new innovative services quickly and gaining deep customer insights to personalize offerings
- Create differentiation from competition by embracing future market opportunities as connected devices, machine-to-machine (M2M) devices, and oriented sensors are proliferating at an incredible growth rate, fueling the amount of data collected
- Reduce churn with the ability to better segment subscribers, to provide more-targeted marketing spend with the insight to predict churn, cross-sell opportunities, the quality of customer experience and the value of a customer
- Reduce cost with the provision for product managers of a better understanding of which services are most profitable, the impact of competitive offerings and the impact of “cannibalization” caused by a new service launch
- Improve operational efficiencies, allowing network operations’ ability to predict capacity issues and the impact of a new service launch

¹ Source: “European Communications survey,” European Communication magazine, March 2012.

Figure 1. What is the biggest opportunity that big data presents to operators?



Use case one: Subscriber Network Usage Analytic

In this first case, we would consider a service provider that wants to collect CDRs or IPDRs from the different operating system support in the network. The first challenge is the quantity of information a service provider may produce 2 billion CDRs per day.

CDRs and IPDRs are still the core of the customer profile. CDRs are an important resource for a CSP, and the complete record must be stored and made available across the company. CDRs and IPDRs provide comprehensive information on each and every call occurring on the data circuits, including: complete signaling information, categorization of the call, disruptive alarms and errors occurring during the call, detailed voice band event information or main Internet protocols information (email, webmail, Web browsing, file sharing, peer-to-peer sharing, chat, and others)

An analytic database is ideal for analyzing CDR data, because the data is characterized by two key properties:

1. Massive quantity of data: Calls produce readings at regular rates—sometimes thousands of times per second, over long time

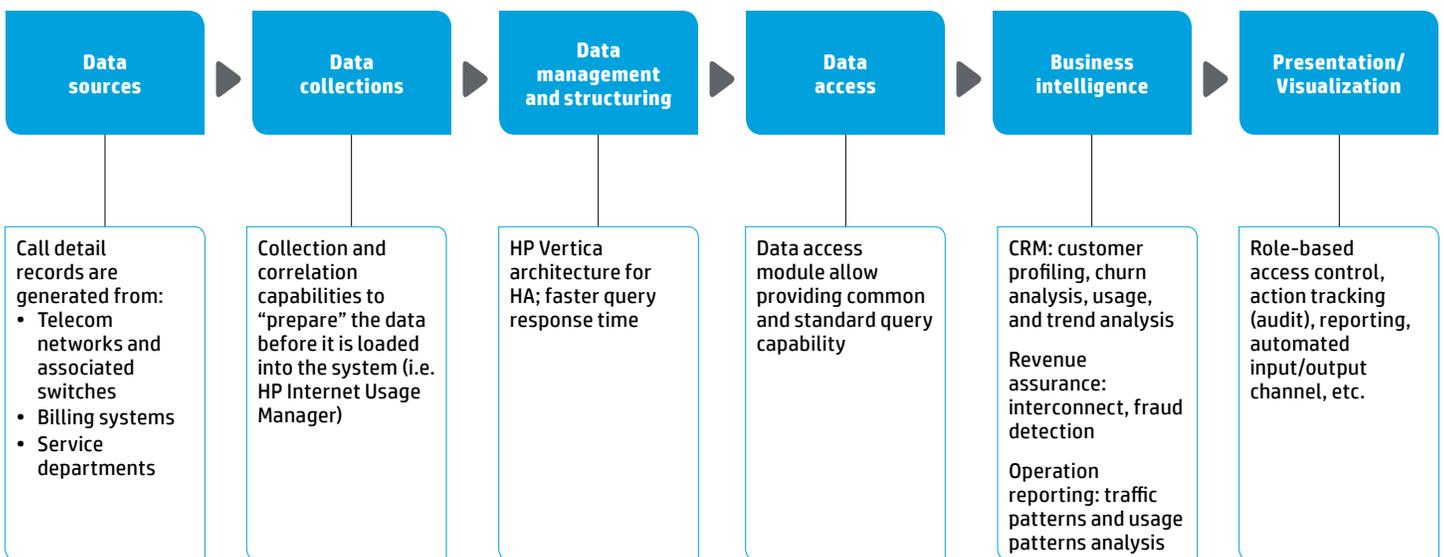
periods. Communications devices are “always on”, generating data. Consider the packets in a streaming video going to and from the device.

2. Need for scan queries : A common use of CDR data is to study historical trends and compare time periods and regions. For example, region managers may want to query all the data in their region and surrounding regions. This requires a series of aggregate queries over large amounts of historical data.

CSPs will have to rely on fast, complex analysis of CDR and IPDR data, for implementing critical functions such as:

- Customer Relationship Management—analyzing behavioral data to optimally target services and reduce churn
- Billing—ensuring complete and accurate billing and avoiding fraud
- Revenue assurance—modeling call behavior
- Network performance—optimizing network operations using operations management programs

Figure 2. CRDs/IPDRs value chain



Use case two: HP Mobile Experience Personalization

Harvesting customer data provides you with the opportunity to strengthen your customer relationships and gain a competitive advantage. Designed to promote a highly personalized customer experience, HP Mobile Experience Personalization solution is targeted at reducing churn, intelligently upselling telecom products and services, and creating new revenue streams.

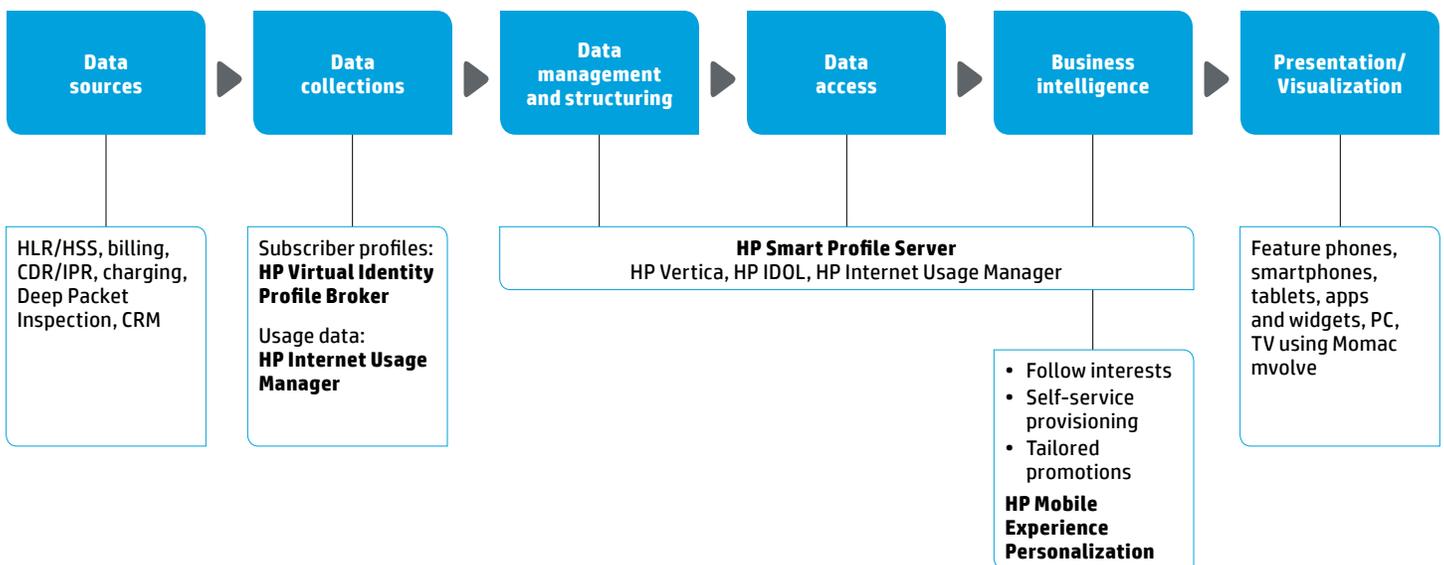
HP Mobile Experience Personalization implementation includes four functional areas:

1. Drawing subscriber profiles, usage events, and demographic information and identity from all sources of CSP operation: home location register/home subscriber server (HLR/HSS), usage detail record (UDR), CRM, location, network traffic, provisioning, and charging

2. Collecting these events into a power analytics environment such as HP Vertica
3. Applying real-time profiling and analytics on data across IT, network, and Web sources to build an enriched, actionable subscriber profile and insight
4. Exposing the smart profile through CSP mobile portal to enable personalization and subscriber interaction in the areas of self care, social media updates, personalized advertising, and content—premium and news

The Mobile Experience Personalization implementation is about enabling CSPs personalizing the service experience to develop subscriber intimacy and stickiness, resulting in reduced churn, relevant recommendations, increased revenue and uptake of data usage and services, and personalized advertising channels.

Figure 3. HP Mobile Experience Personalization



Use case three: HP Ad Experience Personalization

You decide to book a plane ticket to New York on the Internet. Few clicks later, when reading the newspaper online, an advertisement displays an attractive offer for a car rental in New York. It's not a coincidence; it is a mechanism for targeted advertisement.

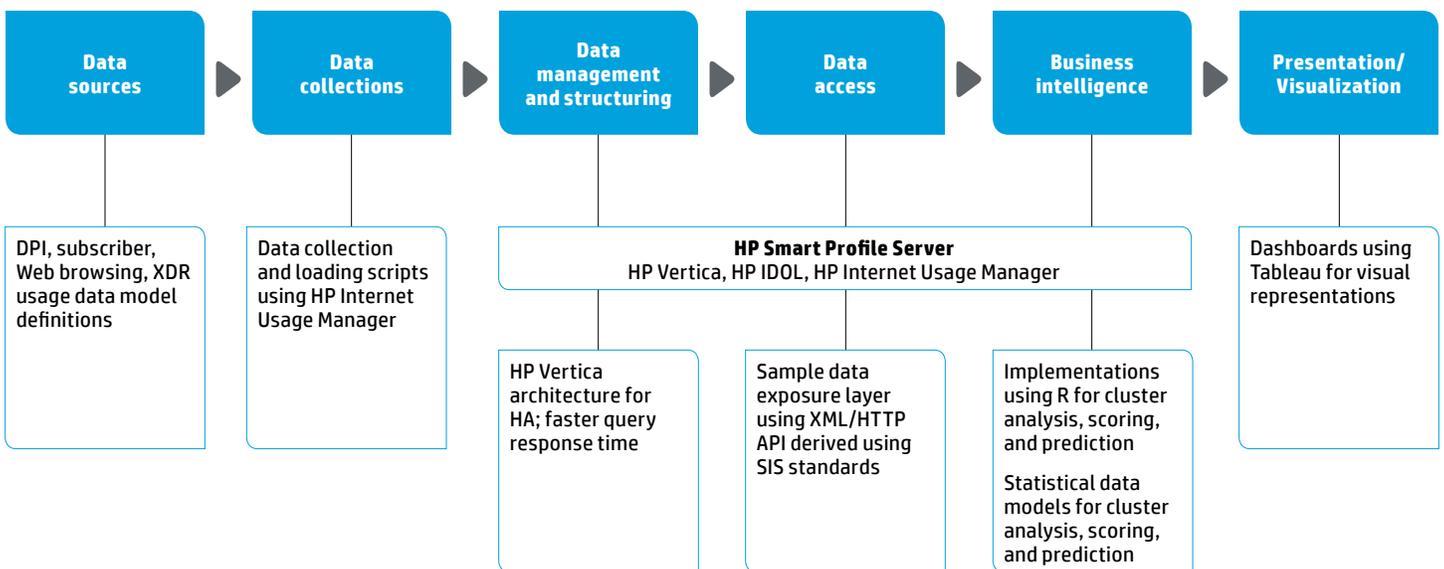
The business model for many leading over-the-top companies like Internet search engines or social media is based on a subscription, apparently “free” to the user, but predominantly, if not exclusively, funded by advertisements. This delivery model for services, backed up by advertisements, has become almost the norm, so that the user, subscribing for these free services, receives an increasing amount of advertisements. Advertising is therefore a strategic issue for all the major players in the digital world. For service providers too, it is a challenge that they need to address. Being able to deliver targeted advertisement as possible to the end-user profile, behavior, and preferences, is a mandatory path to increasing their positioning in the value chain and to the prevention of becoming simple commodities.

Over the past years, CSPs’ advertising systems have reached various levels of maturity. However, there is an increasing demand for introducing personalization in these advertising systems, and the HP Ad Experience Personalization solution provides you with an answer to this new challenge by:

- Building a rich end-user profile by collecting data from across the operator’s network
- Analyzing the profile and enrich it by inferring behavior preferences or additional inclinations; the purpose is to make the inferred data actionable to deliver personalized advertisements
- Enabling targeted campaign triggers by allowing searching, filtering queries, and maintaining confidentiality toward third parties when required

By integrating the power of the HP Vertica data management, the HP Ad Experience Personalization solution adds a unique knowledge and intelligence to the simple delivery of advertisements. It brings you into the new dimension of targeted advertising, with tailored offering having unequalled high acceptance rates.

Figure 4. HP Customer Experience Assurance value chain



Use case four: machine to machine

Billions of connected devices start to be deployed in the world with ebook readers, smart meters and connected cars, tracking devices on containers, health monitoring, wearable, home appliances, building infrastructure monitoring, bridge or dam surveillance, environment sensors, and so on. Sensor technology is becoming smaller and smaller; more and more sensitive, and accelerometers are now inserted on chipsets. Communication protocols, especially wireless, have also developed in many directions to enable very diverse scenarios from low bandwidth, low power to high bandwidth, more energy-consuming technologies.

According to the independent wireless analyst firm, Berg Insight, the number of cellular network connections (wireless WAN) worldwide used for M2M communication was 47.7 million in 2008.² The company forecasts that the number of M2M connections will grow to 187 million by 2014. This represents an opportunity of more than \$50 billion USD for CSPs alone in 2015, according to Harbor.³ All those devices need to be connected to “the” network, authenticated, provisioned, and monitored. Data needs to be collected, analyzed, stored, secured, dispatched, presented, or leveraged by some sort of applications or end users.

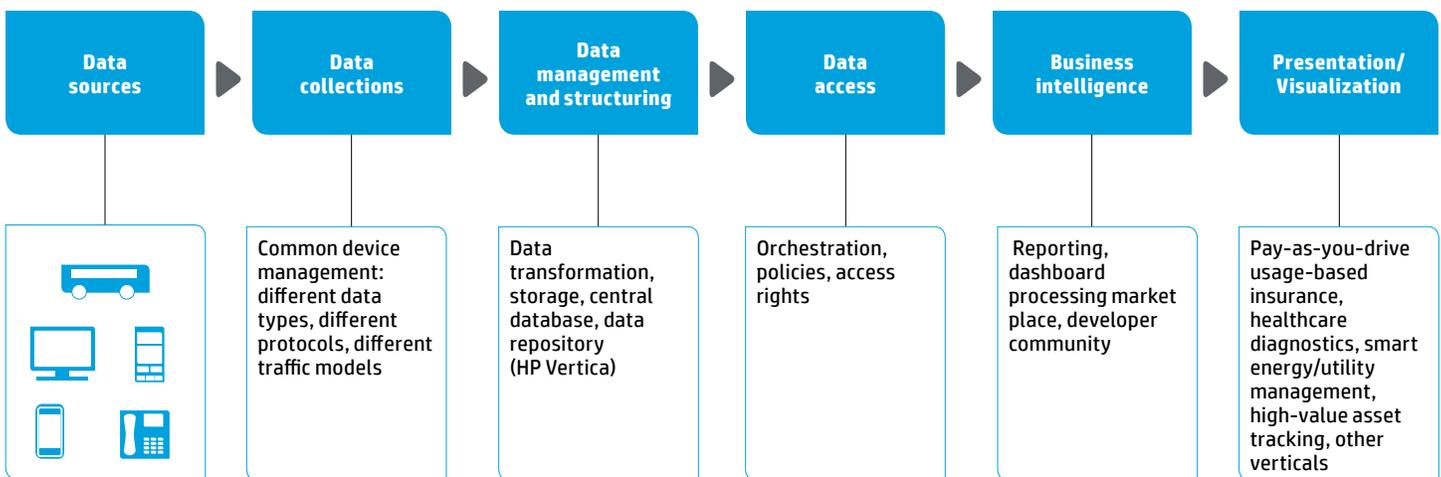
The opportunity is huge for new solutions, new services that combine connectivity, data and service management, and ecosystem management. As a CSP, you are uniquely positioned to serve this market and deliver federated, trusted, and flexible environments for device and application vendors to collaborate and deliver these future solutions.

HP M2M Solution offering covers a broad spectrum of service provider responsibility in this value chain: connectivity and communication, data and service management, and ecosystem management. Communication includes device management; SIM management and self-care portal; device HLR for authentication, security, and location; Unstructured Supplementary Service Data (USSD); and SMS gateway. Data and service management addresses data collection, aggregation, correlation, repository, provisioning, and control as well as monitoring, quality of service and usage tracking without forgetting authorization, authentication, and security. As traffic grows, big data analytics becomes critical, and HP is well positioned with solutions leveraging HP Vertica real-time analytics.

² Source: “The global wireless M2M market—4th edition,” Berg Insight, April 2012

³ Source: “Creative M2M partnerships drive new value for wireless carriers,” white paper, Harbor Research, Inc., March 2011

Figure 5. Machine-to-machine value chain



HP Vertica Analytics Platform for CSPs

Society becomes more connected daily; SMS, MMS, video on demand, email, and basic mobile conversations are a few examples of the countless ways people interact electronically. All of these experiences create unique, detailed records that if analyzed properly, enable providers to not only understand the behaviors and expectation of their subscribers but also develop services and applications to enhance their customer's experience.

The time for database innovation in telecom is now. The number of subscribers to mobile, fixed line and cable communications services is growing by **millions of people** every year, and the volume of CDR, IPDR, subscriber profile information, network probe and M2M data that communications companies must store and analyze is also exploding, by terabytes per year.

The HP Vertica Analytics Platform enables telecommunications providers to analyze and make informed decisions in near real time with unparalleled efficiency, performance, and scalability.

Our telecommunications customers and partners routinely address the following challenges:

- Determine behaviors that may ultimately create either customer or product churn
- Understand customer experiences at a transactional level and determine investment criteria
- Optimize offerings and portfolio in a highly competitive market targeting high value, high margin infrastructure and applications based upon empirical data
- Analyze volumes of data in near real time that eclipse the capabilities of legacy infrastructures

Leveraging the HP Vertica Analytics Platform, our telecommunications customers and partners derive benefits relating to capacity management, performance, scalability, and availability. A few examples include:

- Deliver significantly higher customer satisfaction, retention, and profitability
- Optimize portfolio by focusing on alleviating high cost, low value products and services
- Manage and scale portfolio dynamically without sacrificing details of any individual customer, transaction, or product

- Store, access, analyze, and monetize the vast amounts of customer and network data without sacrificing time, scale, or detail

During the last 30 years, there has been little database management system (DBMS) innovation to keep pace. Performing ad hoc queries on such large data volumes does not come naturally for existing DBMSs, which use a row-oriented design optimized for write-intensive transaction processing workloads rather than for read-intensive analytical workloads. Desperate for better performance, row-oriented DBMS customers spend millions of dollars annually on stop-gap measures such as adding DBA resources, creating and maintaining online analytical processing cubes or replacing their DBMS with expensive, proprietary data warehouse hardware.

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