

## Internet helping CRM to enhance Customer Experience

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<p>The purpose of my Masters' Thesis is to first understand what a Customer Relationship Management (CRM) system is and how it is supporting business. As CRM system is primarily a backbone of every business so as part of the thesis I am keeping my scope primarily to telecommunication industry. After understanding the purpose of CRM system in telco business I explored the idea of how Internet is utilized by the CRM systems to enhance customer experience. I briefly went through the technologies around big data to see how they are supporting this. Although idea was discussed way before with my thesis co-ordinator, but actual work was started during the summer of 2017 and it was concluded in winters of 2017. Qualitative method of research was opted to gather the data for the research and open ended interviews were conducted for these. Research was done from two aspects. Firstly from a telecom organization which is using few legacy CRM systems and also going through a CRM consolidating and digital transformation. Second was from a product based organizations' point of view which has CRM and various other telecom related products. Research had quite interesting aspects and findings like it is an early stage in telcos to start using the power of Internet combined with CRM to enhance customer experience. No one denies the capability of the CRM systems to utilize this, but seems like people need to understand it first. People need to unlearn what they have been doing from years and adopt the new CRM and then only they will be able to make most out of it. New CRM on cloud, in line with social media, capabilities like Omni-channel and concept to follow the customer wherever they go were the key aspects of the new CRM systems and technologies around Big data are supporting it.</p>	
<b>Keywords</b> - Customer Relationship Management, Customer Experience, Power of Internet, Big Data, Telecom.	

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## 1 Introduction

Customer Relationship Management (CRM) software plays a vital role in engaging with the customer and enhancing his experience and giving him the service he is expecting from the product or the organization he is in touch with.

Customer relationship management (CRM) is a term that refers to practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle, with the goal of improving business relationships with customers, assisting in customer retention and driving sales growth (Ehrens and Rouse. November 2014).

Worldwide customer relationship management (CRM) software totaled \$26.3 billion in 2015, up 12.3 percent from \$23.4 billion in 2014. (Gartner. 2017).

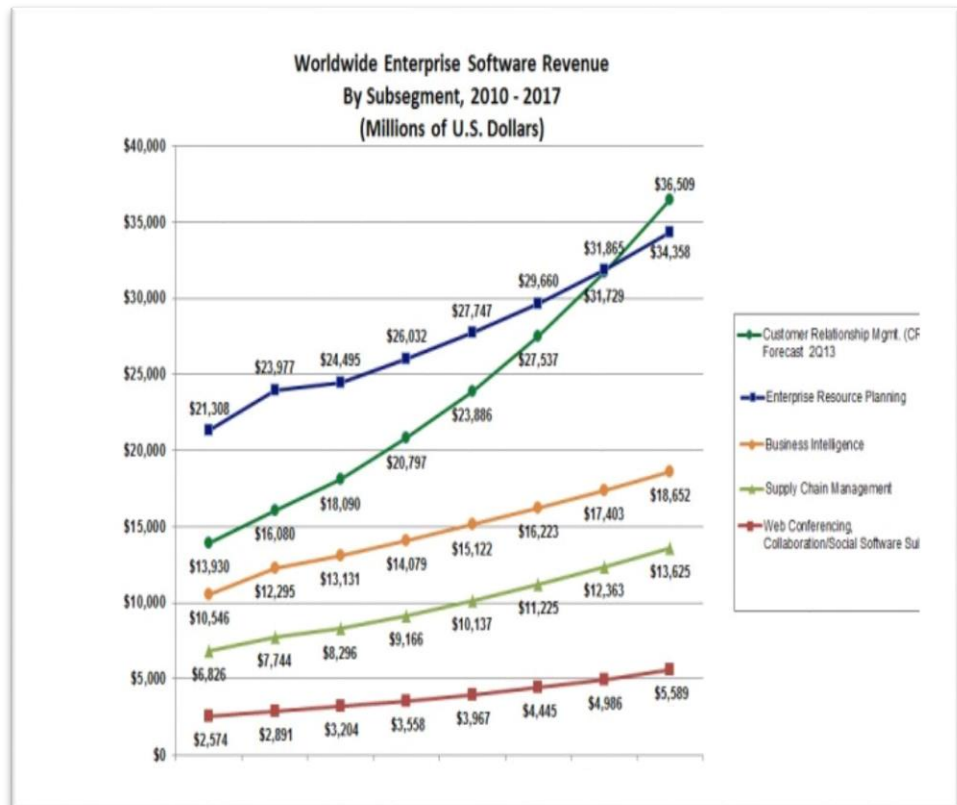


FIGURE 1: GROWTH OF CRM MARKET (GARTNER.COM/NEWSROOM. 2017)

CRM systems are designed in a way to handle all sorts of customer information across various available channels or touch points between the customer and the company which could include the company's website, phone, chat, email, pamphlets, brochures and the latest and most powerful the social media.

There are various other services of the CRM system which mainly include recording customer interactions (over email, phone calls, social media or other channels, depending on system capabilities), automating various workflow processes such as tasks, calendars, cases, faults, call back services, and giving managers the ability to track performance and productivity based on information logged within the system.

Another term that is closely coupled with each CRM system is customer engagement. Customer engagement is not just a series of interactions with the customer, or getting people to visit a website, something on Facebook, or a Facebook page, or download a mobile app. Genuine engagement I would say is the connection or the compatibility in identifying how and where individuals and organizations can co-exist and more over giving a thought on how the organization's products, service or the brand is aligned with the customer's needs and fulfils customer expectations.

## **1.1 Background**

In the evolving digital era of smart phones, tablets and laptops; marketing needs to innovate and look for more and more ways to reach out to the customers. Gone are the days when customers used to visit a shop, the sales representative shows products and then customers decides what to buy. Price is also not a major factor that is attracting the customers, but the whole experience that is delivered to them.

Customer service is a process of activities before, during and after the purchase, with the purpose of meeting customer's needs and expectations, creating both customer satisfaction and repeat business Hooker (2015, lesson 4).

Today's digitally led customer wants to be served at his door step. They are expecting all together a different level of service and the service they get is what creates the experience and more than the service in this socially connected world customer wants to be connected with the service provider to get that 360 degree experience.

Customer experience covers everything from the marketing of the company to using the product, and expecting it to last past its warranty period. Understanding the expectations of the customer is an important aspect in customer experience. Nobody wants unpleasant surprises but every customer wants a product or service that works as promised. It all starts from the marketing that has to be honest and not promising too much (Goodman, 2014, 11-12).

Customer experience (CX) as the customer's perceptions and related feelings caused by the one-off or cumulative effect of interactions with a supplier's employees, systems, channels or products (Gartner. 2017) Customer experience (CX) is the product of an interaction between an organization and a customer over the duration of their relationship. This interaction is made up of three parts: the customer journey, the brand touch points the customer interacts with, and the environments the customer experiences (including digital environment) during their experience (Wikipedia, 28 August 2017)

A customer considers an experience good when his requirements are fulfilled at all his touch points with the service provider.

There is a threefold challenge that stands to impact your ability to keep your customers.

- 1) Customer expectations are rising.
- 2) Customers are openly and readily sharing their bad experiences
- 3) Customers are switching their suppliers at a tremendously high speed.



Below figure explains the customer experience maturity model. This talks about the strategic shift of customers from attracting a new to converting him to a life time customer. It involves 7 steps starting from initiation. The strategic value meanwhile keeps on increasing. Throughout the model the channel of customer communication is the key and a proactive effort is needed by the service provider to identify the digital channel of communication most preferred by the customer and entire service needs to be customized around that.

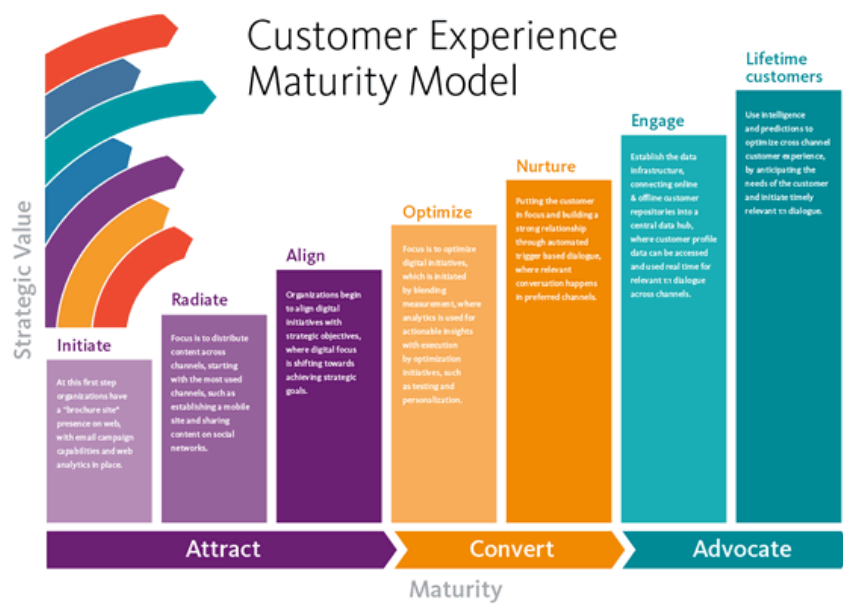


FIGURE 2: CUSTOMER EXPERIENCE MATURITY MODEL (CONNECTTHEEXPERIENCE. 2017)

CX processes are being designed more and more using Customer Journey Maps (CJM). A customer journey map is really quite a simple concept: Customer Journey map is an illustration that details all of the touch points at your organization that a customer comes into contact with as he/she attempt to achieve a goal, and the emotions they experience during that journey. (Darvey, MyCustomer.com. 29 September 2017).

Below is a sample of a customer journey map of the first visit of a customer to various sales channels of a service provider.

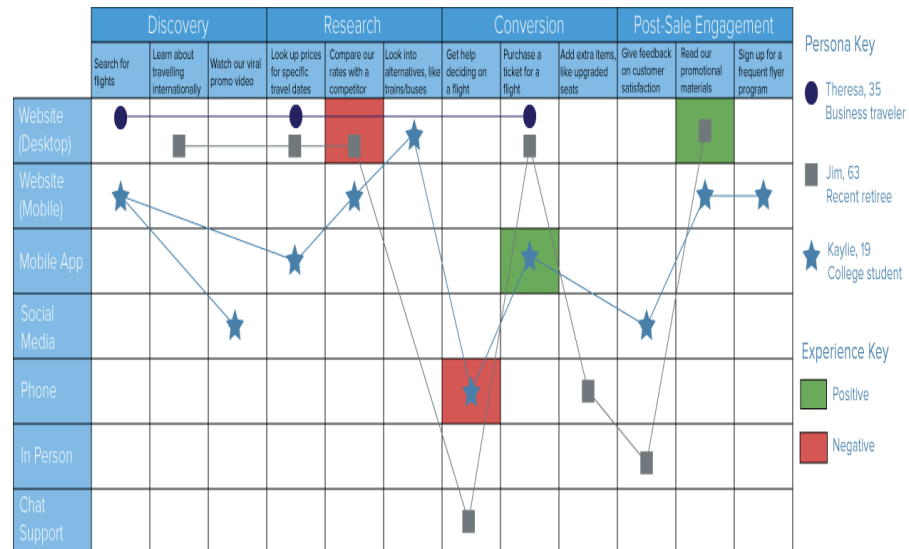


FIGURE 3: SAMPLE CJM WITH GOOD AND BAD EXPERIENCES. (MYCUSTOMER.COM. 2016)

The rise of social media now rewards those brands that engage customers through social channels and deliver a consistent and rewarding customer experience (CX).

The software tools to enable CX strategy include a mix of technologies.

- 1) Capture customer, product and other related information.
- 2) Centralize, integrate or sync the data so it is accessible.
- 3) Expose the data through intuitive search and access tools.
- 4) Automatically deliver the data to the person or interaction point where it can satisfy a customer request or contribute to a customer solution.

A Customer Experience study done by O’Keeffe for Oracle found that 49% of executives believe customers will switch brands due to a poor customer experience, while 89% of customers say they have switched brands because of a poor customer experience. (O’Keeffe and Oracle, 2013).

## **1.2 Purpose**

In this thesis I will explore how Customer Relationship Management (CRM) system is supporting telco business. And how internet is helping the CRM system in telecommunication industry to engage more and more with the customers in their day to day activities and provide personalized products, services, prices, offers and interactions and thus enhancing customer experience.

In today's open world, customer is not doing his purchase only from the shops, so for sales and marketing teams it has become a challenge to know the places to contact the customer.

Customer product and other information reside in CRM software, ERP systems, MDM applications, legacy systems and probably a few more data siloes, including destinations outside your company such as social networks. Integrating this data is a technical challenge that most companies are trying to resolve. To integrate all these big data is the one playing an important role.

Till 2016 various organizations were working on means of capturing and storing the data but 2017 onwards the same companies will be trying to use it. The IT systems will mature and try to extract meaningful information out of the raw unstructured data.

With the rapid expansion of smart phones and other connected mobile devices, communications service providers (CSPs) need to rapidly process, store, and derive insights from the diverse volume of data travelling across their networks. Big data analytics can help CSPs improve profitability by optimizing network services/usage, enhancing customer experience, and improving security. Furthermore in my research I will also explore how CRM is transforming more into Social CRM and how internet enables this. Also the key player in this transformation would be the use of big data.

Most telecom use cases fall into these main categories.

- 1) Customer acquisition and retention
- 2) Network services optimization
- 3) And security.

(McDonald. MAPR, 09 May 2017)

As per the below figure customer loyalty and retention can be handled by churn analysis, sentiment analysis and various other optimized plans. Big data can also be used on network side to optimize the network usage and provide better service to the customer during peak hours. Fraud detection is another domain that can benefit with the use of big data.

Customer Loyalty, Acquisition and Retention	Data Driven Improvement of Network Services	Security
<ul style="list-style-type: none"> <li>● Customer churn analysis</li> <li>● Sentiment analysis</li> <li>● Clickstream Analysis</li> <li>● Targeted Marketing               <ul style="list-style-type: none"> <li>○ Customer segmentation profiling</li> <li>○ Recommendations</li> </ul> </li> <li>● Optimized plans</li> </ul>	<ul style="list-style-type: none"> <li>● Network performance optimization               <ul style="list-style-type: none"> <li>○ Optimize Call routing</li> <li>○ Real time CDR analysis</li> </ul> </li> <li>● Capacity Optimization               <ul style="list-style-type: none"> <li>○ Demand forecasting</li> </ul> </li> <li>● Failure prediction               <ul style="list-style-type: none"> <li>○ Anomaly detection</li> </ul> </li> <li>● Taylor Services New Features</li> <li>● Proactive care</li> <li>● Optimized Plans</li> <li>● GIS location data monetization</li> </ul>	<ul style="list-style-type: none"> <li>● Fraud detection and Prevention               <ul style="list-style-type: none"> <li>○ Anomaly detection</li> <li>○ False Answer and Long Call Detection</li> <li>○ Unauthorized Devices</li> </ul> </li> <li>● Payment processing</li> <li>● Data protection and Compliance</li> </ul>

FIGURE 4: MAIN CATEGORIES OF USE OF BIG DATA FOR TELCOS. (MCDONALD. MAPR. MAY 2017)

CRM and big data together can help and finding below customer information.

- 1) Customer demographic data (age, marital status, etc.)
- 2) Sentiment analysis of social media
- 3) Customer usage patterns, geographical usage trends
- 4) Calling-circle data
- 5) Browsing behavior from clickstream logs
- 6) Support call center statistics.
- 7) Historical data that shows patterns of behavior that suggest churn. With this analysis, telecom companies can gain insights to predict and enhance the customer experience and tailor marketing campaigns.

### **1.3 Objectives**

- 1) My first objective is to understand how CRM is supporting the telecom business as its backbone. Along with this I will also explore why CRM is not just a software which is needed for sales. It is actually the first connection between the organization and the customer and there are various other departments in the organizations which revolve around it.
- 2) Secondly I will analyze how the internet is helping the CRM system to engage more and more with customers by various communication channels and to enhance their customer experience.
- 3) Thirdly how big data is helping CRM to be one data bank of customer details and how it is enhancing customer experience. Earlier one organization used to have various CRM systems and information used to be in these silos but with the evolvement of big data it has becoming possible to merge them, remove redundancies in the data and utilize them in best possible way.

## 1.4 Scope

The scope of my research would focus primarily on the telecom sector and business use of CRM system in this sector. These days' big data has become an integral part of any research around the CRM system. Big data is itself a vast topic so I would explore it around telcos and CRM systems, by not going in depth of big data.

## 1.5 Research questions

I have chosen these research questions as I believe these will cover mostly the scope of my objections. The main purpose of my thesis is to understand how CRM system when empowered by Internet can enhance Customer Experience.

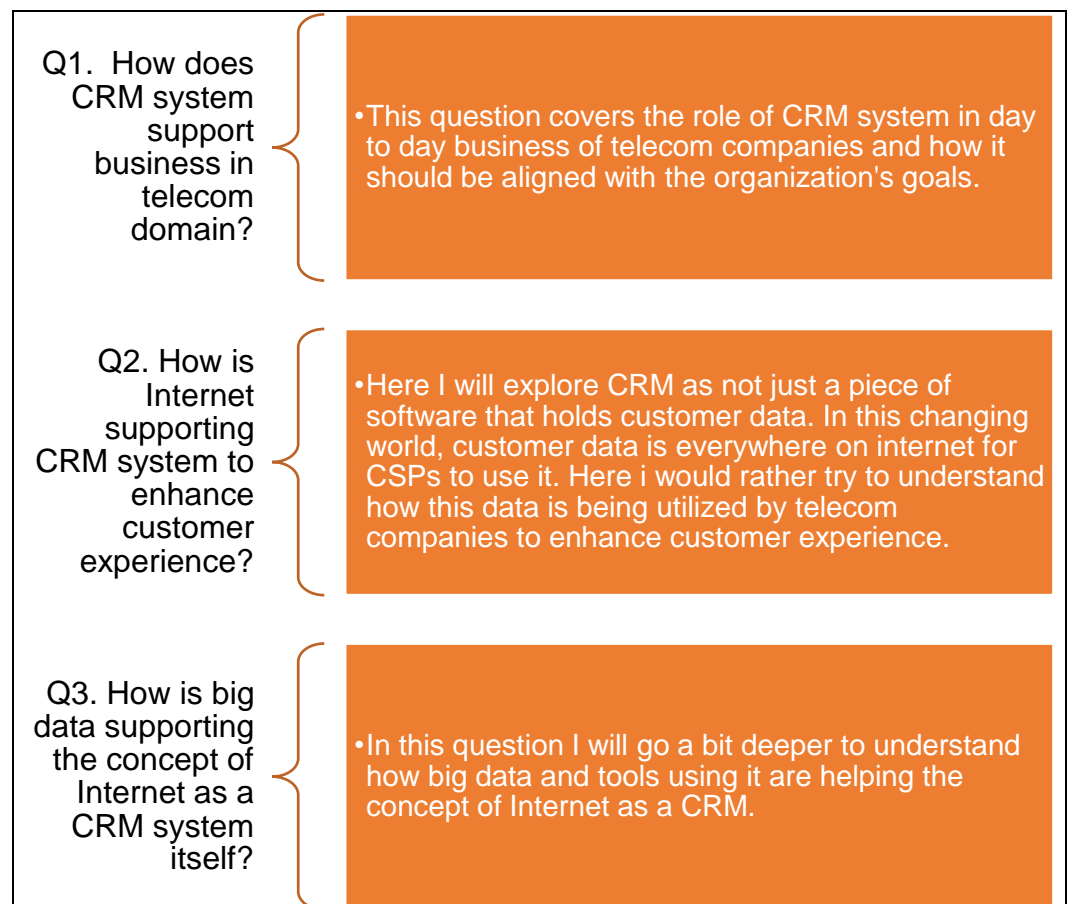


FIGURE 5: RESEARCH QUESTIONS

## 2 Theoretical framework

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists.

(Abend, Gabriel. "The Meaning of Theory." *Sociological Theory* 26 (June 2008): 173–199; Swanson, Richard A. *Theory Building in Applied Disciplines*. San Francisco, CA: Berrett-Koehler Publishers 2013.)

I have made the following topics as the basis of the theoretical framework for my research. Customer Relationship Management (CRM) being the core of my research, I started with doing research and trying to find various terminologies and definitions about the CRM system. Moving on I touched various aspects of CRM and how is CRM supporting not only telcos but various other businesses. Big data is another major part of my research so I also tried to explore the use of big data not only for telco, but I rather took an overview of its uses across various businesses.

### 2.1 What is CRM

Customer Relationship Management, or CRM, is broadly defined as the business process of understanding, collecting and managing all of the information in a business environment relating to a customer. The goal of CRM is to more effectively communicate with customers and improve customer relationships over time. (Wong. [smallbiztrends.com](http://smallbiztrends.com). 20 January 2016).

CRM is an enterprise wide business strategy designed to optimize profitability, revenue and customer satisfaction by organizing the enterprise around customer segments, fostering customer-satisfying behaviors and linking processes from customers through suppliers. (Gartner, 2017)

Customer Relationship Management is a comprehensive strategy and process of acquiring, retaining, and partnering with selective customers to create superior value for the company and the customer. It involves the integration of marketing, sales, customer service, and the supply-chain functions of the organization to achieve greater efficiencies and effectiveness in delivering customer value. (tutorialspoint. 2017)

CRM is a business strategy that permeates your entire company, beginning with the acknowledgement that your customer is the center of your organization. All your management decisions, systems, processes, marketing, advertising, sales approaches, customer retention programs, product or service enhancements, on-going support, billing, pricing everything revolves around your customer . Your overall organization's business processes are designed to enhance your relationships with customers and their customer experience

Customer relationship management (CRM) is a business strategy that aims to understand, anticipate and manage the needs of an organization's current and potential customers. It is a journey of strategic, process, organizational and technical change whereby a company seeks to better manage its own enterprise around customer behaviors. It entails acquiring and deploying knowledge about one's customers and using this information across the various touch points to balance revenue and profits with maximum customer satisfaction. (SalesProCRM. 2013)

Traditionally, data intake practices for CRM systems have been the responsibility of sales and marketing departments as well as contact center agents. Sales and marketing teams procure leads and update the system with information throughout the customer lifecycle and contact centers gather data and revise customer history records through service call and technical support interactions.



Below figure explains the scope of CRM system and the purposes CRM system supposed to handle.



FIGURE 6: SCOPE OF CRM (TUTORIALSPPOINT. 2017)

For sustained success, Customer Relationship Management strategy must be aligned with the organization's mission, purpose and business strategies. CRM strategies are iterative processes; as the organization advances so will the CRM strategy. If developing successful CRM strategies and objectives were either easy or routine, the implementation failure rate would not be deplorably high (over 50% according to research firm Gartner) (crmsearch. 2017).

Below figure gives the growth in CRM market share over the period of 8 years and gives a clear picture that it is increasing exponentially.

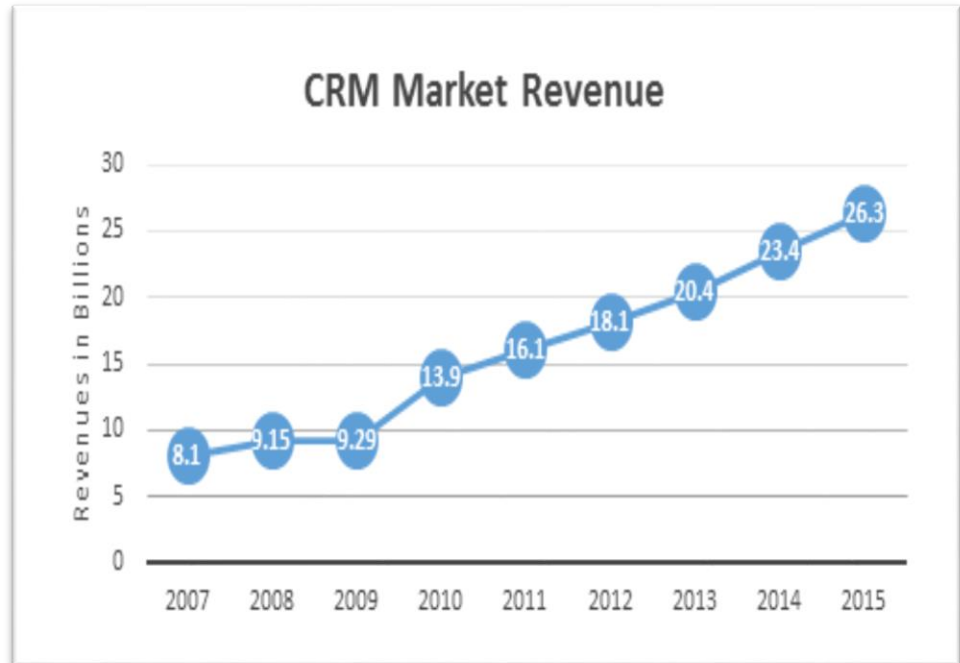


FIGURE 7: CRM MARKET REVENUE. (GARTNER. CRMSEARCH. MAY 2016)

Below graph shows the market share growth of various CRM systems available in the market.

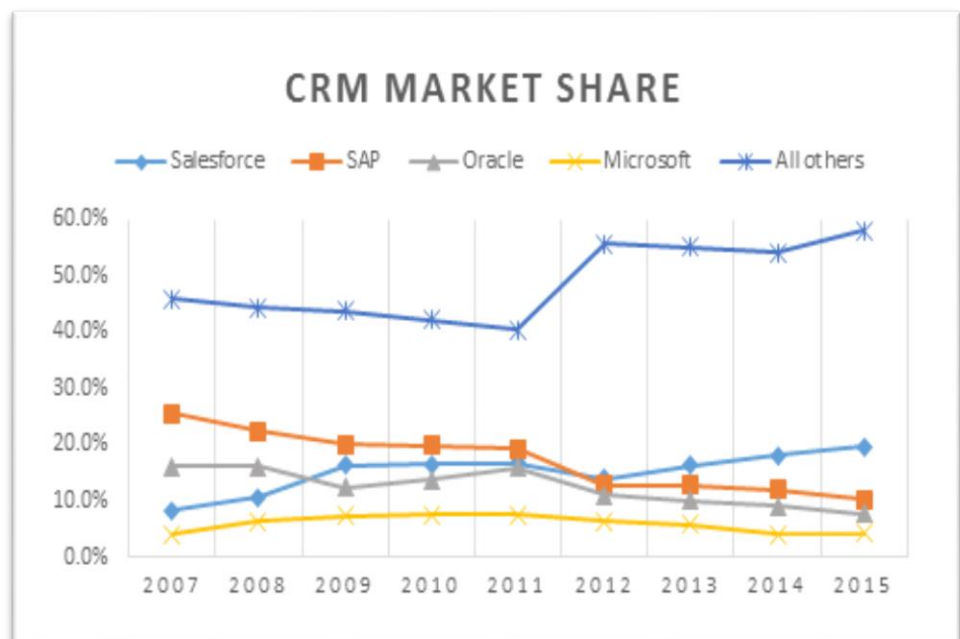


FIGURE 8: CRM MARKET SHARE. (GARTNER ANNUAL MARKET SHARE RELEASES. CRMSEARCH. MAY 2016)

Main Purpose of a CRM system.

- 1) To keep track of all present and future customers.
- 2) To identify and target the best customers.
- 3) To let the customers know about the existing as well as the new products and services.
- 4) To provide real-time and personalized services based on the needs and habits of the existing customers.
- 5) To provide superior service and consistent customer experience.
- 6) To implement a feedback system.

In a podcast discussion, Laurence Buchanan hones in on the critical success factors of effective CRM strategies. He shares how CRM strategies have evolved, why organizations fail in achieving their CRM endeavors, how newer disruptive technologies can actually exacerbate CRM failures and advises a six step approach to successfully implement a CRM strategy. (Buchanan, crm-search.)

Keys take away points from his discussion.

- 1) Companies should understand that each customer is different and CRM system should be aligned with the goals of the organization.
- 2) Organization should try to focus more on what customer needs then to put the latest technology in the CRM systems.
- 3) With CRM systems moving to cloud and companies providing Omni channels to the customers from mobile CRM, to mobile apps shows a need for companies to stay connected with their customers.
- 4) Implementing a new CRM system also comes up with various challenges like a big cultural change. People who have been working on a system from 10-15 years will always try to avoid the change.

## 2.2 Customer centric design

Customer centric is a way of doing business with your customer in a way that provides a positive customer experience before and after the sale in order to drive repeat business, customer loyalty and profits (MacDonald. superoffice.com. 2 August 2017).

Let me try to explain this with an example. A customer orders a pair of shoes online, returns them for a smaller size and then orders a second pair of shoes from the same website needs to be analysed. She can be more than just a one-time customer. If the first shoe was high heels, the customer is most probably a woman who wants to pursue her fashion style. If the second pair is a child's sneaker then she may also be a mother who will need shoes for years to come. This customer should be considered as a business asset. If her buying and browsing the website pattern be analysed and if CRM is able to customize and optimize her journey across the website will give her value.

When CRM system and the organization has customer centric approach and when they start giving value to each and every customer and consider them unique, this on a long term will give benefits to the business. Customer centric is not just giving good service, but it is delivering a great experience to the customer.

Customer Relationship Management software is the technology behind this approach that enables to consider all customers as assets and help customers across all touch points and all customer facing departments from marketing to sales. It helps in creating a unified profile of the customer that is accessible across the customer enterprise. CRM software can use data analytics to correlate all these aspects and then in return give customer, personalized offers, campaigns and suggestions. Thus success of the CRM system across all touch points (call centre, web shop (online shopping portals), emails, chat/IM, and even on social media should be integrated to a single customer profile. This would eliminate information silos in different departments of the CRM system.

Below figure explains what customer centric design means.

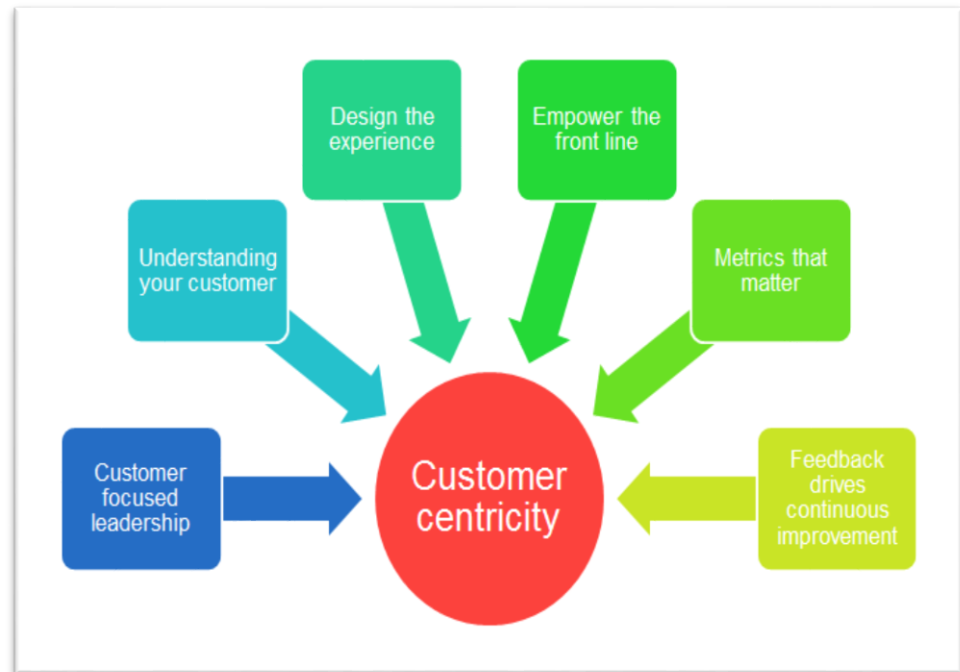


FIGURE 9: CUSTOMER CENTRIC DESIGN MEANS. (MACDONALD. SUPEROFFICE.COM. 2017)

Now what needs to be understood is that CRM is only a technology that can enable all this. But it needs to come from organizations goals if they want to achieve this or they want to work the traditional way. Implementing a new CRM system can always be challenging a may be called as the biggest digital transformation or shift and it not just needs training people to use a new system, but also to think differently. A lot of companies don't realize this and thus fail.

Tanner says - Consumers benchmark us against their best experiences so the expectations of sellers operate at a much faster velocity than our ability to adapt. What my students benchmark college against is some combination of MTV and Disney. Consumers benchmark you against other suppliers who are not your competitors. He also says – We know that putting CRM software ahead of CRM strategy is like putting the cart in front of the horse, however, it can also be argued that creating a CRM strategy without consideration for CRM software is like creating a cart without a horse. (Tanner. crmsearch. 2011).

### **2.3 Design thinking applied to CRM**

Design thinking is a methodology used by designers to solve complex problems, and find desirable solutions for clients. Design thinking draws upon logic, imagination, intuition, and systemic reasoning, to explore possibilities of what could be and to create desired outcomes that benefit the end user (the customer).

Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success. (Brown. ideou.com. 2017)

Most people make the mistake of thinking design is what it looks like. People think it's this veneer — that the designers are handed this box and told, 'Make it look good!' That's not what we think design is. It's not just what it looks like and feels like. Design is how it works. (Jobs. digitalsurgeons.com. 28 November 2016)

The design thinking framework begins with customer empathy. When customers are better understood at an emotional level, businesses can better design products, services and experiences that satisfy their emotions and make real advancements in affinity, loyalty and customer share. Supporting artifacts may include journey maps, empathy maps, voice of the customer analysis and dynamic models which present alternative ways of looking at problems or architecting solutions.

Most people who have been through a CRM transformation or implementation project think that successfully installing a complex CRM system is a success, but success should be when users start feeling the difference and customer experience is enhanced. Design thinking is an iterative, people focused design and problem solving method that applies deep empathy for users and collaboration among multi-disciplinary teams.

A positive CRM experience lowers CSR training costs and increases CSR satisfaction. In this case CSR doesn't waste time in understanding the system, he can rather concentrate on customer interactions. Design thinking is an alternative method of problem solving that focuses on how to achieve a human-focused goal.

Principles of design thinking.

- 1) Empathy for the end-user
- 2) Curiosity
- 3) An openness to failure
- 4) Rapid prototyping
- 5) Cross-functional collaboration

Design should be simple. Let's say you go on eBay, Amazon or any major shopping site. You don't have to read any manual to operate it. They are self-explanatory. The UI is focused on the visual presentation, but the User Experience is much more than that, as it contributes to an emotion that either enhances or degrades the continued use of the application.

For example, in a CRM context, a typical goal is to track more customer information. A design thinking goal is how to apply more customer information to deliver relevant, personalized and contextual communications which create positive emotional responses with customers.

Thinking like a designer can transform the way organizations develop products, services, processes, and strategy. This approach, which IDEO calls design thinking, brings together what is desirable from a human point of view with what is technologically feasible and economically viable. It also allows people who aren't trained as designers to use creative tools to address a vast range of challenges.

In order to firmly identify the highest impact and most important success criteria, measured in user, customer and business outcomes, and according to the people who will most use or benefit from the solution.

Below figure explains the 5 steps of design thinking process.

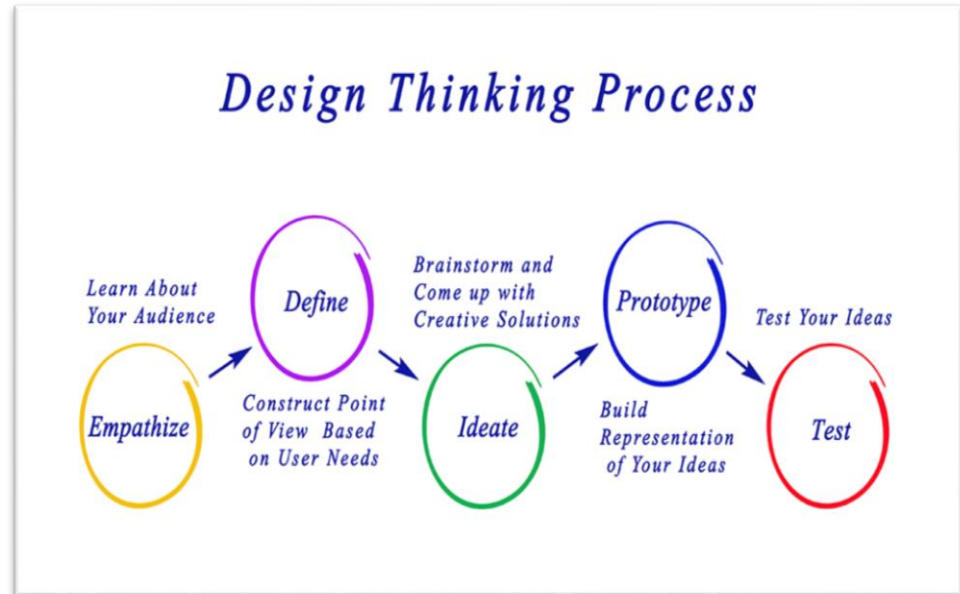


FIGURE 10: DESIGN THINKING PROCESS. (PAL. THINK360STUDIO.COM. NOVEMBER 2017)

#### Five key aspects of design thinking

- 1) Empathize - It is the center of the design. This would mean stepping into user's shoes and understanding the requirement. This is done by empathy maps.
- 2) Define - Here it combines all the insights of the data collected by talking to users and writing them down.
- 3) Ideate - Now we know what the main problem is and how to make it into an opportunity. As part of design thinking we give a lot of stress to this phase and never ignore the obvious.
- 4) Prototype - This stage is to put everything that is in the mind into a frame. Various methods or tools can be used for this. Main idea in design thinking is to do, learn make mistakes and correct them at an initial level.
- 5) Test - Next step is testing where prototype is shown various times to the users to get feedback and all changes can be quickly made at this stage.



## 2.4 How CRM supports business

CRM systems gives customer-facing staff detailed information on customers' personal information, purchase history, buying preferences and concerns. CRM software consolidates customer information and documents into a single CRM database so business users can more easily access and manage it.

The other main functions of this software include recording various customer interactions (over email, phone calls, social media or other channels, depending on system capabilities), automating various workflow processes such as tasks, calendars and alerts, and giving managers the ability to track performance and productivity based on information logged within the system. Companies also struggle to achieve a "single view of the customer," where many different data sets can be seamlessly accessed and organized in a single dashboard or interface to create one view of a customer's account and relevant information.

The four main vendors of CRM systems are Salesforce.com, Microsoft, SAP and Oracle. Other providers are popular among small- to mid-market businesses, but these four tend to be the choice of large corporations.

CRM software can be installed on premises or on cloud. With cloud-based CRM also known as SaaS (software-as-a-service) or on-demand CRM -- data is stored on an external, remote network that employees can access anytime, anywhere there is an Internet connection, sometimes with a third-party service provider overseeing installation and maintenance. The cloud's quick, relatively easy deployment capabilities appeals to companies with limited technological expertise or resources.

Common features of CRM software should include below things.

- 1) Marketing automation - CRM tools with marketing automation capabilities can automate repetitive tasks to enhance marketing efforts to customers at different points in the lifecycle. For example, as sales prospects come into

the system the system might automatically send them marketing materials, typically via email or social media, with the goal of turning a sales lead into a full-fledged customer.

- 2) Sales force automation - Also known as sales force management, sales force automation is meant to prevent duplicate efforts between a salesperson and a customer. A CRM system can help achieve this by automatically tracking all contact and follow-ups between both sides.
- 3) Contact center automation - Designed to reduce tedious aspects of a contact center agent's job. Contact center automation might include pre-recorded audio that assists in customer problem-solving and information dissemination. Various software tools that integrate with the agent's desktop tools can handle customer requests in order to cut down the time of calls and simplify customer service processes.
- 4) Geo-location technology, or location-based services - Some CRM systems include technology that can create geographic marketing campaigns based on customers' physical locations, sometimes integrating with popular location-based GPS apps. Geo-location technology can also be used as a networking or contact management tool in order to find sales prospects based on the location.

## **2.5 Social CRM**

With the advent of social media and the proliferation of mobile devices CRM providers these days have to upgrade their offerings to include new features that cater to customers who use these technologies. Social CRM refers to businesses engaging customers directly through social media platforms such as Facebook, Twitter and LinkedIn. Social media presents an open forum for customers to share experiences with a brand, whether they're airing grievances or promoting products.

To add value to customer interactions on social media, businesses use various tools that monitor social conversations, from specific mentions of a brand to the frequency of keywords used, to determine their target audience and which platforms they use. Other tools are designed to analyze social media feedback and address customer queries and issues.

Companies are interested in capturing sentiments such as a customer's likelihood of recommending their products and the customer's overall satisfaction in order to develop marketing and service strategies. Companies try to integrate social CRM data with other customer data obtained from sales or marketing departments in order to get a single view of the customer.

Another way in which social CRM is adding value for companies and customers is customer communities, where customers post reviews of products and can engage with other customers to troubleshoot issues or research products in real time. Customer communities can provide low-level customer service for certain kinds of problems and reduce the number of contact center calls. Customer communities can also benefit companies by providing new product ideas or feedback without requiring companies to enlist feedback groups.

As businesses gather more and more information about customers through their customer relationship management systems, CRM technology has become a natural partner of data-hungry business intelligence and analytics tools. Companies can score some big business wins by pairing up their CRM and analytics initiatives -- but there are some best-practices ground rules to get straight first in order to achieve the desired BI benefits.

For an organization that is seeking for a competitive edge, applies analytics and uses customer data to provide customer a better experience and service makes a perfect business sense. Effective CRM analysis enables marketing managers and customer service workers to treat people as individuals rather than just numbers. That kind of customer knowledge can lead to more-tailored marketing campaigns and improved customer engagement efforts. But organizations need to make sure they're applying the right kinds of analytics tools to their customer data. CRM vendors may say that their software includes analytical features, but the functionality they provide often fails to deliver in comparison to what analytics applications can or should deliver, especially when it comes to doing predictive analytics and other forms of advanced analytics.

CRM systems have an important role to play in gathering customer data for BI and analytics applications though most CRM software packages are highly customizable, which enables companies to provide data scientists, statisticians and other data analysts with the information they need to build precise predictive models, but for some reason end to end product is missing.

Mobile CRM or the CRM applications built for smartphones and tablets is becoming a must have for sales representatives and marketing professionals who want to access customer information and perform tasks when they are not physically in their offices.

Mobile CRM apps take advantage of features that are unique to mobile devices, such as GPS and voice-recognition capabilities, in order to better serve customers by giving employees access to this information on the go.

Along with all these there are some challenges as well. Companies are struggling to get a single view for the customer as there are various channels that customer can expect to be contacted. Challenges arise when customer data is siloed in several separate systems or when data is complicated by duplicate or outdated information that slows down and hampers the business process. These problems can lead to a decline in customer experience due to long wait times during phone calls, improper handling of technical support cases and other issues.

CRM has established itself as a business standard or rather an organization's primary framework of strengthening customer relationships while doing that finding new ones. As a consequence now most of the companies are now investing more in this domain.

Below figure is mapping the key features of traditional CRM to the improved social CRM.

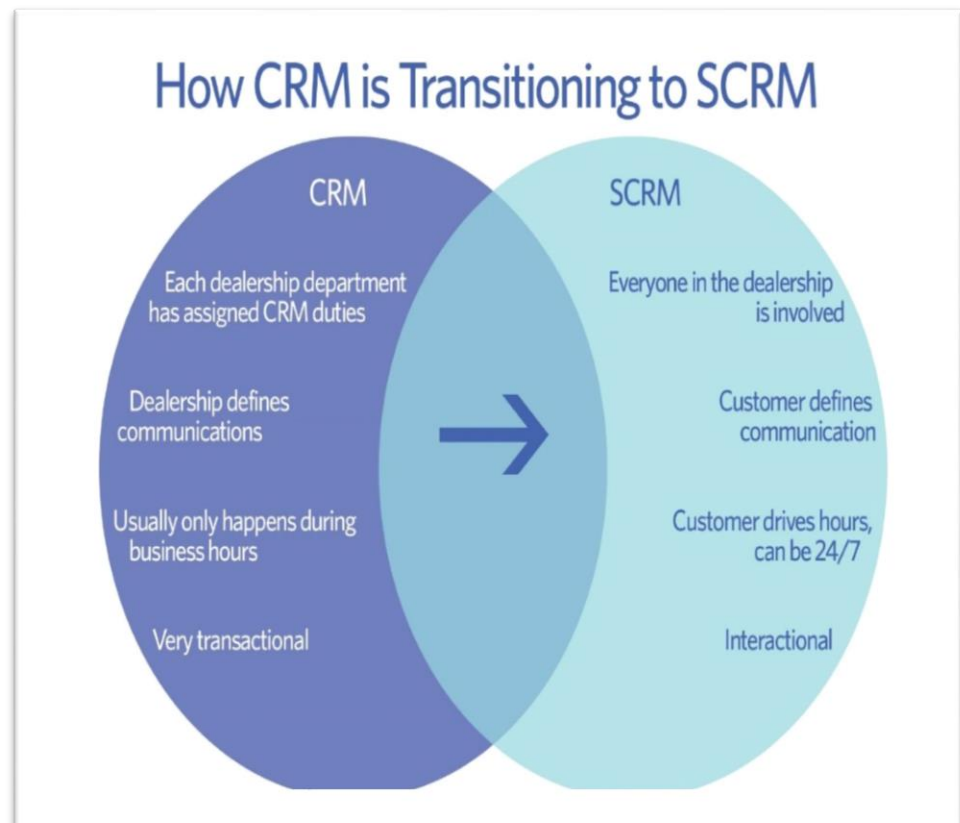


FIGURE 11: CRM TRANSITIONING TO SOCIAL CRM. (DOANE. AUTODEALERMONTHLY.COM. APRIL 2012)

## 2.6 Simplifying CRM

Another aspect of looking at this is, with the evolvment of technology and industry realizing the need for enhancing customer experience more than required attention is given to CRM systems. The result is that CRM has be overpowered by adding various technologies to it and this has resulted in a more complex and difficult to maintain CRM solution. Now companies want to keep the CRM light and make it more and more user friendly and interactive. This need has been addressed by various companies and they are now coming up with lighter and more customizable solutions. There are more features which companies get developed in the system and which are never used.

Few key rules for the CRM system.

- 1) Remove everything that the user has not used since last few months.
- 2) By removing un-necessary tabs, button will result in un-wanted errors.
- 3) Simplifying the screen can improve the speed of CSRs.
- 4) Lesser the actions needed to be performed, lesser the CSR training cost.
- 5) User friendly system leads to happy CSRs.

## **2.7 About Big Data**

Big Data refers to a term that describes a large amount of data, structured and unstructured, important for an organization's processes, decision making and competitive environment. Big data refers to so large amount of data that it is difficult to process using traditional database and software techniques.

Big Data is a common term used to describe the deluge of data in today's networked, digitized, sensor-laden, and information driven world. Big Data has emerged in the past few years as a new paradigm providing abundant data and opportunities to improve and/or enable research and support applications with unprecedented value for digital earth applications including business, sciences and engineering.

IBMs four Vs of Big Data

- 1) Volume - Volume simply describes the volume of big data and the possibility to store and analyze larger sets of data than ever before. Through volume a better and more detailed insight into an issue is created. We can achieve a higher accuracy of information gained from data and thus are able to understand schemes a lot easier.
- 2) Velocity - Velocity describes the technological capabilities to collect and analyze data in real time. As mentioned before, volume is an element of big data, however technology nowadays also enables us to get insights into data in real time.

Organizations used to rely on historic data of previous months, etc., simply because technology would not allow to process data fast enough. With the new technology we are able to analyze data in real time (Gartner, 2013). This is especially crucial in time sensitive businesses like the banking industry, where markets can change in a matter of seconds, but also the logistics sector is benefiting from real time updates and information flow.

- 3) Variety - Variety describes in general the diversity of data. The multitude of sources of data, giving us the possibility to interconnect different data sets and derive conclusions from it. In previous decades, organizations were already collecting large data sets from various sources like mobile phones, emails, etc. Technology now enables us to actually take a look at the data and combine it with different knowledge to create a more comprehensive and complete picture of our business problem.
- 4) Veracity - Big Data Veracity refers to the biases, noise and abnormality in data. Is the data that is being stored, and mined meaningful to the problem being analyzed. I feel veracity in data analysis is the biggest challenge when compares to things like volume and velocity. In scoping out your big data strategy you need to have your team and partners work to help keep your data clean and processes to keep 'dirty data' from accumulating in your systems.

Cloud computing provides fundamental support to address the challenges with shared computing resources including computing, storage, networking and analytical software. Cloud computing has engaged Big Data and enlightened potential solutions for various digital earth problems in geoscience and relevant domains such as social science, astronomy, business and industry. The increasing demand for accuracy, higher resolutions and Big Data will drive the advance of cloud computing and associated technologies. The integration of cloud computing, Big Data, and economy of goods and digital services have been fostering the discussion of IT-related services, a large share of our daily purchasing consumption.

How much can companies in the telecommunications industry benefit from “big data”? That’s a critical question. Every operator is searching for new ways to increase revenues and profits during a time of stagnant growth in the industry, but few have demonstrated the capabilities needed to make the most of this new technology. Big data promises to promote growth and increase efficiency and profitability across the entire telecom value chain.

Big data brings a lot to value to every business – below are some of them.

- 1) New market enabler - Big data promises to open new avenues of business apart from traditional way of doing business.
- 2) Data integration - Currently customer information is in various CRM systems and with the use of big data, reading this information and using it into usable information would be faster.
- 3) Analytics accelerator - Using structured and non-structured information and visualizing it into a readable format is faster with the use of big data.
- 4) Near to real time analysis and monitoring - With the scale of data, a concept like big data can only help in real time analysis of such a huge amount of data.

## **2.8 Big data technologies**

Now I would like to cover some of the leading technologies that are being used by big data.

- 1) Data mining is the process of sorting through large data sets to identify patterns and establish relationships to solve problems through data analysis. Data mining tools allow enterprises to predict future trends. (Margaret. techtarget. March 2017). Specific data mining benefits vary depending on the goals of the industry. It includes creation of various mathematical rules and algorithms and as an output presenting meaningful data. So are we at a stage where most of the companies are investing in big data because their competitors are doing so. Or is it because everyone around them is investing in it and they don’t want to fall behind.



- 2) NoSQL database - A NoSQL (originally referring to "non SQL" or "non-relational") database provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases. NoSQL databases are increasingly used in big data and real-time web applications. Motivations for this approach include: simplicity of design, simpler "horizontal" scaling to clusters of machines (which is a problem for relational databases), and finer control over availability. The data structures used by NoSQL databases (e.g. key-value, wide column, graph, or document) are different from those used by default in relational databases, making some operations faster in NoSQL. The particular suitability of a given NoSQL database depends on the problem it must solve. Sometimes the data structures used by NoSQL databases are also viewed as "more flexible" than relational database tables.
- 3) Predictive Analysis and Visualization - Predictive analytics is the practice of extracting information from existing data sets in order to determine patterns and predict future outcomes and trends. Predictive analytics does not tell you what will happen in the future. Tableau is data analysis software that helps people see and understand their data.
- 4) Hadoop and MapReduce - Apache Hadoop MapReduce is a technique which allows for parallel processing of data on separate Hadoop clusters. This allows for huge horizontal scalability and processing power. It has gotten its name from the two tasks, or jobs, that together create the technique. Mapper jobs. The dataset is divided for the mappers with certain criteria and after all the mappers have completed their jobs, the reducers start working and combine the data from the mappers getting the wanted results. (IBM MapReduce.). Essentially, MapReduce is a way to perform parallel calculations on a distributed file system. (IBM MapReduce.)
- 5) SAP Solutions - SAP so far mainly known for its SAP ERP, SAP SCM etc. related products has also realized that big data is the need of the hour. And what about a company that holds entire companies data. SAP offers a tool called lumira to analyze data and get visually excellent reports out of lots of raw data.

SAP Business-By-Design is an enterprise-wide ERP and CRM system that facilitates end to end integration for key business functions such as financials, human resources, supply chain management, project management, compliance management and customer relationship management. SAP offers four business applications for small and midsize enterprises (SMEs). Business One and Business All-in-One are mature on-premises ERP systems, while Business-By-Design and the most recent Sales-On-Demand represents SAP's foray into the cloud. SAP is cloud convert. The company's drive to the cloud is less about innovation and more about market demand.

- 6) Dynamics 365 - Dynamics 365 was announced as the next generation of Microsoft's Azure-hosted business services. From an ERP and CRM software perspective, Dynamics 365 is mostly a change to branding and bundling. While the ERP and CRM software hasn't changed, the messaging is clear that what were separate applications are morphing and being offered in a more flexible consumption model.

This new Microsoft business application bundling includes some new product names of what were previously called Dynamics AX, Dynamics CRM and Project Madeira arranged into two editions.

## **2.9 What do we make out of big data**

There is another aspect of this debate. Do companies really know what to with the enormous data that is being stored these days?

When we conducted a "Big Data" survey in 2012, and asked which characteristic is the biggest issue for your organization – it wasn't the volume of data that was the issue (which is really the 'big' part), it was the variety, such as video and audio, that dominated. In fact 50% of the respondents thought that was a bigger issue over Volume and/or Velocity of data so 2:1 thought variety more challenging. And, variety of data doesn't need to be big. Or is it that "Big Data" is just a catchy phrase that we're never going to get rid of? (Bertram, [blogs.gartner.com](http://blogs.gartner.com). 25 August 2013)

From where I see this data is data. Taking an example of telecom companies, amount of data was small when we had only landlines. With mobile phones amount of data increased and now with the bombardment of social media and apps same data has increased. So is it that we have just found new ways to store more data by various tools like Hadoop, no-sql-db etc. further explained in the research.

In a nutshell, big data is a catch-all term for data sets that are so large and complex that they necessitate new forms of processing beyond the SQL databases prevalent since the early 1980s.

The typical example is a Hadoop stack housing petabytes of “unstructured” data: things like Twitter comments, video content, recordings of call center conversations and other information that isn’t organized in a pre-defined fashion.

To illustrate the scale of this data firehose, Twitter processes 400 million tweets every day. Cisco predicted that by this year, annual traffic flowing over the Internet would reach 667 exabytes annually. That is equivalent to 2.6 million times the amount of information stored in the U.S. Library of Congress. In just five years, the amount of digital information shared globally increased nine fold, to nearly 2 trillion zettabytes in 2011.

(Miller, [blog.marketo.com](http://blog.marketo.com). 2013)

Marketers are trying to use most from big data but do they really need it. E.g. if you want to find out few customers that are calling the call center frequently or is network going really bad at peak hours. These are not so complex questions and can be answered by traditional sql/database tools. You don’t need Hadoop or other new fancy tools to answer them. So I think question is not how to look for data the more important question is what to look for. This is what data mining comes into picture.

Below is the result of one of the research done by Gartner. This says a big enough percentage of people either don't know and have no plans to invest in big data.

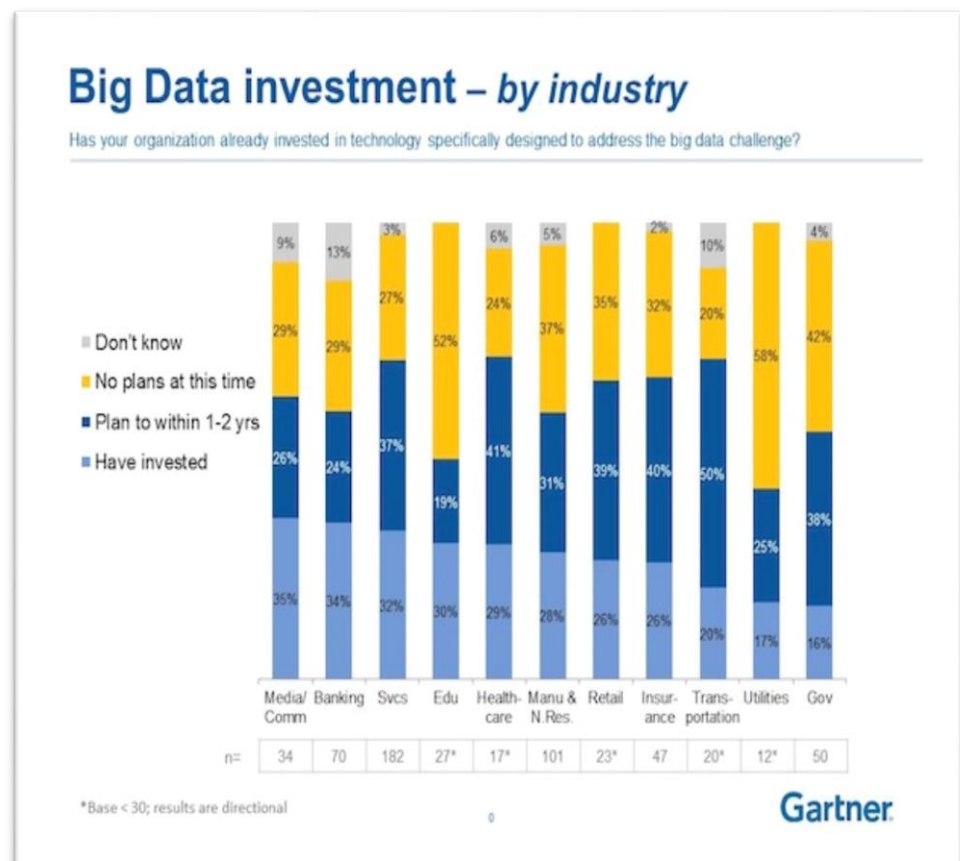


FIGURE 12: INDUSTRIES ARE INVESTING IN BIG DATA. (BERTRAM. BLOGS.GARTNER.COM. AUGUST 2013)

## 2.10 About Cookies

An HTTP cookie (also called web cookie, Internet cookie, browser cookie, or simply cookie) is a small piece of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing. Cookies were designed to be a reliable mechanism for websites to remember stateful information (such as items added in the shopping cart in an online store) or to record the user's browsing activity (including clicking particular buttons, logging in, or recording which pages were visited in the past).

Below are various types of cookies.

- 1) Session cookie - A session cookie, also known as an in-memory cookie or transient cookie, exists only in temporary memory while the user navigates the website. Web browsers normally delete session cookies when the user closes the browser. Unlike other cookies, session cookies do not have an expiration date assigned to them, which is how the browser knows to treat them as session cookies.
- 2) Persistent cookie - Instead of expiring when the web browser is closed as session cookies do, a persistent cookie expires at a specific date or after a specific length of time. This means that, for the cookie's entire lifespan (which can be as long or as short as its creators want), its information will be transmitted to the server every time the user visits the website that it belongs to, or every time the user views a resource belonging to that website from another website (such as an advertisement).
- 3) Secure cookie - A secure cookie can only be transmitted over an encrypted connection (i.e. HTTPS). They cannot be transmitted over unencrypted connections (i.e. HTTP). This makes the cookie less likely to be exposed to cookie theft via eavesdropping. A cookie is made secure by adding the secure flag to the cookie.
- 4) Http Only cookie - An HttpOnly cookie cannot be accessed by client-side APIs, such as JavaScript. This restriction eliminates the threat of cookie theft via cross-site scripting (XSS). However, the cookie remains vulnerable to cross-site tracing (XST) and cross-site request forgery (XSRF) attacks.
- 5) Same Site cookie - Google Chrome 51 recently introduced a new kind of cookie which can only be sent in requests originating from the same origin as the target domain. This restriction mitigates attacks such as cross-site request forgery (XSRF). A cookie is given this characteristic by setting the Same Site flag to Strict or Lax.
- 6) Third-party cookie - Normally, a cookie's domain attribute will match the domain that is shown in the web browser's address bar. This is called a first-party cookie. A third-party cookie, however, belongs to a domain different from the one shown in the address bar. This sort of cookie typically appears when web pages feature content from external websites, such as banner advertisements. This opens up the potential for tracking the user's browsing history, and is often used by advertisers in an effort to serve relevant advertisements to each user.
- 7) Super cookie - A supercookie is a cookie with an origin of a top-level domain (such as .com) or a public suffix (such as .co.uk). Ordinary cookies, by contrast, have an origin of a specific domain name, such as example.com. Supercookies

can be a potential security concern and are therefore often blocked by web browsers.

- 8) **Zombie cookie** - A zombie cookie is a cookie that is automatically recreated after being deleted. This is accomplished by storing the cookie's content in multiple locations, such as Flash Local shared object, HTML5 Web storage, and other client-side and even server-side locations. When the cookie's absence is detected, the cookie is recreated using the data stored in these locations.

(Wikipedia. September 2017)

### **3 Review of Work around Big Data and CRM**

Under this section I will explain how big data and CRM are related and how is CRM using general data over internet to enhance customer experience across various sectors.

#### **3.1 Big data in retail**

Retail is one industry sector which is most uncertain and most likely to be benefited with big data. As shown in the figure no. 13 below shows the number of possible big data touch points is immense. As consumer technology adoption and multi-channel shopping experiences become the norm, data becomes increasingly critical. For example, a consumer might begin researching a product on a mobile app, purchase it online and pick it up at a store. Coordinating this multi-channel shopping interaction requires entirely new data competencies for the retailer whose business now depends upon whether it can manage, integrate and understand this vast array of data coming at a non-stop pace.

It is increasingly clear that retailers must leverage their information assets to gain a comprehensive understanding of markets, customers, products, distribution locations, competitors, employees and more. In this industry deep dive, we examine industry-specific challenges, as well as provide our top-level recommendations for retail organizations.

Key expectations from big data for the retail industry.

- 1) Retailer should be able to generate recommendations for the buyers by analyzing their buying history and patterns.
- 2) Forecasting Trends for both demand and supply.
- 3) Utilize on market basket - A standard technique used by retailers, the market basket analysis helps figure out what products customers are most likely to purchase together.
- 4) Optimizing Price is the most important aspect of retail business.

- 5) Predicting trends of products and sales is another most important requirement for retail business.

Amazon one of the biggest retail chain and one of the biggest online behavior bank is also trying to mine from that data and suggest products to the users. Amazon uses big data also to offer a superb service to its customers. This could be the effect of the purchase of Zapos in 2009, but it clearly helps that it ensures that customer representatives have all the information they need the moment a customer needs support.

However, there is more. Amazon also uses Big Data to monitor, track and secure its 1.5 billion items in its retail store that are laying around it 200 fulfilment centers around the world. Amazon stores the product catalogue data in S3. This is a simple web service interface that can be used to store any amount of data, at any time, from anywhere on the web. It can write, read and delete objects up to 5 TB of data each. The catalogue stored in S3 receives more than 50 million updates a week and every 30 minutes all data received is crunched and reported back to the different warehouses and the website.

In the past few years, Amazon has definitely moved away from a pure e-commerce player to a giant online player who offers much more than just products. It focuses massively on big data and is changing from an online retailer into a big data company.



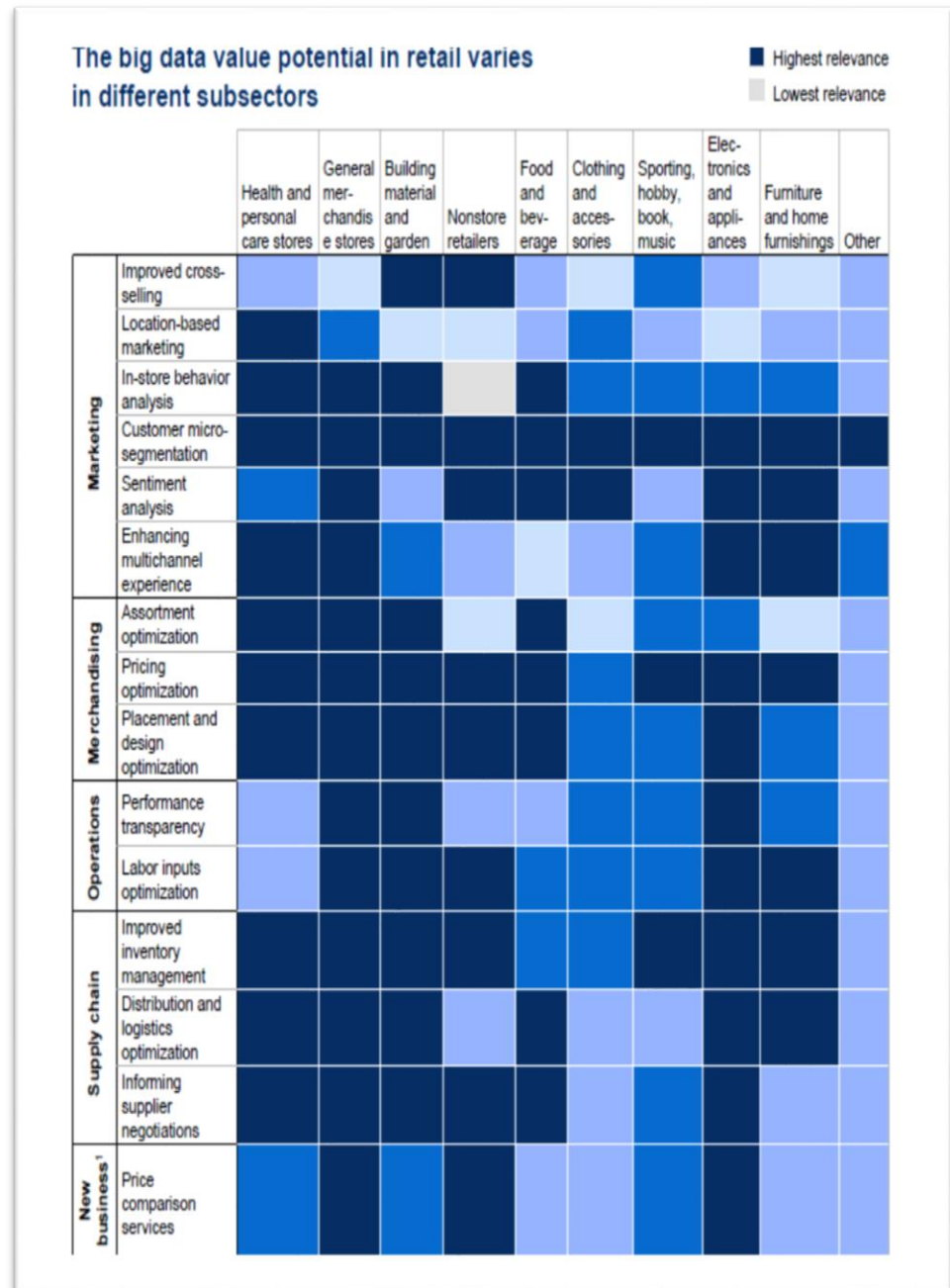


FIGURE 13. BIG DATA RELEVANCE IN RETAIL IN DIFFERENT SUBSECTORS. (MCKINSEY GLOBAL INSTITUTE, 2013)

With number of businesses and sectors which could benefit from big data so high shows great hopes for retail sector to invest more and benefited from big data.

### **3.2 CRM not just a CRM for Telecom Industry**

Telecommunication companies are under immense pressure to keep up with their operating cost and at the same time grow customers and revenue. CRM plays key role here to keep the existing customers happy and to get new customers.

In a Telecom environment, CRM software is evolving beyond the traditional account, contact and activity management. Telecom CRM systems help manage customer churn by analyzing data collected from other touch-points across functional areas like sales and service. When integrated with transactional data like usage and call patterns, analysis reveals rich insights and intelligence into customer behavior and helps identify and mitigate customer churn.

Below are some of the major Enterprise CRM providers.

- 1) Amdocs Limited (Amdocs CRM CES v. 7.5.2)
- 2) CDC Software (CDCPivotal CRM v. 6.0)
- 3) Clear C2, Inc. (C2 CRM v. 8.6)
- 4) Consona Corporation (Consona CRM)
- 5) Firstwave Technologies, Inc. (Firstwave CRM v. 4.1)
- 6) Infor Global Solutions (Infor CRM)
- 7) OnContact Software Corp. (CMS v. 9.0/OnContact CRM V v. 6.2)
- 8) Optima Technologies, Inc. (ExSelligence 5.9 & IAS 360 3.5)
- 9) Oracle Corporation (PeopleSoft CRM)
- 10) RightNow Technologies, Inc. (RightNow CRM February 09)
- 11) Sage Software (Sage SalesLogix v. 7.5)
- 12) Salesforce.com (Salesforce.com)
- 13) SAP AG (SAP CRM 7.0)
- 14) Sword Group (Sword Ciboodle v. 2.10)
- 15) Update software AG (update seven)

An increased number of competitors, higher consumer expectations, fast and frequent consumer switching from one supplier to another and a high dependence on economic conditions have converged to result in an increasingly challenging telecom market.

During the past 5 years telecom business has declined with revenue growth declined from 4.5 percent to 4 percent, EBITDA margins down from 25 percent to 17 percent, and cash-flow margins down from 15.6 percent to 8 percent. Now digitalization can be considered as a treat or an opportunity for telcos to re-invent themselves. Mckinsey says that digitization could enable telecom operators to improve their profits by as much as 35 percent, yet the average improvement achieved is just 9 percent. As per Mckinsey few things that telcos need to do to sustain this era of digitalization. (McKinsey& Company June 2016, 8)

### **3.3 Introduction of Omni-channels**

Today customer wants to access the self-service from computers, tablets, smart phones. Telcos need to provide services streamlined across the channels. E-care or Digital is now the leading channel in many customer-service transactions too. Customers prefer digital service with more and more of telecom customers prefer digital-only journeys, compared to traditional channel users.

However, few service journeys are entirely digital as yet a very small amount of them are digital from start to finish, while more of them start on an e-care platform and then switch to traditional channels. For telecom operators, migrating to e-care can reduce call volumes and operating expenses.

One company that launched an e-care effort as part of a broader digital sales transformation saw a reduction in customer-care costs as well as a rise in customer satisfaction. Another company is trying to make online purchase such a way that if a customer started his order on one device and he stops and then goes to another device then he can continue with the same purchase.

In the near future, telcos will be able to use real-time 360-degree data on individual customers to personalize promotions, campaigns, and service interventions along the entire customer journey. The new approach cuts churn among these customers. In network design, clustering customers according to their daily travel patterns can enable some operators to fine-tune their geographical networks to optimize customer service and investment.



FIGURE 14: OMNI-CHANNEL IN TELCO. (ENTERPRISEINNOVATION. 2015)

### 3.4 Salesforce.com CRM

Salesforce.com also known as cloud CRM, founded only in 1999 and become the market leader of the product. Not only this has also been awarded as the most innovative company of the year and grown like anything. Salesforce CRM includes traditional account, contact, activity, opportunity management along with basic marketing campaign management and marketing automation.

Marketing automation includes more sophisticated lead management capabilities such as digital prospect tracking, lead scoring, progressive profiling, nurture campaigns and marketing analytics. Many Salesforce.com customers use Marketo for marketing automation as it is perceived to offer richer lead management and marketing capabilities. Sales Cloud also includes basic Partner Relationship Management (PRM). This application sync's communication between brand owners and indirect channels and gives brand management performance visibility into both direct and indirect channels. PRM includes routine process support for lead distribution, deal registration, content sharing, partner attribute data tracking and partner portals.

As per below figure Salesforce is clearly the market leader of CRM systems

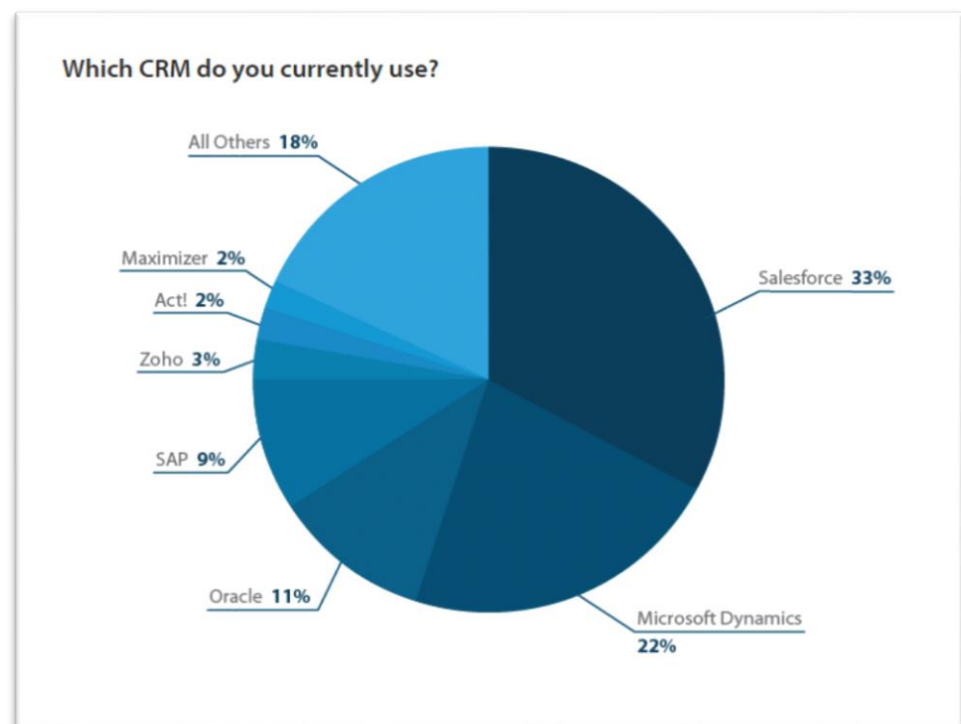


FIGURE 15: MARKET SHARE OF CRM SYSTEMS. (BLOG.CAPTERRA. JANUARY 2016)

### 3.5 Customer Insights – 360 degree View

Nearly half of telecoms operators believe that integrating data from multiple sources is their greatest barrier and to obtain a 360-degree view of their customers. Iteratively enrich data across all platforms for a true 360-degree view of the customer and building predictive models that indicate leading indicators of churn, saving billions in lost revenues, and enable a higher share of wallet by delivering a better customer experience and product personalization. (Cloudera, 2017).



FIGURE 16: CUSTOMER 360 DEGREE VIEW. (INFORMATICISINT. 2015)

When you leverage data to better serve your customers, you begin to understand their journey across multiple online touch points and across multiple enterprise systems. Buried in these interactions is true business insight. Cloudera helps organizations better understand their customers, learn from

their behaviors, and deliver personalized interactions. To understand your customer you need to take a journey with your customers to cross engagements, platforms, and purchases to better understand their needs and behaviors. When you begin to truly leverage your data, you can serve them faster and with more relevance.

### **3.6 IBM Watson Customer Experience Analytics**

IBM Watson Customer Experience Analytics allows you to view your sites and apps from the customer perspective to discover opportunities. It provides a seamless, end-to-end view of the customer experience to understand and optimize every journey and gives you the insights you need to resolve issues, boost conversions and maximize lifetime customer value.

Key Features.

- 1) Visualize the customer journey - Visualize complete, cross-channel customer journeys across devices and over time. Know where customers are in their journey and learn how activity in one channel impacts performance in another.
- 2) Re-live customer experiences - See where customers struggled and pinpoint trouble spots. Replay sessions to see what your customer experienced. Identify opportunities to improve the customer experience and refine the journey.
- 3) Gain the insights you need - Bring together customer experience insights from multiple channels in a unified dashboard. Identify trends and understand root causes. Get immediate insight to go from question to decision in minutes.
- 4) Role-based dashboards - Customized top line metrics provide quick access to business conditions and customer experience activity.
- 5) Session replay - Summarized session views and detailed session replays of all sessions—whether on the web, mobile app or hybrid app—provide a deep understanding of individual experiences.
- 6) Journey analytics - New multi-channel path analysis provides a holistic understanding of customer journeys.

- 7) Flexible reporting - Offers pre-built and customizable digital analytics reports, rich segmentation and syndication of customer behavior audiences, traffic and funnel reporting with actionable insights.
- 8) Eventing and Alerting - Provides struggle detection and behavior reporting that pinpoint where and why experiences are occurring; powerful event and alert engines provide the ability to act on insights.
- 9) Site optimization - Uncover usability flaws that cause customers confusion and struggle; compare segments side-by-side to optimize experience, content and campaigns.
- 10) Mindset analysis - Understand which events impact discovery, purchase consideration and advocacy to increase conversion, revenue and customer loyalty.

### **3.7 Network Optimization**

Bandwidth demand is growing 60% per year, leaving operators increasingly unable to respond to spikes. With an enterprise data hub, gain a real-time view to allocate network resources more efficiently, build predictive capacity models, and adopt a next-best-investment approach. (Cloudera, 2017).

To optimize your network, you need technology solutions that help you.

- 1) Design and develop a network infrastructure that is agile and cost efficient and ready to support new services faster.
- 2) Easy to leverage from latest data analytics solution and able to optimize on the basis of this analysis.
- 3) Able to go deep into user behavior and optimize it to the best of user needs.
- 4) Virtualized network functions and should be cloud based.



Below is an example of one of the biggest network provider, Nokia's vision for network optimization.

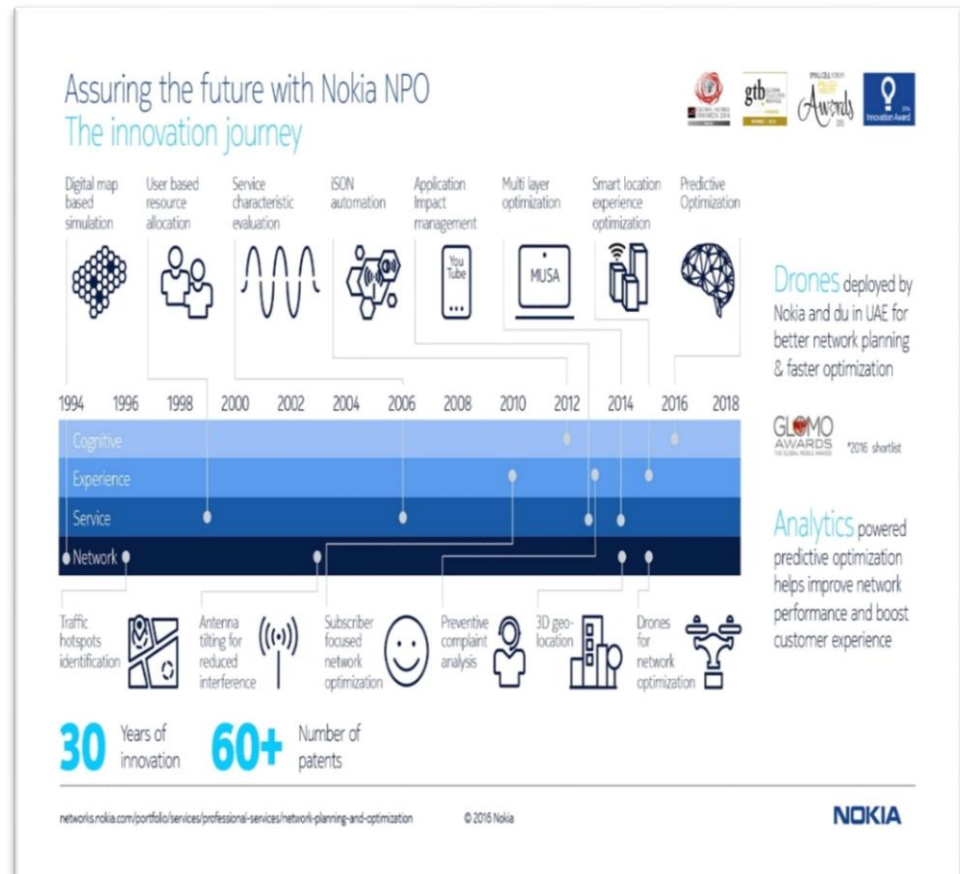


FIGURE 17: TELCOS: NOKIA PLANNING AND NETWORK OPTIMIZATION

(NETWORKS.NOKIA.COM NETWORK PLANNING AND OPTIMIZATION. 2016)

### 3.8 Data Monetization

Telcos have a rich and diverse source of insights into context-specific behaviors, customer preferences, and online interactions. Build revenue-generating analytics-as-a-service and information brokerage capabilities on a platform with complete data security and governance. (Cloudera, 2017).

Telecom companies are also able to create better proactive care by taking advantage of Big Data solutions and identifying issues before they affect the customer, before the customer has to notify them of the issue or by just reactively contacting the customer and notifying that the issue can be solved.

### **3.9 Develop new products**

Mobile devices produce huge amounts of data about how, why, when and where they are used. This data is extremely valuable for product managers, but its volume and variety make it difficult to ingest, store and analyze at scale. Not all data is stored for conversion into business insight. Even the data that is stored may not be retained for its entire useful life.

Apache Hadoop can put rich product-use data in the hands of product managers, which speeds product innovation. It can capture product insight specific to local geographies and customer segments. Immediate big data feedback on product launches allows PMs to rescue failures and maximize blockbusters.

### **3.10 Social Media and Sentiment Analysis**

The evolution of social media has transformed the way companies view their customers. Data scientists are harvesting data from reviews, rants and social feeds and subjecting this information to detailed sentiment analysis.

Their goal in doing so is to help telecommunications companies.

- 1) Improve or defend their brand image
- 2) Track usage patterns
- 3) Monitor the reaction to new products, offers and campaigns
- 4) Tackle potential problems and ease customer concerns
- 5) Identify new revenue streams

### **3.11 Churn Prevention**

Customer churn – when subscribers jump from network to network in search of bargains is one of the biggest challenges confronting a telecom company. It is far more costly to acquire new customers than to cater to existing ones. Common causes of churn include high prices, poor service, poor connection quality, new competitors and outdated technology.

To prevent churn, data scientists are employing both real-time and predictive analytics to combine variables (e.g., calls made, minutes used, number of texts sent, average bill amount) to predict the likelihood of change, know when a customer visits a competitor's website, changes his/her SIM or swaps devices. They use sentiment analysis of social media to detect changes in opinion, target specific customer segments with personalized promotions based on historical behavior, react to retain customers as soon as change is noted.

### **3.12 Data Lake**

A data lake is a central location in which to store all your data, regardless of its source or format. It is typically built using Hadoop, but there are various other tools available in the market for this. The data can be structured or unstructured. You can then use a variety of storage and processing tools, typically tools in the extended big data ecosystem to extract value quickly and inform key organizational decisions.

The differences between traditional enterprise data warehouses (EDW) and data lakes. An EDW is fed data from a broad variety of enterprise applications each application's data has its own schema, requiring the data to be transformed to conform to the EDW's own predefined schema. Designed to collect only data that is controlled for quality and conforming to an enterprise data model, the EDW is capable of answering only a limited number of questions.

By concept in data lakes information can be fed in its native form. Little or no processing is performed for adapting the structure to an enterprise schema. The biggest advantage of data lakes is flexibility. By allowing the data to remain in its native format, a far greater and timelier stream of data is available for analysis.

Telco companies are turning to Hadoop to help them effectively create data lakes where information of all formats, including structured and unstructured data, and whether online or archived, can be stored. One such company that has evolved its technology stack with Hadoop is Razorsight, a provider of cloud-based predictive analytics software that's used by the world's best-known communication and media brands.

Although the potential use cases are limitless, today data lakes are seeing success with these common use cases.

- 1) EDW augmentation: Offloading data from a traditional enterprise data warehouse (EDW) to Hadoop or the cloud brings storage cost savings and increases bandwidth in the EDW for business intelligence (BI) processes.
- 2) Agile analytics: A “fail fast” approach to data science where hypotheses, testing, iterating and improvements are in a constant cycle using real-time data, which can result in more and innovative insights that can add business value.
- 3) Enterprise reporting: The ability to do ad hoc reporting using an enterprise wide data source is key to understanding the business in real-time and reducing risk.
- 4) Data monetization: More enterprises are leveraging their data to better understand current customers and also develop new products and services that resonate with consumers.
- 5) Data science: Some enterprises are working to support an enterprise wide data science capability, particularly for predict churn etc.

### **3.13 Razorsight**

Razorsight used Hadoop to build a central data lake as a primary data store for both online and archived data. Since the launch of this new stack in late 2014, the production cluster has received, processed, and analyzed more than 40 terabytes of data. Since Razorsight's customers send data in all shapes and formats from multiple sources, they use an NFS gateway to move these data sets in and out of the cluster seamlessly, making it extremely easy and intuitive to integrate Hadoop into the overall data flow.

Razorsight then uses Spark as an in-memory processing engine to enrich and transform the source data to prepare the analytical records for advanced modeling. Spark provides the required high performance to accomplish this function, and they also used Elastic Search for search-based analysis. Additionally, the end users and business analysts continue to use existing business intelligence and visualization tools on their downstream data warehouse.

## 4 Methodology

Research methodology can be divided in two parts. Qualitative and Quantitative.

- 1) Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to fulfil a given quota.
- 2) Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods.

Below are two main challenges in data collection method in qualitative research.

- 1) Technical competence: Find right candidates for the interview. Identify the right groups for the open discussion. These would be the key factors in taking my research work forward in right directions.
- 2) Interactive competence: This would be another important thing needed when I am conducting the interview. I would need to take the interview in correct direction as per my objectives. While doing that I should leave my opinion behind and try to get more from the interviewee.

Below table shows the qualitative research approach.

<b>Purpose</b>	<b>To capture, describe, understand experience</b>
<b>Approach / Design</b>	Plan the guidelines of data analysis and interpretation
<b>Data Collection Methods</b>	Interviews, focus groups, observation, videos, text etc.
<b>Data</b>	Words, images or numbers
<b>Data Analysis and Interpretation</b>	Thematic analysis, Grounded Theory or eclectic
<b>Data Reporting</b>	Primary Narrative

FIGURE 18 QUALITATIVE APPROACH. (HARRIS AND O'BRIEN. AAMC AND MERC. 2012)

## 4.1 Strategy

The methodology that best suits to my topic from my point of view is Qualitative Research as it deals with collecting and interpreting data by analyzing the user experience.

The nature of my research would be exploratory and open minded so I would be taking two approaches. In this descriptive study I would first explore possible material around my topic which would help me the answer my research questions. I have chosen to use multi-method qualitative study, semi structured interview with experts to understand the importance of material found for research.

Common Approaches for qualitative research.

- 1) Ethnography: Study of culture through engagement
  - 2) Grounded theory: Develop theory inductively, based on iterative data collection
  - 3) Case study: In-depth study of a case
  - 4) Phenomenology: Understand essence of phenomena, based on lived experience.
  - 5) Hermeneutics: Interpretation of text
  - 6) Narrative research: Elicit stories
  - 7) Action research: Collaboration between researchers and participants
- (Goodson and Vassar. 2011)

The approach that I used is ethnography. Firstly ethnography because people that I have picked for this research are those I have been working from a long time so there is a long term engagement and I personally have been working around same this topic from a long time now. Also as I would be conducting semi structured interviews to with a series of open ended questions based on the topic area. I have a series on pre-defied question and in addition I would be having few on the stop questions as well. I have decided to go for open ended questions to have a healthy discussion between the researcher and the interviewer about the topic.



## 4.2 Data collection plan

Regardless of the topic of your thesis it is highly likely that at some point you will need to collect data. Below are some of the data collection methods.

- 1) Self-Report: It is the method where participants give their responses to a given set of questions.
- 2) Observation: It is a data collection method where researcher observes the participants from outside. This method lacks to get participants beliefs, feelings, thoughts etc.
- 3) Interviews: Under this method researcher meets with the participant one on one and asks open ended questions. Interviews questions can be structured or semi-structured.
- 4) Focus groups: This method is similar to interviews, but the only difference is it consists of multiple participants at the same time.

These methods are often represented as alternatives to conducting research, but they can also be seen supporting each other as both can be used for analyzing the material in a single research (Alasuutari, 2011, 32-33).

There are four main features of research design, which are distinct, but closely related.

- 1) Ontology. How you, the researcher, view the world and the assumptions that you make about the nature of the world and of reality.
- 2) Epistemology. The assumptions that you make about the best way of investigating the world and about reality.
- 3) Methodology. The way that you group together your research techniques to make a coherent picture.
- 4) Methods and techniques. What you actually do in order to collect your data and carry out your investigations.

(Easterby-Smith, Thorpe and Jackson. Management and Business Research)

### Process of qualitative data collection



FIGURE 19: PROCESS OF QUALITATIVE DATA COLLECTION. (BUCKNAM. NOTECODE CREATIVE. 2006)

### 4.3 Details of data collection

Any CRM system can have two users or organization's aspects. One is the customer service provider (CSPs) and second is the customer (end user). CSPs are the companies which are making the CRM products and end users are the companies using it.

Data collection for the empirical part of my study is collected via interviews. Interviews include personals of different levels of hierarchy in a telecommunication company as well as a product based company making softwares supporting telco business.

The reason for including two organizations is to get the picture from both sides of the coin. One is the organization which is selling telco as a service in both B2B and B2C mode and other which is providing service to world's leading telcos.

Reasons for using this format are.

- 1) This could give me rich and personal perspective about the topic.
- 2) Average duration of interview was 10-12 minutes.
- 3) Questions were semi-structured and open ended, with room for interviewee to think and provide his core opinion about the topic.
- 4) Interview was transcribed for analysis at the later stage.

#### **4.4 Description of the Customer Organization**

Customer that I have picked here is a well-known telecom provider of Finland. The telecom provider has a business across various lines of business from GSM post-paid, GSM pre-paid, fixed line, entertainment services, TV channel packages etc. Interviewees for the research are picked from various segments of the organization for top to bottom view about the topic. Interestingly for my research there can't be a better situation as the customer organization has few legacy CRM systems and a latest CRM software also implemented so the interviewees would be able to explain distinctly the latest features of CRM and how or how not it is helping the business. Outline of respondents from the customer organization are explained in figure 20 below.

#### **4.5 Description of the Customer Service Provider Organization**

CSP that I have picked here is a well-known customer service provider with customers across the globe. CSP has a range of telco related products and CRM system for both telcos and non-telcos. Reason for picking this CSP is to find out the perspective about my research by a global market leader for CRM systems. Outline of respondents from the customer service provider organization are explained in figure 21 below.

## 5 Analysis of data collected and Findings

After collecting the data next step would be to sample it on various grounds to achieve to a conclusion. This would be done under this section. Data analysis is a process used to inspect, clean, transform and remodel data with a view to reach to a certain conclusion for a given situation. (dissertationindia. 2013).

Data analysis is the process of bringing order, structure and meaning to the mass of collected data. It is a messy, ambiguous, time consuming, creative, and fascinating process. It does not proceed in a linear fashion; it is not neat. Qualitative data analysis is a search for general statements about relationships among categories of data. (Marshall and Rossman, 1990:111).

Data analysis is the process of analyzing all the information and evaluating the relevant information that can be helpful in better decision making (Sivia & Skilling, 2006)

Qualitative content analysis defines itself within this framework as an approach of empirical, methodological controlled analysis of texts within their context of communication, following content analytical rules and step by step models, without rash quantification. I will be using Inductive category development

Basic idea of content analysis is to preserve the advantages of quantitative content analysis for a more qualitative text interpretation.

Four advantages of content analysis.

- 1) Fitting the material into a model of communication: It should be determined on what part of the communication inferences shall be made, to aspects of the communicator (his experiences, opinions feelings), to the situation of text production, to the socio-cultural background, to the text itself or to the effect of the message.
- 2) Rules of analysis: The material is to be analyzed step by step, following rules of procedure, devising the material into content analytical units.

- 3) Categories in the center of analysis: The aspects of text interpretation, following the research questions, are putted into categories, which were carefully founded and revised within the process of analysis (feedback loops).
- 4) Criteria of reliability and validity: The procedure has the pretension to be inter-subjectively comprehensible, to compare he results with other studies in the sense of triangulation and to carry out checks for reliability. For estimating the inter-coder reliability we use in qualitative content analysis (in contrary to quantitative content analysis) only trained members of the project team and we reduce the standard of coder agreement.

## 5.1 Analysis

Analysis of the data would be done by first giving an outline of respondents of the research from customer organization.

Respondents	Work Place	Themes	Tool
<b>Business Manager</b>	Customer Organization	Perception of problem and views. High level management view about the research topic	Face to Face, Semi-structured Interviews with open ended questions
<b>Development Managers / Project Manager</b>	Customer Organization	Perception of problem and views. Mid-level management view about the research topic	Face to Face, Semi-structured Interviews with open ended questions
<b>Developer / Tester of the application</b>	Customer Organization	Perception of problem and views. Root level view about the research topic	Face to Face, Semi-structured Interviews with open ended questions
<b>CSR (End user of the application)</b>	Customer Organization	Perception of problem and views from the perspective of real users	Face to Face, Semi-structured Interviews with open ended questions

FIGURE 20: OUTLINE FOR PARTICIPANTS FOR QUALITATIVE RESEARCH FOR CUSTOMER ORGANIZATION.

Below is the outline of list of respondents from the service provider organization.

Type of Respondents	Work Place	Themes	Tool
<b>Business Manager</b>	Service Provider Organization	Perception of problem and views. High level management view about the research topic	Face to Face, Semi-structured Interviews with open ended questions
<b>Development Managers / Project Manager</b>	Service Provider Organization	Perception of problem and views. Mid-level management view about the research topic	Face to Face, Semi-structured Interviews with open ended questions
<b>Developer / Tester of the application</b>	Service Provider Organization	Perception of problem and views. Root level view about the research topic	Face to Face, Semi-structured Interviews with open ended questions

FIGURE 21: OUTLINE FOR PARTICIPANTS FOR QUALITATIVE RESEARCH FOR CSP.

## 5.2 Outcome of Interviews

Below section is used to go through the answers and match them to research and come up with the constructive analysis.

### 5.2.1 Answers of interviewees from Customer Organization

Interviewee from Customer Organization - Business Manager	
<b>Question 1</b>	It is able to, but the organization is not mature enough to utilize all its capabilities
<b>Question 2</b>	CRM is now the master of a lot of things and is affecting most of its downstream systems. New CRM is affecting even non-IT departments.
<b>Question 3</b>	Currently the organization is not using it much. Social media interactions of the customers or many more out of features are also not used.
<b>Question 4</b>	Along with the support people need to learn. Currently the Organization is in a mode of shift from old to new CRM. But people are giving some resistance to use the new features.
<b>Question 5</b>	Not doing enough to utilize even Out of box features.

FIGURE 22: RESPONSE OF INTERVIEWEE FROM CUSTOMER ORGANIZATION - BUSINESS MANAGER



Interviewee from Customer Organization - Development Manager	
<b>Question 1</b>	Multiple CRM systems were a bottle neck. By consolidating them to a single CRM system and with the feature of own API layer now any system can directly get the data from the CRM system. This is aligned with the company's goals.
<b>Question 2</b>	For IT and business, now CRM can be one master data bank. This makes life easier for most of the departments
<b>Question 3</b>	Cloud based CRM brings cost effectiveness by reducing the cost of hardware, reducing cost of upgrades and operational cost This is much more efficient then in-premise solution.
<b>Question 4</b>	CRM system has a lot of features, we just need money to customize them as per our requirement.
<b>Question 5</b>	For IT people it is easier to understand the benefits, but end user need to be trained and motivated for the change.

FIGURE 23: RESPONSE OF INTERVIEWEE FROM CUSTOMER ORGANIZATION - DEVELOPMENT MANAGER

Interviewee from Customer Organization - Developer / tester	
<b>Question 1</b>	It is supporting the goal but not completely as the CRM is still in the development phase.
<b>Question 2</b>	The business has expanded with the CRM system.
<b>Question 3</b>	CRM is currently for the sales purpose only but not really utilizing internet as a service.
<b>Question 4</b>	Not yet.
<b>Question 5</b>	In future maybe business can analyse the usage of a product to make it better.

FIGURE 24: RESPONSE OF INTERVIEWEE FROM CUSTOMER ORGANIZATION – DEVELOPER / TESTER

Interviewee from Customer Organization - CSR (Actual user)	
<b>Question 1</b>	In the current implementation of CRM system is not capable of supporting all type of telecom business, with the current implementation it can support broadband, office 365 and regular sales product. Capabilities like GSM are part of the future roadmap.
<b>Question 2</b>	With current implementation CRM is affecting each and every department of the organization.
<b>Question 3</b>	Existing CRM system is not capable enough to support internet as a service. There is an in-house implementation to handle a bit of this. E.g. If an SME (Small to mid-level enterprise) is using specific services, it could suggest appropriate plans to it.
<b>Question 4</b>	No it is not aligned.
<b>Question 5</b>	Organization has a road map to use the capabilities of big data and internet more and more to enhance customer experience. But in current implementation it is not in use.

FIGURE 25: RESPONSE OF INTERVIEWEE FROM CUSTOMER ORGANIZATION – CSR / ACTUAL USER

## 5.2.2 Answers of interviewees from Service Provider Organization

Interviewee from Service Provider Organization (Business Manager)	
<b>Question 1</b>	<p>Actually the current CRM system is supporting the telecom business in every aspect. But it is an older implementation and not up to date with the latest technologies.</p> <p>From business point of view, it supports every activity related to telecom.</p>
<b>Question 2</b>	<p>Customer has an in-house self-service portal, designed around this approach. It fetches customer data from current CRM system and uses Internet as a service to enhance customer experience and provide them customer specific campaigns.</p>
<b>Question 3</b>	<p>Not with the current implementation, but newer version has the capability to use big data.</p>
<b>Question 4</b>	<p>Vendor should propose the newer version to the telecom providers so that they can also be up to date with the latest market trends.</p>

FIGURE 26: RESPONSE OF INTERVIEWEE FROM SERVICE PROVIDER ORGANIZATION – BUSINESS MANAGER

Interviewee from Service Provider Organization (Development Manager)	
<b>Question 1</b>	CRM system which is in place was created with keeping in mind all possible business flows of the telecom industry few years back. But telco has evolved from just a fixed line and mobile subscription provider to all sorts of entertainment services provider as well. So current version of CRM is not supporting the evolved telco, but the latest versions of CRM system that the service provider has supports all types of telecom business.
<b>Question 2</b>	Current CRM system is not but the latest digital orientation and additional capabilities which are still in development above the traditional CRM layer do promise to use the power to internet in every aspect.
<b>Question 3</b>	Current CRM system is not aligned with it.
<b>Question 4</b>	The organization should realize the power of big data and the power of internet and soon provide an end to end CRM solution which uses these to enhance customer experience.

FIGURE 27: RESPONSE OF INTERVIEWEE FROM SERVICE PROVIDER ORGANIZATION – DEVELOPMENT MANAGER

Interviewee from Service Provider Organization (developer / tester)	
<b>Question 1</b>	<p>CRM help organization by storing and managing customer information and provide organization a sales opportunity. Organization can have 360 view customer in order to help, resolve customer need faster. CRM provide 360 view data in Telco industry where all department can view the customer information as per their requirement. E.g.: account department can see payment history, billing department can see invoice etc.</p>
<b>Question 2</b>	<p>Telco org using internet to market their product and give end user /subscriber various offering where user can decide their need. Also Telco can suggest what customer need based on previous usage (e.g. calls or data plans used).</p>
<b>Question 3</b>	<p>No, Big data analysis of customer data yet not implemented.</p>
<b>Question 4</b>	<p>Multichannel / Omni channel gives power to CRM system to give end user /organization flexibility and various point of sales opportunity.</p> <p>Telco can harness the various module of CRM like sales, support, interaction manager in order to maximize the sales and retain the existing customers.</p>

FIGURE 28: RESPONSE OF INTERVIEWEE FROM SERVICE PROVIDER ORGANIZATION – DEVELOPER / TESTER

## **6 Conclusion**

In this chapter I would be presenting the outcome of the research and how are they aligned with the research questions. As I conducted my research from two aspects, first the telecom organization which is using the CRM system of a service provider and in a transformation project to move from legacy CRM systems to a new CRM system and second a service provider organization which provides telecom related solutions to the telecom provider including CRM systems.

### **6.1 Answers of my research questions from Customer Organization perspective.**

Research Question 1: How does CRM system support business in telecom domain?

CRM can be considered as a back bone of any business as it holds all your customer data. As per most of the interviewees from the customer organization it was quite evident that the old CRM system which was serving all kinds of business needs are getting outdated. As stated due to multiple CRM systems, most of customer data was in silos and not usable. Cost of operating and maintaining various CRM systems was more. Consolidating data from multiple legacy systems to one new smart CRM system looks the way forward from the organization, but at the same place this is a big shift for people. Organization is still learning and exploring the capabilities of the new CRM system. To customize the available features as per the organization's business is also a challenge and adding on cost of training the people also needs to be considered. But one thing is quite clear that these are early stages of the implementation, but the people are quite confident that this new CRM system would be able to serve and support all the lines of business of the organization. Additionally the new CRM system is supposed to affect even the non-IT departments of the organization and this complete digital transformation is already becoming challenging for some other people in the organization.

Low operating and software upgrade cost was also a big plus which was highlighted by the interviewees. Being on cloud the hardware cost is also low. All these factors are quite promising that the new CRM system not only supports the telecom business of the organization, but it brings additional value to the organization and help them achieving their goals.

Research Question 2: How is Internet supporting CRM system to enhance customer experience?

According to most of the interviewees, they are quite confident that the CRM system is capable of using internet to enhance customer experience. It is only a matter of time that the implementing team and business managers learn about the available features and start using them. But a concern was also raised that all the great features come with a price and the organization first wants to implement the basic features so that business can operate efficiently and then with additional funding they would be exploring the features that are using Internet as a service to enhance customer experience. Overall two main points were raised, the lack of knowledge about the new product and organization's zeal to quickly learn new thing and implement. Overall to support business the best, it requires a change in attitude and a lot of home work by the organization.

Research Question 3: How is big data supporting the concept of Internet as a CRM system itself?

Organization seems to have a road map to start using big data supported capabilities within the CRM system, but they are not currently implemented. Even some out of box features which just need to be customized are not utilized to the full extend. Here another finding was done. It is not only about the CRM system, it is also about the people. Organization has various lines, people from IT understand the benefits but various non-IT departments are taking more time in adapting to this change. This is also a big enough reason for the slow pace in utilizing the big data related features of CRM.



## **6.2 Answers of my research questions from Service Provider Organization perspective.**

Research Question 1: How does CRM system support business in telecom domain?

Here the interviewees were quite aware that the implementation here is not the latest one. Even the service provider organization has new versions already available in the market. But actually the current CRM system here is supporting the telecom business in every aspect. As it is an older implementation it is not up to date with the latest technologies.

CRM system which is in place was created with keeping in mind all possible business flows of the telecom industry few years back. But telco has evolved from just a fixed line and mobile subscription provider to all sorts of entertainment services provider as well. So current version of CRM is not supporting the evolved telco, but the latest versions of CRM system that the service provider has supports all types of telecom business. CRM help organization by storing and managing customer information and provide organization a sales opportunity. CRM provide all customer related information in one view for Telco industry where all department can view the customer information as per their requirement. E.g.: account department can see payment history, billing department can see invoice etc.

Research Question 2: How is Internet supporting CRM system to enhance customer experience?

Features of internet being utilized by CRM system is not in place with the older version. To cover that an in-house system was created to serve exactly the same purpose. Currently this tool extracts all customer related information and is capable enough to analyse and suggest some Small to mid-size (SMEs) about their usage plans and even offer campaigns to them.

Research Question 3: How is big data supporting the concept of Internet as a CRM system itself?

Big data was not in place when this CRM system was implemented so it is can't be used with this CRM system. The latest versions of CRM available by the service provider organization has the features of creating a data lake and utilize big data to the fullest and enhance customer experience.

### 6.3 Discussion and personal reflection

Telecom companies are not going through the best of their times. Below figure supports the same. It clearly says that average ARPU is on a decline across the world.

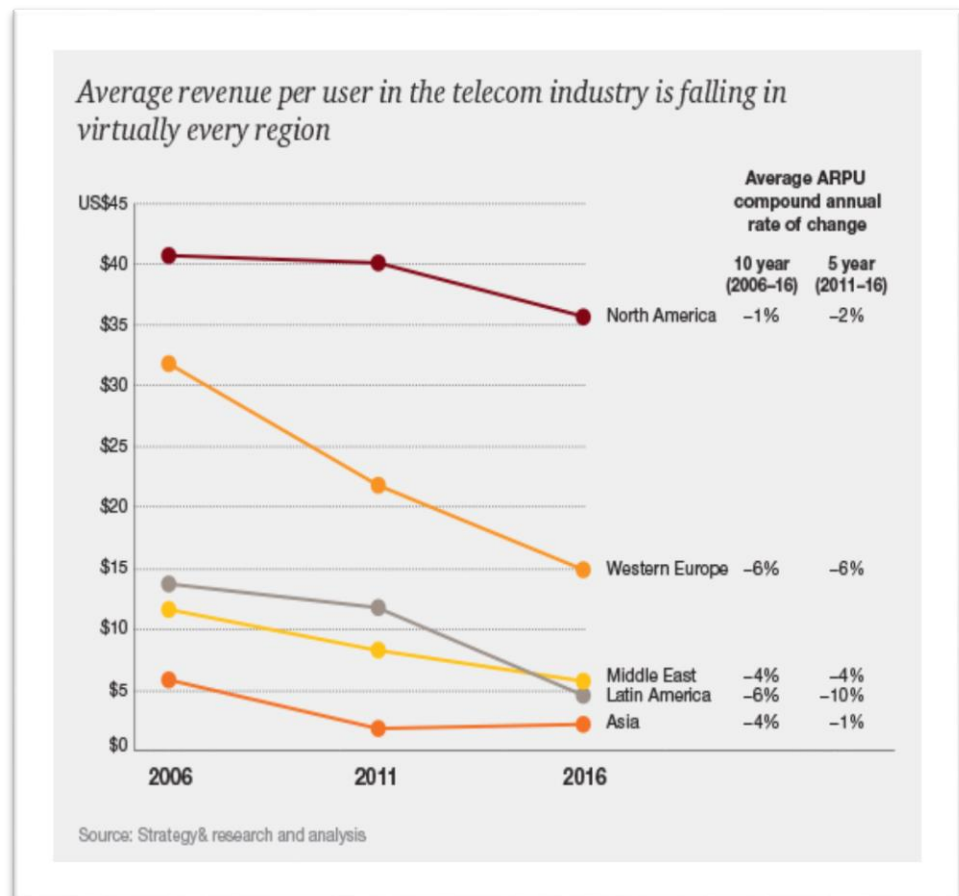


FIGURE 29: AVERAGE REVENUE PER USER IN TELECOM IS DIPPING (BAHJAT EL-DARWICHE, PIERRE PÉLADEAU, CHRISTINE RUPP, AND FLORIAN GROENE. STRATEGYAND.PWC 2017).

Telecom companies fighting for their survival. Now in this situation for telecom provider only way ahead is by looking for more opportunities to use customer data to generate new avenues of earnings and keeping the customer intact by providing him a good customer experience. In both the cases existing customer data is a key and thus we see such a trend in telcos also these days to try and monetize from the customer data. Not only this, telcos are exploring various other line of business.

For any telco there are 3 core elements of business.

- 1) Network: The network across which communication is carried out. Talking about Finland, this is already at its best. Telcos have invested enough to support the subscriber base.
- 2) IT systems running behind like the Operational support systems (OSS) and Business support systems (BSS).
- 3) Lines of business like Residential or Corporate.

From these 3 digitalization is needed around the BSS stack the most. This is where the customer data lies. It is high time to understand the customer, analyse him as an individual entity and provide them customized services.

To summarize from my point of view there is still a long road for CRM to be able to utilize all the data that they have. It is too early and technologies around big data are still not mature enough in telcos. Even the CSPs are learning and exploring the possibilities that big data and internet can provide.

But undoubtedly telcos are investing in big data and related technologies. So far the results look hazy but that seems to be future.

Below is one research from McKinsey which shows how various telcos are investing in big data.

Among telecom companies that invested in big data, only a few enjoyed an incremental profit impact exceeding 10 percent.

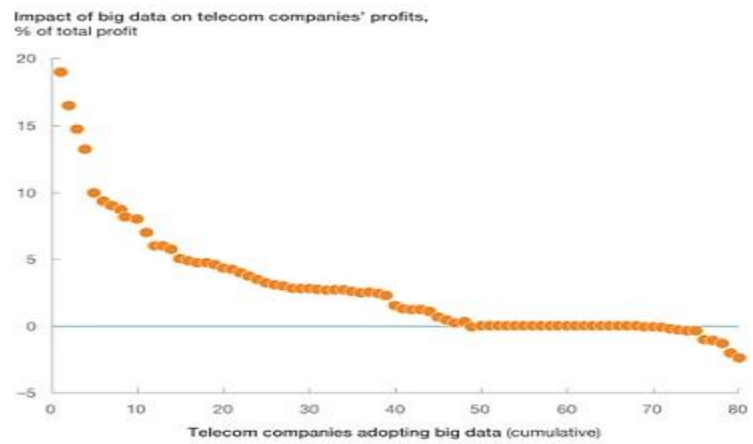


FIGURE 30: TELCOS: THE UNTAPPED PROMISE OF BIG DATA. (MCKINSEY QUARTERLY JUNE 2016)

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## 8 Appendixes

Below is the list of items in the appendix.

### 8.1 Appendix 1: Interview Questions for Customer Organization

Interview questions have been kept same for everyone in the organization so that analysis can be done on the basis of same questions.

Q1. Do you think your CRM system is supporting the goals of the organization?

Q2. How is your CRM system affecting the work in other departments of the organization?

Q3. How is your organization using Internet as a service in your CRM system to enhance customer experience?

Q4. Do you have enough support in your organization to analyze data in your CRM system?

Q5. In your opinion what should your organization do to use Internet more in your CRM system?

## **8.2 Appendix 2: Interview Questions for Service Provider Organization**

Interview questions have been kept same for everyone in the organization to that analysis can be done on the basis of same questions.

Q1. Do you think your CRM system is capable enough to support all types of telecom business?

Q2. How is your organization using Internet as a service in the CRM system to enhance customer experience?

Q3. Is your CRM system aligned with the latest big data capabilities?

Q4. In your opinion what should your organization do to use Internet more in your CRM system?