DATA INTEGRATION USING e-CRM (ELECTRONIC CUSTOMER RELATIONSHIP MANAGEMENT)

1 Overview

The health relationship between customer and organization results in high satisfaction rates of customers towards the organization. All business focus on developing and enhancing this relationship because customers are the ones who keep the business running (Jayanthi & Vishal, 2009) [1]. The competitive advantage of an organization can be achieved with customer satisfaction with the help of customer relationship management. (Nguyen et.al., 2007; Dean et.al., 2008) [2-3]. All the business enterprises are would like to have good relationship and communicate with their customers they choose e-CRM(electronic Customer Relationship Management). Many business enterprise are customizing their goods according to customer requirements. With the help of e-CRM business to understand customer behaviour and forecast customer needs through online activities and able to improve long-run profitability (Christopher et.al., 1991 cited in Aileen, 2006) [4].

The interaction between customer and service can be achieved with the help of e-CRM Dotan (2008) [5]. To retain the profitable customer is one of the main aspects of using e-CRM. In addition to that, e-CRM is able to create loyalty and extent customer life cycle by increasing customer value and satisfaction (AvJill, 2001; Ravi and Macia, 2001) [6-7].

The relationship created through e-CRM can help organization maintain their profitable customers and also create loyalty among customers. The three main factors in the e-CRM processes are strategy, technology and people. Because the purchase behaviour is based on the satisfaction of customer needs, hence the marketing manager should be able to communicate and show how their products and services can satisfy the needs of their target customers (Stanton et.al., 1994; Eric & Jerry, 2001) [8-9]. Technical institutions in India like to have a close contact with the stakeholders such as Students, Administrators, Faculty Members, Donors, Institution and Alumni for their sustainability in the global market to attracting and retaining the valuable customers they are attracted towards e-CRM solutions so that they can reach the highest customer satisfaction. This strategy help the institutions to attract, retain

and get the maximum profit from the customers so that they can sustain in the competitive market.

CRM Background

Customer Relationship Management (CRM) is an integration of business processes and technologies which is used to satisfy customers needs (Ranjit, 2002; Dotan 2008; Jayanthi & Vishal, 2009) [10, 5, 1]. It is processes that collects customers' information and applies those data in marketing activities (Ron, 2001) [11]. The Internet capabilities and software can help organizations manage relationship with their customers through CRM (Xu et.al., 2002 cited in Dotan, 2008) [39, 5]. The CRM becomes an important factor in business strategies, processes, and information technologies which enable organizations to maximize profits and increase customers' satisfaction and needs. Its process permits organizations to analyze customer data rapidly while improving customer loyalty via their products (courses) and services (Liu, 2007; Darrell et.al., 2002) [12-13].

Electronic Customer Relationship Management (e-CRM)

Background:

To enhance the relationship between customer and organization, Electronic Customer Relationship Management (e-CRM) which is referred to the marketing activities, tools and techniques via the Internet network is used. (Lee-Kelley et.al., 2003 p.241) [14]. Bradway and Purchia (2000) [15] mentioned that e-CRM is the intersection between Internet market and customer-centric strategies. It is sometime referred to web-enabled or web-based CRM (Aileen, 2006) [4]. e-CRM to support the multiple electronic channels to contact and communicate with its customers (Bernett & Kuhn, 2002) [16]. As CRM, e-CRM objective is to gather information from customers and adjust service level to match with specific needs which will able to enhance customer relationship (Jerry & Nicholas, 2006, p.23) [17]. The organization uses e-CRM to enable specific products and services to reach customer through Internet (Schneider, 2004; Hugh et.al., 2002) [18-19]. This is one of the opportunities that organizations received because it can retain profitable and valuable customers by fulfilling their requirements (Ing-long & Ching-Yi, 2009) [20]. Customer satisfaction, customer retention and customer loyalty are three significant components of customer

relationship that organization wants to achieve significant goals of CRM (AvJill,2001; Mohamad & Ning, 2005) [6, 21]. The first paradigm shift from old economy to new economy primarily addressed the mechanics of business operations and supporting technologies. The second paradigm shift and the one that many businesses fail to make is to address the relationship between businesses and the customers they serve; that is the shift from customer relationship to the new paradigm e-CRM. In today's competitive arena the market dynamics which institutions must address in order to survive and prosper are a) newly empowered customers who choose how to communicate with the institutions, b) consumers who expect a high degree of personalization, c) emerging real time, interactive channels including email, web, ATMs and call centre that must be synchronized with a customer's non-electronic activity. The business change requires flexibility and rapid adoption to technologies. Though the core of e-CRM remains to be across channel integration and optimisation.

Electronic Channels: The electronic channels such as the web and personalised e-messaging have become the medium for fast, interactive and economic communication, challenging companies to keep pace with this increased velocity

Enterprise: With the help of e-CRM a company gains to touch and shape a customer's experience through sales, services and the organization need to understand and assess customer behaviour.

Empowerment: The strategies of e-CRM must be structured to accommodate consumers who are having the power to decide when and how to communicate with the organization/institution. An e-CRM solution must be structured to deliver timely pertinent, valuable information that a consumer accepts in exchange for customer attention.

Economics: The strategy of e-CRM ideally should concentrate on customer economics, which has asset-allocation decisions, directing individuals to likely to provide the greatest return on customer-communication initiatives.

Evaluation: To understand the customer economics relies on organization ability to attribute customer behaviour to market programs, evaluate customer interactions along various customer touch point channel, and compare anticipated ROI against actual returns through customer analytic reporting.

External Information: The e-CRM strategy should be able to gain and leverage information from such sources as third party information networks and web page profiler application.

The e-CRM must address the stakeholders optimization along three dimensions are acquisition, expansion and retention. Any e-CRM solution should also establish a central mechanism to determine which customer should receive what information with type relationship level.

1.1. e-CRM Architecture

The Institution should develop a Connected Enterprise Architecture (CEA) within the context of the institution's and its own Customer Relationship Management Strategy. The following set of technical e-CRM capabilities and applications that collectively and ideally comprise a full e-CRM solution. They are:

- Customer Analytic Software.
- Data Mining software
- Campaign Management Software.
- Business Simulation software.
- Real Time decision engine.

The Customer analytic software predicts and interprets the customer behaviour allowing organizations to understand the effectiveness of e-CRM efforts in both inbound outbound channels. Most importantly, customer analytic should integrate with customer-communications software to enable organizations to transform customer findings into ROI-producing initiatives.

Data mining software builds predictive models to identify customers most likely to perform a particular behaviour such as purchase an upgrade or churn from the company. Modelling must be tightly integrated with campaign management software to keep pace with multiple campaigns running daily or weekly basis.

Campaign management software leverages the data warehouse to plan and execute multiple, highly targeted campaigns overtime, using triggers that respond timed

events and customer behaviour. This software tests various offers against control groups, capture promotion history for each customer and prospect, and produces output for virtually any on-line or off-line customer touch point channel.

Business simulation used in conjunction with campaign management software optimises offer; messaging and channel delivery prior to the execution of campaigns, and compares planned costs and ROI projections with actual results.

A Real time decision engine co-ordinates and synchronizes communications across disparate customer touch point systems. It has business intelligence(BI) to determine and communicate the most appropriate message, offers, and channel delivery in real time. It also supports two-way dialogue with the customer.

Regardless of the type of the business the organizations should follow the basic e-CRM tenets cross channel co-ordination, warehouse-centric customer profiling, personalization, permission marketing and consistent and continuous measurement and assessment can achieve considerably higher response rates and ROI on marketing programs.
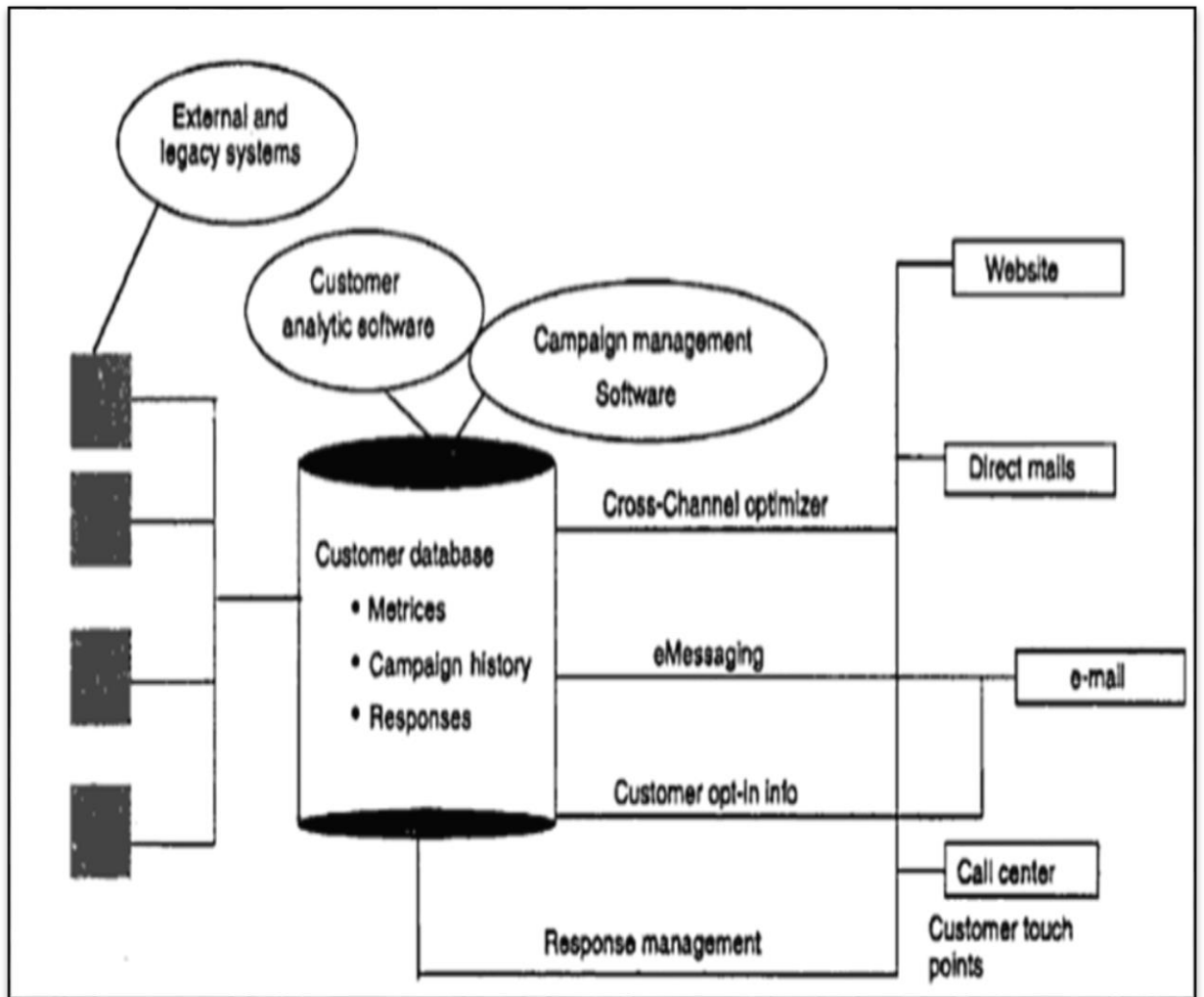
Fig.1. Architecture of an e-CRM solution

1.2. e-CRM Components

The components of e-CRM and the purpose of these components in the functioning of the business are shown in Table 1 with emphasis on the enabling technology to support e-commerce, e-marketing, e-shipping and e-care.

Table 1 : Components of e-CRM

Components	Purpose	What does it do			
Presentation Layer	Customer facing web site	Look and feel, site navigation, wireframes			
Tools and Applications	Enabling technology to support eMarketing, eShopiing, eCommerce and eCare	**e-Marketing**	**e-Shopping**	**e-Commerce**	**E-Care**
		Web content personalization merchandizing catalog admin	Product configurator shopping cart customization	Order Mgmt, Authorization payment processing tax calculation billing	Collaboration co-browsing , Chat, Email, FAQ
Business rules	Business automation	Documenting business rules for automation			
Measurement Analysis and Reporting	Continuous monitoring and improvement	Measurements and reporting tools, metrics, analytics, database, reporting database.			
Real-time information data	Capture, storage and dynamic access to real-time information.	Product, catalog, pricing, financial systems, OLTP (Real-time)			
Backend data information	Integration with backend with legacy system	Inventory, operational DB, accounting, supply chain, supply financial chain.			

There are five e-CRM components they are:

- Customer Centric Information Store.

- Analysis and Segmentation Engine

- Personalization Engine

- Broadcast Engine

- Transaction Engine

These above five components together provide the platform for an e-CRM business process. Without these five engines, e-CRM is not a scalable, defensible business proposal practice for an organization.

The Customer Centric Store – It provides the 360-degree of customer view. A customer centric information store integrates data from different information sources such as web sites, transactional system and operational databases, call centres, enterprise resource planning systems and third party data. This engine enables organization to recognize and respond accurately to customers. Such an information store should be scalable, flexible and give high performance.

The Analysis and Segmentation Engine – Building trusted customer relationships depend on accurate customer segmentation. It performs business analysis, segmentation and prediction so that customer interactions take place in an appropriate and personalized manner. e-CRM lacks the intelligence to be effective even if it has massive volumes of customer-centric information without this engine.

The Personalization Engine - This makes it possible to personalize products and services for customers in a cost-effective manner, by lowering the marginal cost of personalization. Most organizations provide personalized attention to a small group of clients who are "worth it". Personalization that relies on static information about customer transactions.

The Broadcast Engine – This engine enables 24/7 customer interaction. Successful e-CRM requires an engine that reaches millions of customers wherever they are. A scalable Broad Cast Engine that is built on a open architecture and supports all communication devices enables this level of customer interaction.

The Transaction Engine – Interactions lead to trusted relationships. It promotes information exchange between every customer and the enterprise. This engine maintains customer contact and transmits information to the Customer-Centric Information Store for later use.

1.3. e-CRM Framework

The studies (Brancheau, Janz & Wetherbe, 1996; Neiderman, Brancheau & Wetherbe, 1991; Brancheau & Wetherbe, 1987; Dickinson, Leithesier, Wetherbe & Nechis, 1984; Ball & Harris, 1982; Martin, 1982) [22 -27] have shown that the data is the top

priorities for information services (IS) executives. External data refers to data that is not generated by systems within an organization, such as government census data, industry benchmark data, consumer psychographic data and economic data. If this data is collected, integrated and formatted properly, it can prove to be immensely beneficial to the organization in better understanding its customers (Rendlemen, 2001) [28]. External data should be leveraged in a CRM system that adds additional value with the existing internal organizational data.

The recent studies have shown favorable CRM outcomes with data integration. The main barriers in implementing and maintaining successful CRM Projects are the Technical issues such as capturing the wrong customer information, using misleading metrics and underestimating the difficulties involved in data mining, data cleansing and data integration. (Jain, Jain & Dhar, 2007; Kale, 2004; Missi, Alshawi & Fitzgerald, 2005) [29 – 31].

Organizations collect data from various marketing channels and the data is managed separately and maintained in its own system in their own format (Eckerson & Watson, 2001; SAS Institute, 2001) [32–33]. Technically the data integration can be defined as the standardization of data definitions and structures through the use of a common conceptual schema across a collection of data sources (Heimbigner & McLeod, 1985; Litwin, Mark & Roussopoulos, 1990) [34-35]. The data is accessible across functional areas, making data in different corporate databases accessible and consistent (Martin, 1986) [36]. If these issues are addressed, an organization must present the data in a way that is consistent and conducive to viewing across heterogeneous enterprise departments (Johnson, 2000) [37].

A recent report from Forrester Research (Ostrow, 2009) [38] forecasts interactive marketing (which includes mobile marketing, social media, email, display advertising and search marketing) to grow over the next five years. Of these online mediums, the social media marketing is projected to grow at an annual rate of 34% —from $716 million in 2009 to $3.1 billion by 2014. By then, social media will be a bigger marketing channel than both email and mobile, but only a fraction of the size of search or display advertising ($31.6B and $16.9B, respectively). Consequently, some of this growth comes at the expense of offline advertising. Forrester estimates that

online advertising will grow from 12% of total marketing spend in 2009 to 21% by 2014, thereby reducing the amount spent on offline advertising.

More than half of total retail sales will be affected by the web i.e. the consumer will do product research or contact customer service (Engleman, 2010) [39]. To minimize these marketing costs, organizations should concentrate on satisfying and serving existing customers and understanding the engagement of those customers with their companies (Johnson & Davis, 2009) [40]. The above findings suggest that if organizations wants to compete in now-a-day's marketplace and increase profitability in the coming years, they need to go beyond web cookies and meta-tags— organizations/institutions need to build an integrated offline and online customer profile.

To realize measurable business value, organization must be able to combine physical resources (such as computers and networks) and informational resources (online and offline customer databases, call records, email correspondence and other customer service interactions) in their CRM systems (Foss, Stone & Ekinci, 2008) [41]. With today's ever demanding customers communicating through multiple marketing channels, organizations must be prioritize the customer preferences to optimally manage their delicate yet to maintain vital relationship with them.

More value for the organization can be generated through integrating online data with data from the organizations offline operations Timeliness of data is an important component of user satisfaction (Doll & Torkzadeh, 1988; Ballou, Wang, Pazer & Tayi, 1998; Adams & Song, 1989) [42-44]. Organizations need to have up-to-date/real time information about customers' needs and preferences (Swift, 2002) [45] to thoroughly understand and satisfy customer.

The book entitled *Web Farming* (1998), Richard Hackathorn [46] informs that organizations must integrate external data into their data warehouse to gain a complete picture of its business.

In many of the instances, organizations focus their limited resources on their core competencies and outsource many remaining business functions, sometimes retaining the services of application service providers (ASP) and specialized hosting partners to

manage online and ecommerce functions (Eckerson & Watson, 2001) [32]. The collaboration and integration of systems and data from multiple functional areas is complex and difficult. A prior Data Warehousing Institute Industry Report (Eckerson & Watson, 2001) [32] found that organizations are challenged when integrating web technologies into their existing legacy and IT systems. Some of the challenges scalability issues, managing large click stream databases, immaturity of technology, lack of experience, and the complexity of modeling web data for analysis.

Any CRM initiative, an enterprise-wide, customer-centric data repository should be utilized rather than a channel specific data repository (Beck & Summer, 2001; Swift, 2002; Johnson, 2000) [47, 45, 37]. Vasset (2001) [48] suggests an enterprise-wide, customer-centric data warehouse should be the foundation. The Data Warehousing Institute (TDWI) has defined unified data management (UDM) as a best practice for coordinating diverse data management disciplines and aligning them to business goals. The two benefits of organizations that practice UDM are better business decisions and better data quality (Russom, 2010) [49]. Deploying an enterprise-wide data warehouse as the CRM backbone will lead to better customer insight, thus creating more value for the company.
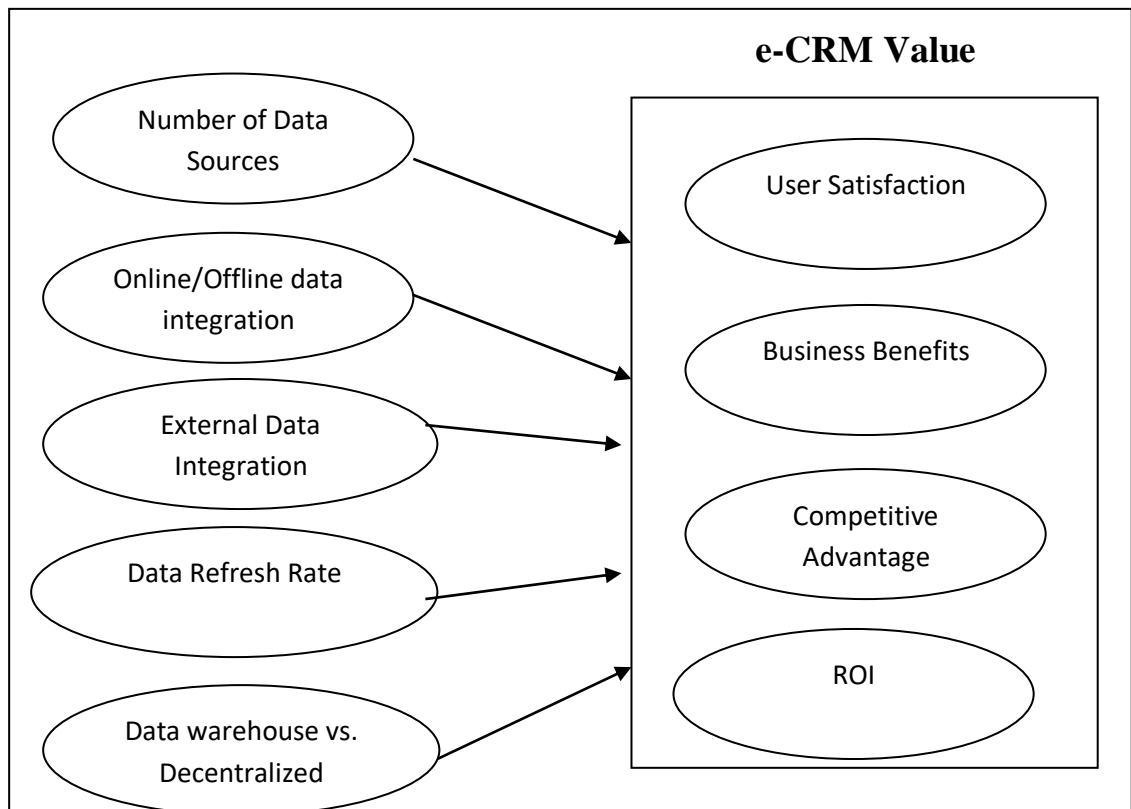

Fig. 2 : e-CRM Value Framework

Research in customer relationship management is growing as it gains the researchers attentions in diverse disciplines. Even though the complexity of the issues involved in data integration, the enormous benefits that electronic customer relationship management can offer, and the role data integration plays a vital role in achieving e-CRM's goals.

The data warehouse should contain all the online and offline data and external data also (Figure 2). This architecture in place, companies are able to achieve greater profitability by obtaining a better understanding of its customers and its relationships with them in all the directions. The above e-CRM value framework will definitely help to better examine the significance of integrating data from all customer touch-points with the final intention and goal of improving customer relationships and creating additional value for the firm, ultimately leading to a competitive advantage.

1.4. Data Integration using e-CRM

In today's globally competitive market place, organizations of all sizes can no longer ignore the value of business intelligence (BI) technologies and the competitive advantage they offer through optimal, or at the very least enhanced, decision making. These decision support technologies provide business value by discovering analytical insights and incorporating them into organizational processes. This value creation process requires the integration of various technologies and data—a challenging and complex endeavor for even the experts. Although we have a growing arsenal of robust programming APIs along with web-based data standards and universal communication protocols, many technologies remain disjointed. From search engines results and social networks to XML data sources to data warehouses and government databases to software-as-a-service (SaaS) applications hosted in the "cloud" in geographically dispersed data centers, the integration of these technologies to improve decision making is a growing but necessary challenge in creating business value (Kavanagh, 2009) [50].

The trends of the yesterday are recurring today as organizations continue to leverage their data resources by developing and deploying data mining technologies to enhance their decision-making capabilities (Eckerson & Watson, 2001) [32]. To address this, organizations are implementing organizational data mining (ODM) technologies,

which makes data into valuable and actionable knowledge to gain a competitive advantage (Nemati & Barko, 2001) [51]. ODM spans a wide array of technologies, including but not limited to e-business intelligence, data analysis, CRM, predictive analytics, dashboards, web portals, etc.

These marketplace trends, organizations must begin implementing customer-centric metrics against the old idea of product-centric metrics (Cutler & Sterne, 2001) [52]. This has triggered increased interest in the implementation and use of ODM technologies such as CRM systems. CRM can be defined as the adoption of enabling technology, of customer-focused sales, marketing, and service processes (Forsyth, 2001) [53]. The vendors of CRM are labeling these packages as CRM systems because their main goal is to analyze customer behavior and identify actionable patterns. This information will be used to improve goods/services offered to customers.

Research in CRM suggests that as little as a 5% increase in retention can provide a 95% boost in profits, and repeat customers generate over twice as much gross income as new customers (Winer, 2001) [54].

Most organizations as well as educational institutions now realize the values of collecting customer data but are faced with the challenges of using this knowledge to create intelligent pathways. These technologies also enable companies to maintain customer privacy and confidentiality. By integrating these data mining tools with CRM software, organizations are able to analyze very large databases to extract new customer insights for stronger and more profitable relationships with the customers.

During the earlier research we found that in order to understand online customers, a company must integrate its data from both online and offline sources (Mena, 2001) [55]. More recent research (King & Burgess, 2008; Chen & Chen, 2004) [56, 57] has also concluded that system and data integration are critical success factors in e-CRM and CRM initiatives.

2 Business Intelligence and e-CRM

Educational institutions throughout the world are undergoing drastic fundamental shifts in how they operate and interact with their "customers" i.e. students, alumni, donors, faculty members, and staff members. The architecture of BI consists of a data warehouse (or one or more data marts), which collects and consolidates data from several operational databases, and serves a variety of front-end querying, reporting, and analytic tools. The back-end of the architecture of BI is a data integration pipeline for integrating the data warehouse by extracting data from distributed and usually heterogeneous operational environmental sources. Cleansing, integrating and transforming the data; and loading it into the data warehouse.

The customers should be contacted through either with the help of web-site, e-mail, phone, fax or other media to get the information about the technical institutions. If the customers do not respond with the above are contacted with follow-up e-mails.

The following customers/stakeholders are contacted with either one of the above media's and the data was collected. The individual data marts are maintained pertaining to Students, Administrators, Faculty Members, Advancement and the institution. Finally the data marts are integrated together to create final technical institutions database.

The categories of different types of CRM information resources are i) content data ii) contextual data and ii) analytical data. Each category requires different tools and methods for the appropriate management and use within your CRM strategy. It is the effective integration of information across these resources that will drive your CRM strategy development and related business intelligence processes. As a result, it is important aspect to know the fundamental differences in information resources and their roles within an overall CRM strategy. (Table 2).

Table 2: Business Intelligence for CRM

Content	Context	Analysis
Action	Nuance	Meaning
Event-oriented	Conditions	Trends and Comparisons
Who, What, When, Where	Environment	Impact
Capture	Relationship	Predictability

Content Data

The content data comprises of all data captured about individual events and customer encounters. Content information essentially records the details, or facts, of customer encounters - who, what, when and where. This fact-based information reflects an activity that has occurred. The content-oriented information includes direct sales encounters, customer calls to the contact center and Web service interaction.

Contextual Data

Contextual data refers to the *conditions* under which an individual event or customer encounter occurs. Contextual information enhances the knowledge of basic encounter content data by providing a more detailed view of the conditions of an encounter.

In addition to customer encounter (or fact), contextual data includes a broader representation of information that might have influenced the customer's behavior during the encounter. One thing to remember is the contextual information often changes over time. Thus, it is important to maintain records of customer contextual information that reflect both the current context, such as a customer address or buying propensity, as well as the historical context, such as prior demographics. This combination of current and historical data enables effective analysis of customer relationships and trends over time.

Contextual information involves leveraging such internal and third-party information as customer demographics, related marketing and event campaign details, and customer historical behaviors such as buying trends and customer service interactions.

The integration of information content and context drives analytic applications, which evaluate the relationship of encounters under various contextual circumstances to identify predictable trends in customer behaviors. The output of this can be incorporated in to business intelligence process.

Analytical data includes customer-buying propensity by geography and other demographics, customer service preferences by channel and customer type, and customer profitability by longevity and other demographic categories.

3 Conclusion

There several different ways that institutions offering technical education can improve their e-CRM to enhance the customer relationship. Firstly, institutions should understand what the key factors are, their significance and characteristics. Secondly, they must understand the relationship and relevancy of those key factors. Implementation of e-CRM is very important in the early stage because its outcome has a great impact on e-CRM operation. Technical Institutions should provide an efficient network facilities as well as IT facilities which will support e-CRM. In present scenario, e-CRM technologies must be one of priorities that the organizations should consider. This is because e-CRM is the system that runs 24x7 operations and if it falls, it can cost some loss to organization.

Once integrated, these unified customer view provide the entire organization with the ability to drive meaningful business action within and across operations systems. While building and managing a unified customer view across disparate data source, applications and channels have often proved to be a complex and costly exercise. A neutral, metadata driven, rules-based approach to building a open customer hub can make the process much easier.

Technical institutions are always striving to more efficiently enrol, retain and graduate students. On top of these standard priorities, the ability to share student data to external constituencies compounds the complexity of their IT challenge. Faster access to enrolment information, consolidating different records of students' information such as attendance, grades and documented special needs can provide a single view of actionable consolidated data. Unfortunately, most of the technical

institutions are facing the problems to deliver the consolidated view. The factors affecting the technical institutions are a) lack of data availability b) budget and resource constraints, c) strategic considerations, d) duplication and inconsistency and e) decentralisation with some shared services. Integrating the data across the institutions is very difficult. The present research work will be providing a better solution for the above problems in the technical institutions.

Data integration flows are the back-end of a typical business intelligence (BI) architecture. Today, the design and implementation of these flows is a labor-intensive activity, consuming a large fraction of the effort in data warehousing projects. The current generation of ETL (Extraction, Transfer and Load) tools provides little support for systematically capturing business requirements and translating these into optimized designs that meet the correctness and quality requirements. The BI solutions will help even for the challenging requirements such as real-time execution, integration of structured and unstructured data, and more flexible flow of data between the operational applications and analytic applications resulting in even more complexity in integration flow design. Hence, it is important to create automated or semi-automated techniques that will help to deal with complexity. The data warehousing (DW) and Business Intelligence (BI) are increasingly becoming relevant technologies for the institutions offering technical education. Specifically, they have been pegged as the best methods to address the quality reporting requirements spelled out in the meaningful use criteria. However, BI is a potent tool for institutions offering technical education in general. It can support other types of regulatory reporting as well as a plethora of other analytic uses. Our research aims in creating the dimensional modeling in Business Intelligence environment so that all the problems can be addressed with better customer data integration.

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