

**CRM architecture  
for enterprise  
relationship  
marketing in the  
new millenium**



**i n v e n t**

**technical  
white paper  
by rose janjicek**

<b>hp executive overview</b> . . . . .	<b>.3</b>
<b>introduction</b> . . . . .	<b>.4</b>
evolution of CRM . . . . .	.4
what is advanced customer relationship management? . . . . .	.6
<b>principles for building strong customer relationships</b> . .	<b>.11</b>
hp's customer relationship model . . . . .	.11
basic CRM is step number 1 . . . . .	.12
principle's based CRM value chain . . . . .	.13
<b>CRM architecture for an effective customer experience</b> .	<b>.15</b>
<b>CRM reference model for the telecom industry</b> . . . . .	<b>.17</b>
<b>critical success factors</b> . . . . .	<b>.21</b>
<b>conclusion</b> . . . . .	<b>.22</b>

crm  
architecture

technical  
white paper

## executive overview

The paradigm shift from business focus to a customer focus has resulted in Customer Relationship Management (CRM) being on the corporate agendas across all major industries, and most visibly in consumer-based businesses. Forrester and Gartner predict that business will spend \$11B by 2002<sup>†</sup>. What is driving this level of investment? How did we get here? Where should we focus our expenditures and resources to get the most out of CRM initiatives, and not fall victim to the latest technology spending "fad"?

Electronic business has grown at an exponential rate such that the latest forecast is that by 2003, the amount of commerce conducted over the web will top \$3 trillion (Gartner Group). Merchants can get to market faster with new products and services, expand revenue channels, extend reach globally, improve customer service, enhance customer loyalty and reduce cost. Many definitions of CRM exist and therefore HP has taken the many definitions of CRM and defined Enterprise CRM to be a

business strategy that involves focusing knowledge business processes, and organizational structures around customers and prospects enterprise-wide.

As the customer relationship becomes more electronic in nature customers want innovative, clever and convenient ways of doing business. Industries are experiencing the challenge of ATM machines not remembering that the preferred language is English or that a telephone switch has no concept of customer. Therefore a second paradigm shift towards effective and electronic Customer Interaction, which

provides the ability to have a personalized dialogue/conversation with each individual customer seamlessly across channels/touchpoints and over time

has evolved. Based on this definition, Hewlett Packard has developed an industry-based Reference Model accompanied with a principles-based Functional Architecture for CRM and Customer Interaction.

These are the topics that this paper will discuss.



<sup>†</sup> Source: Forrester, Jan. 99 and Gartner Group, Dec. 98

crm  
architecture

technical  
white paper

# introduction

## evolution of CRM

Significant changes in the last fifty years have occurred through time, target market, and the value proposition as various customer and product marketing approaches have evolved.

### Competition has forced changes along marketing dimensions

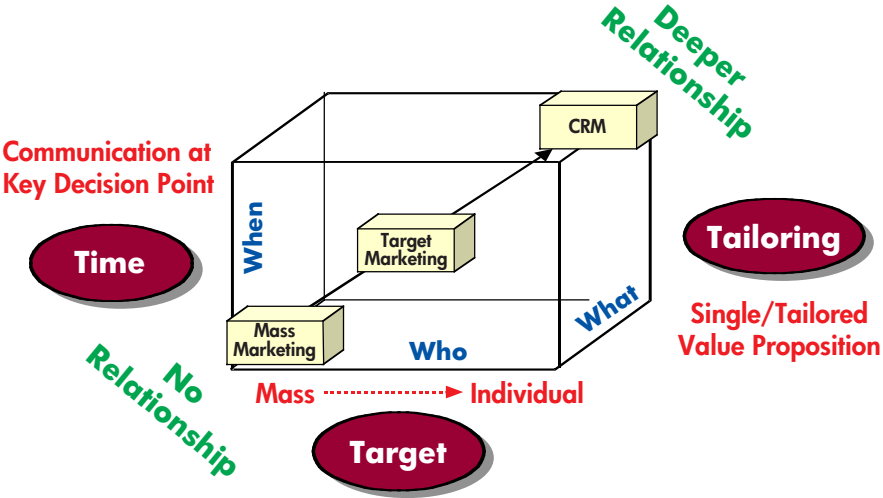


Figure 1: Customer and Product Marketing Dimensions

### mass marketing (1 to many interaction)

Fifty years ago, Mass Marketing replaced the intimacy of door-to-door sales forces. This business strategy was measured by market share and relied on pushing product and creating brand recognition among the masses. Various channels such as T.V., radio, newspaper, and magazines served as enablers to communicate to large populations simultaneously with the identical sales and marketing message. Although successful initially, this marketing approach lost impact with respect to client loyalty and trust, since the industry wanted excellence in operations, and not excellence in serving the customer. The client loyalty + client retention resulted in smaller share of wallet and a decrease in revenue.

### target marketing (1 to target group interaction)

In the early 80s, a revolutionary approach to telemarketing, direct mail, and electronic mail permitted easier selection of target clients with the capability of receiving a direct response. Database marketing



## introduction

applications sifted through mass populations and potential clients. This still resulted in multiple channels generating their own unique marketing potential client lists. This business strategy was also measured by market share(daily product sales) and not the lifetime value of relationship. Target marketing has improved results over mass marketing; but now consumers' mailboxes are clogged and the ability to create targeted outbound messages was diluted by the industry's tendency to over-communicate. The final result for Target Marketing is that it is expensive, ineffective, and irritating to the customer. In addition, marketing to the averages resulted in average marketing results.

### **customer relationship marketing (1 to 1 interaction)**

In the 90s, studies have shown that "it is 6 time more expensive to gain a new customer than to retain an existing one". Statistics like these have pushed the industry want to become more knowledgeable and intimate with customers. Business drivers were determined to qualify and justify development initiatives such as :

- Increasing the loyalty of profitable customer
- Improving cost efficiency and effectiveness of marketing campaigns
- Cross selling opportunities
- Reducing customer attrition/churn
- Tailoring prices, offers, or product components to specific types of customers
- Provision of single point of contact with a customer

Peppers & Rogers<sup>†</sup> in their book have the following methodology for relationship marketing

## Relationship Marketing Peppers & Rogers Methodology

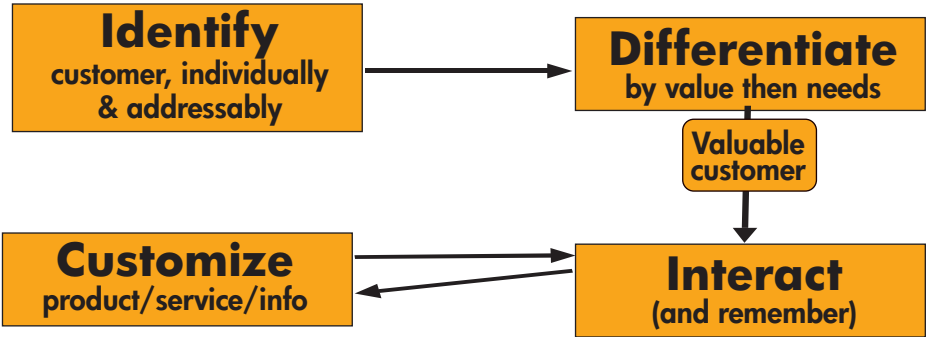


Figure 2: Relationship Marketing

The first stage is to identify the client and understand client behaviour with attributes in order to understand their needs, habits, and desires. The knowledge obtained in this stage is “fed” into marketing campaigns, treatment plans, and business strategies.

The second stage is to start managing the customer relationship by first performing direct customer interaction and then continually integrating all relevant interaction or dialogue that occurs across passive and active network of client channels or “touchpoints”. In order to dynamically maintain the client life cycle, the relevant client dialogue must be captured and customized for the best possible future action. Ultimately, the vision is to build a “one-to-one Enterprise” such that the most valuable customer is treated differently by providing customized products and services.

### what is enterprise customer relationship management (CRM)?

The Customer Relationship Management life cycle process shown in the left box highlights the fact that we need to know your customer and enable the various customer-centric processes of acquiring, identifying, nurturing, securing, and retaining clients in order to enable a company to increase revenue by preserving customer loyalty and retention.

<sup>†</sup> Don Peppers & Martha Rogers, *The One to One Future-Building Relationships One Customer at a Time*, Doubleday Dell Publishing Group, Inc, 1997

introduction

# Basic CRM establishes a foundation for customer information

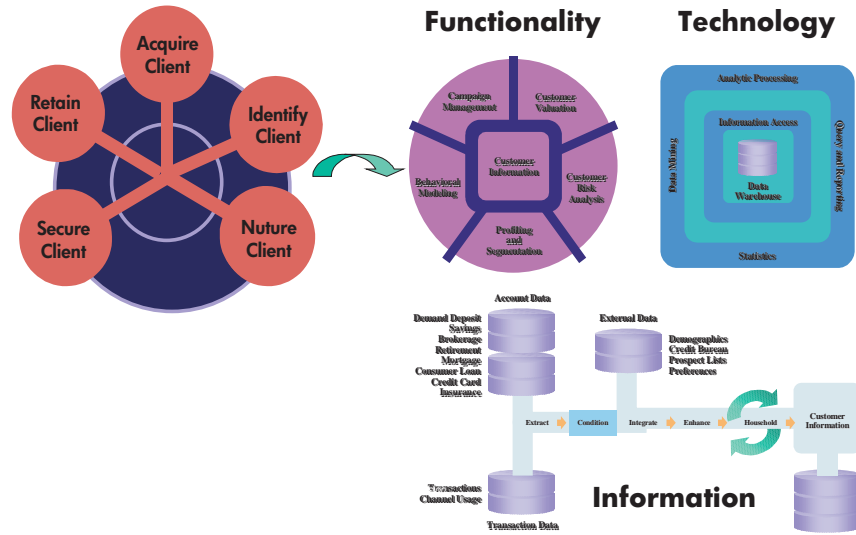


Figure 3: Basic CRM

The information box at the bottom effectively highlights the extraction from the core transaction data, account data, and external data. And then the various steps required to build the customer information system.

The functionality box highlights the five key aspects of studying the customer relationship through target marketing and campaign management as one box. Behaviour modeling, profiling and segmentation, customer risk analysis, and customer valuation all surrounding the customer environment. Various technologies are utilized for implementation of CRM functionality such as Data Mining, Analytic processing, Query & Reporting, Statistics, and Information Access, which all surround the core content-base: Data warehouse.

There are a variety of definitions that exist in the marketplace:

- Some say CRM is supply chain management process such that all processes related to customer and supplier relationships are integrated.
- Some say CRM is having the ability to improve the effectiveness and efficiency of enterprise marketing automation or direct marketing campaigns and lead generation
- Some say CRM is implementing customer service automation so that customer service representatives have access to detailed customer profiles and content scripts for customer service provision

## introduction

- Some say CRM is sales force automation that assists sales people to better manage their sales forecasts, customers, opportunities and contact information.

In fact, Hewlett Packard has seen that CRM actually represents an enterprise business strategy that involves focusing knowledge, business processes and organizational structures around customers and prospect for the whole organization. Surrounding this business strategy is an information technology infrastructure consisting of data warehouses, decision engines and integrated middleware for touchpoints/channels in order to better understand customer behaviour and respond in a timely and relevant manner.

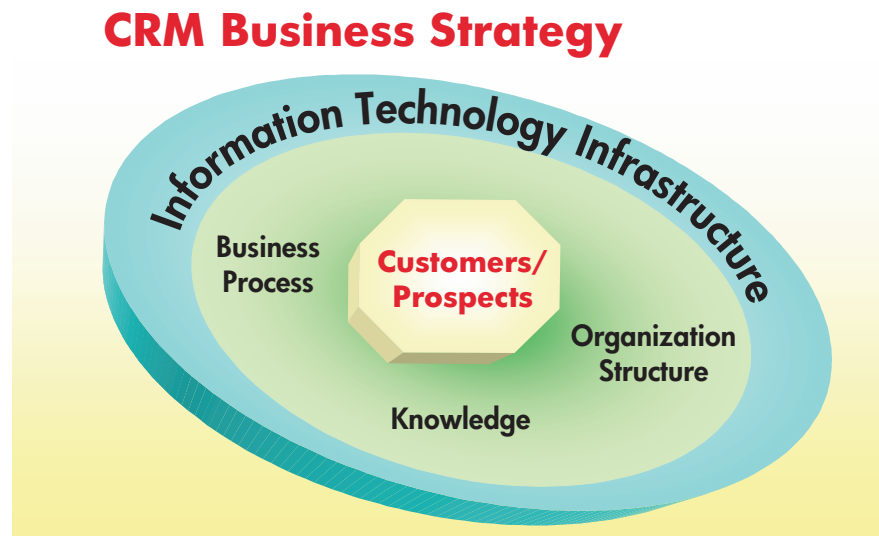


Figure 4: CRM Business Strategy

During the last 10 years, a major shift from a mass market culture of standardized products and options to a dynamic market culture where many products and options can be customized to satisfy specific needs and preferences of an individual has occurred. Today's consumers' can no longer be treated as a "homogenous collection of revenue generating units"<sup>†</sup>, but rather as individuals whose specific wants and needs determine unique behaviour (buying patterns, channel usage, etc.). As the customer relationship becomes more electronic in nature; customer loyalty has been impacted; since the personal service has

<sup>†</sup> Peppers and Rogers

## introduction

slowly diminished. In John Naisbatt's new book: "High Tech High Touch"<sup>†</sup>, he describes our society as being in a "Technologically Intoxicated Zone", such that high-touch, high-tech time and high-tech simplicity are part of our daily routines.

Therefore, today industries have to maintain consumer's interests by providing them with innovative, clever and convenient ways of doing business. For example:

- Telcos offering incentives to switch to their products and services, personalized product notices via email
- Manufacturing connecting systems that track purchase agreements and order processing for high valued customers
- Financial services offering personalized financial services such as personalized product notices via email, mortgage, investment and loan account solutions based on usage patterns, mutual fund automatic options notification service based on customer profile.

The rapid convergence of CRM and e-commerce has changed the face of enterprise customer relationship management and marketing, enabling customer to virtually purchase any item and obtain services continuously throughout a day. It has been estimated that U.S. companies will realize benefits of profit improvement (\$360billion to \$480billion) from e-commerce cost-side benefits. (Giga, July 26, 1999).

### **tenets of customers**

Two tenets of "customer" actually exist. The first is that a customer focused company needs to have a single, unified view of each customer. Conversely, customers need to have unified view of business regardless of the business unit or channel with which they are working. This bi-directional view is critical for true relationship marketing.

Regardless of touchpoints or channels (customer support centers, direct mail, telesales, direct sales, e-commerce, Web), clients want recent contacts (including complaints) or interaction to be known and reasonable personal recommendations to be made.

---

<sup>†</sup> High Tech High Touch book

## introduction

As a result, the need for this bidirectional view has also promoted a paradigm shift towards effective and relevant customer interaction, which provides the

ability to have a personalized dialogue/conversation with each individual customer seamlessly across channels/touchpoints and over time with the following attributes of

- engage customers in a constant conversation
- customize conversations to the individual
- coordinate all conversions centrally
- deliver conversations on any channel (preference of the customer)

The ability to support customer interactions consistently across channels or touchpoints is the prerequisite to sustaining the customer experience, customer loyalty and profitable customer relationship

crm  
architecture

technical  
white paper

## principles for building strong customer relationships

How do you acquire, strengthen, and retain strong customer relationships in the era of electronic delivery channels?

**Principle 1:** By knowing more about the customer value and anticipating relationship needs better than when the customer was involved in a high-touch relationship.

**Principle 2:** Consolidate and make available all customer interaction information from all channels/touchpoints

**Principle 3:** Develop a customer centric infrastructure that can consistently support the customized treatment of each customer.

**Principle 4:** Assign dedicated people, process and technology resources to achieve profitable results

### hp's customer relationship model

Hewlett-Packard has developed a Customer Relationship Model based on experiences attained from CRM project engagements globally. The Model shows that the customer relationship is strengthened by Relationship Building tactics, which are continuously measured through time.

The end result is a strong customer relationship, which lead to acceptable customer loyalty, profitability and retention. Success criteria such as share of wallet, profitability and cross-sell ratios are also applied as part of the continuous measurement to ensure that Business Case requirements have been achieved.



principles  
for building  
strong  
relationships

## HP's Customer Relationship Model

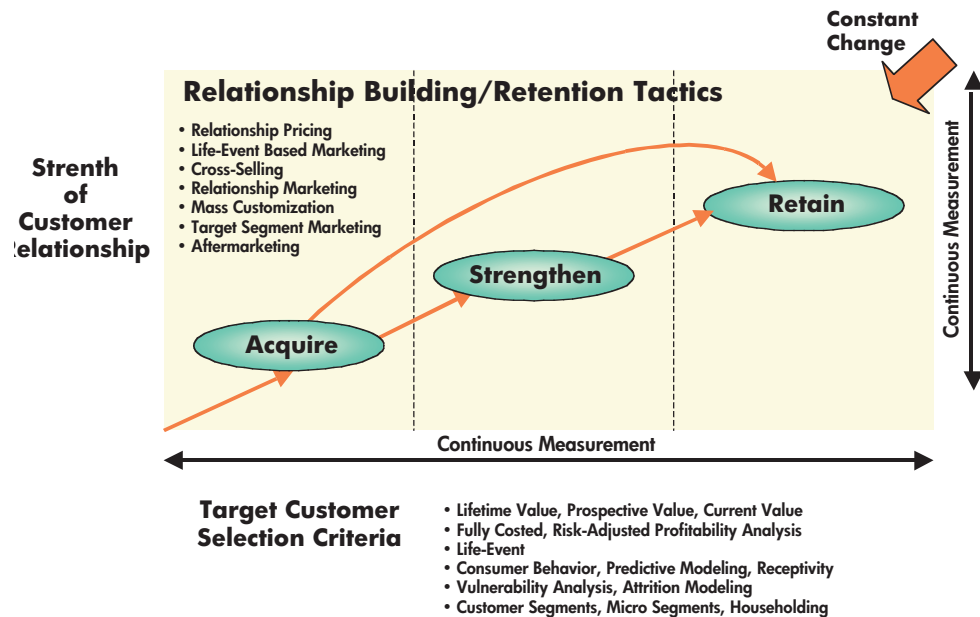


Figure 5: HP's Customer Relationship Model

### basic CRM is step number 1

Basic CRM involves the construction of data marts and data warehouses as the core components to support the sales and marketing decision making process. The data warehouse is the technology centerpiece that acts as a repository for all customer-centric data required for the decision making process in CRM. Marketing models such as Customer Segmentation, Life Time Value, Campaign analysis, and Profitability analysis are fed as information to the Customer data warehouse. In addition, external data such as Demographic, Mailing lists, Credit Bureau are also fed into the data warehouse. Some current efforts are failing to achieve desired CRM results due to

- Misalignment between IT and Business
- Many claim to address CRM but no single vendor can address the entire complex value chain
- Very challenging to bridge the informational and operational linkage

The principle raison d'être for this architecture is to move information from a basic CRM infrastructure to a knowledge base so that both supplier and client can act on this information. This enables various industries to transform themselves into a customer-oriented business by lever-

**principles  
for building  
strong  
relationships**

aging information as a strategic asset. For example, call center agents can look to CRM to supply them with information on the customers calling them with their purchases, transaction history and complaint history. Alternatively, a sales force can have customer contact and demographic information as part of their sales force automation. BasicCRM acts a foundation to move quickly to Step2 CRM, which provides integrated contact history, customer profile, channel integration, etc. In addition, decisioning technology develops knowledge from information used to determine the best recommended actions for a customer regardless of touchpoint/channel.

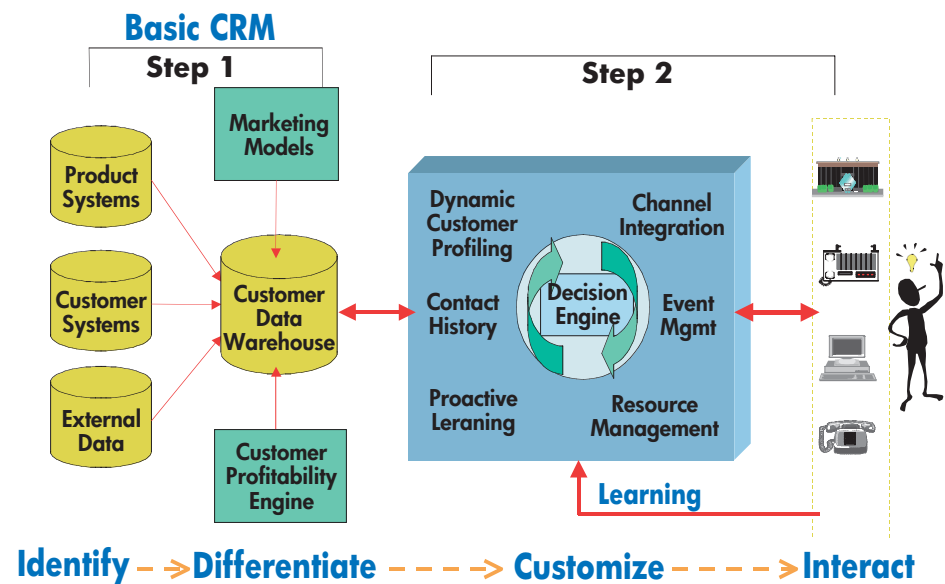


Figure 6: Knowledge-based CRM

**principles-based CRM value chain**

The development of an Enterprise CRM Architecture is created by evaluating a principles-based Industry value chain. In order to make an end-to-end customer experience, both Technology, Data & Applications, and Services and People are all examined at an enterprise level. There are two phases to the development of this architecture.

The first part is to develop a Principles-based Conceptual Functional Architecture, which attempts to be technology independent, focusing on functional components and the interfacing needed between them. The method to develop the Conceptual Architecture is to gain an understanding of not only the enterprise business driver needs, but the design principles as well. These principles clarify the vision by identify-

**principles  
for building  
strong  
relationships**

ing business expectations for the functionality and operation of the solution. They give constraints and objectives for technology use, much like a building code provides guidelines for the construction industry. In parallel the enterprise organization is examined for alignment of Marketing, Sales, Customer Care and Performance Management. Various discovery mechanisms are also used to define and articulate the strategic vision for customer interaction. This includes the assessment of where the enterprise is today in relation to that vision. In addition, one customer segmentation model is decided upon for all products and services.

The second part is to develop the Technical or Physical CRM Architecture, which makes recommendations and provides some decision methodology to the actual deployment of the Conceptual Architecture. Therefore, there would be one CRM architecture that would enable anyone who impacts the customer at any channel or touchpoint to provide the best customer experience.

The architecture also includes the documentation of the real software, hardware and methods that will be deployed to address the components documented in the Conceptual Architecture.

**Solving Customer Relationship Management  
involves addressing a principles-based value chain**

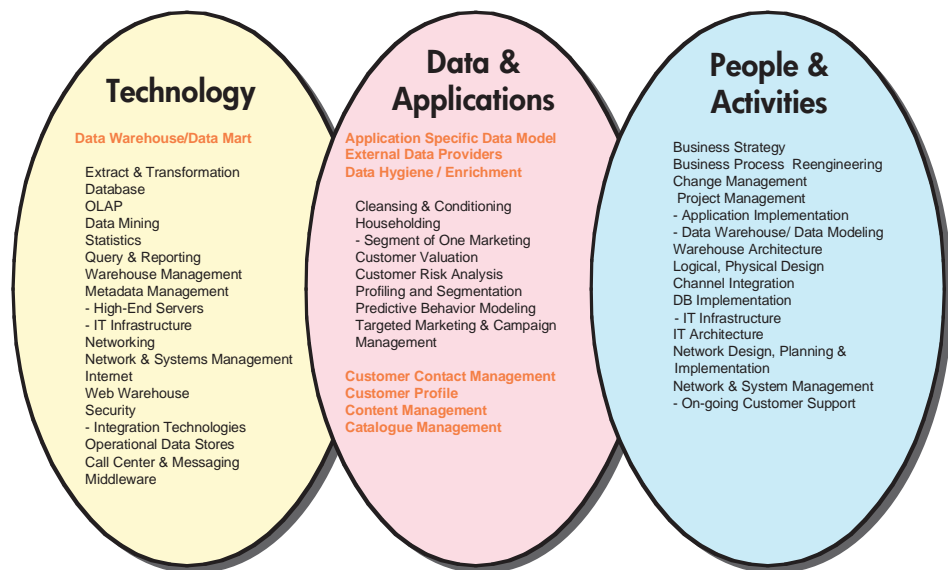


Figure 7: Principles based Value Chain

crm  
architecture

technical  
white paper

# CRM processes and functions

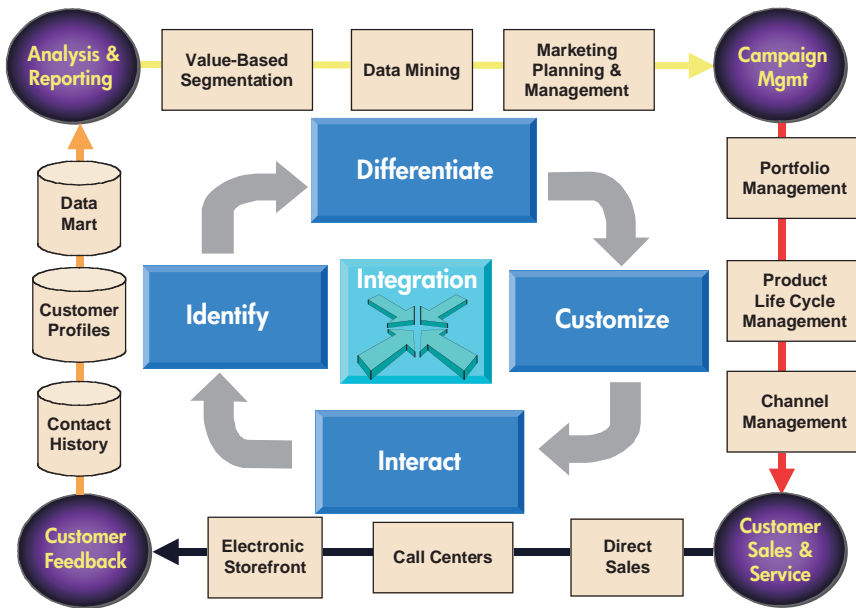


Figure 8: CRM Processes and Functions

## CRM architecture for an effective customer experience

Hewlett-Packard takes the CRM processes and functions into the E-commerce millenium and has developed an CRM architecture to support effective customer interaction for sales and marketing automation. This architecture addresses the requirements of “enhancing/enriching and changing the customer experience” by providing the functionality required to effectively interact with the customer, during the Sales and Marketing process. Effective interaction with the Customer requires the following information :

1. Know your customer’s needs and pro-actively engage your customer.
2. Know your customer and also his conversations/interactions with you{not only to build a better relationship with the customer, but also to serve the customer effectively}.
3. Use the knowledge gained during customer interaction to improve the interaction and relationship with the customer.



The core of this architecture is the **Decision Engine** component, which

**effective customer experience**

uses Business Rules (a set of Enterprise Rules that define the “actions” to be taken and are termed as “Customer recommended actions or CRA”). The Decision engine takes as input the Customer Profile, Contact History and applies the stored Business Rules thereby creating a set of one or more Recommended Actions for the customers.

The **Business Rules Management** component enables the creation, deletion, analysis and storage of the Business Rules in a repository.

The **Customer Profile** component is generated based on the information in the Customer Information File (CIF), Customer Information Warehouse (segmentation, scoring)

The relevant customer conversation/contact/dialogue information is captured and stored in **Contact Management component**.

The **CRA Effectiveness Analysis** component by using Data Mining technology provides a facility to explore rules, recommended actions and customer interaction effectiveness in general.

The **Treatment** provides unique treatment data for customer, products and services.

**Functional Components of CRM Architecture for Enterprise Marketing Automation**

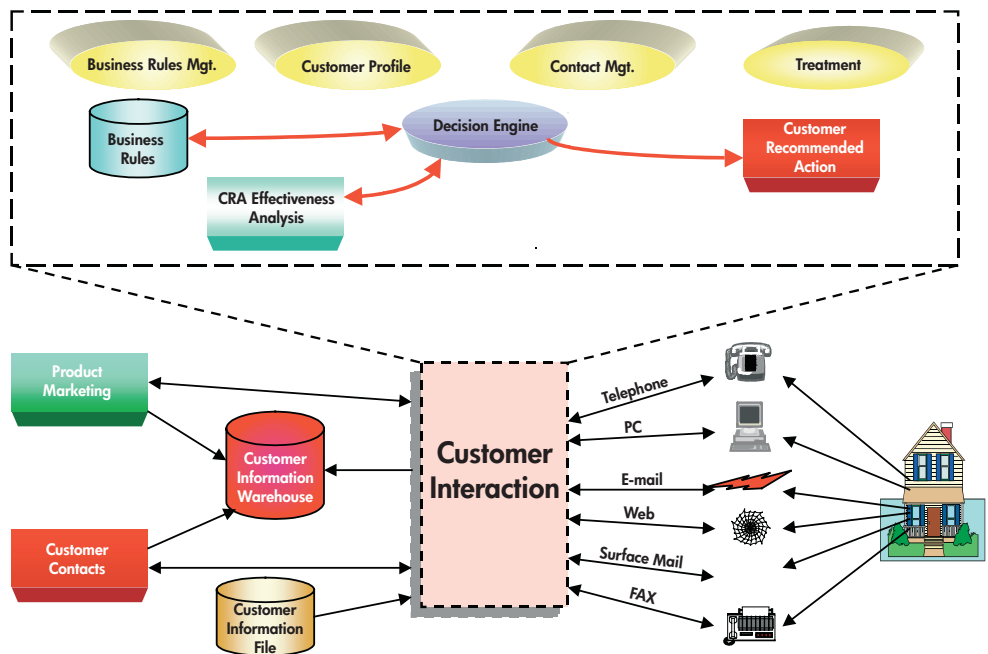


Figure 9: Functional Components

crm  
architecture

technical  
white paper

# CRM reference model for the telecom industry

This reference model is logically layered model that includes touch-point, business application, process, CRM, Data management and Decision support layers. It was developed as a result from customer feedback and extensive research in the marketplace on Enterprise Customer Relationship Management.

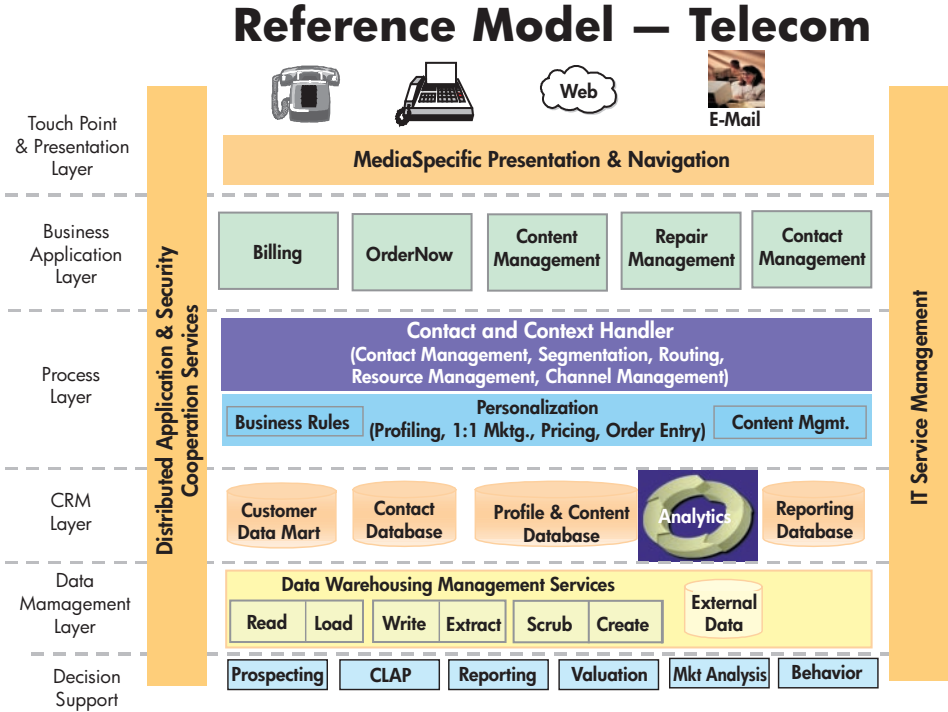


Figure 10: Reference Model - Telecom

## touchpoint and presentation layer

This layer presents information to the business end-user through a communication channel-specific device. The presentation and navigation displays a consistent “look and feel” for input and output information in the format required by the device (e.g., browser, terminal, keyboard, keypad, phone) that is consistent across different business processes and their functions.

Navigational aids will be presented to human interfaces; buttons, hotspots, etc on windows or browser (HTML) based interfaces, menus or other simpler interfaces such as 3270 terminals, or interactive voice for voice channels. The navigation function of a front-end helps the



## telecom reference model

user to control the usage of, or switch between different elements of the presentation surface, e.g., activate a specific window with the mouse, or a select a presentation object specific function with the right mouse button.

In addition, this layer will determine the kind of communication channel being used, and will transform the information going to and from the process layer to the required interfacing of this communication channel, e.g., Text-to-speech for Phone/IVR, CGI/Java for Internet, etc. It will also prepare the user identification and process selections required by the next layer.

### **business application layer**

This layer determines the communication touchpoint being used, and transforms knowledge from the touchpoint to the Application such as Billing.

### **process layer**

The process layer provides services to different communication touchpoint-specific devices, from a single implementation of that specific device. The process layer is separated into a Contact, Context handler and personalization. The user accesses information through a communication channel-specific front-end; the user's authorization and profile together form a context under which all interaction between the user and IT functions that form and support a business process are carried out.

The Contact and Context Handler initiates and terminates the communication channel/user dependent context with a process/routing engine. It registers the context to the Contact Management, Segmentation, Routing, Resource Management and Channel Management making it known to the underlying layers. Personalization executes the business logic initiated from specific context and selects a set of usiness rules specific to the business process.

### **CRM layer**

This layer represents databases that consist of the single customer view, integrated contact/dialogue, customer profile, and content information. This layer also provides for the ability to perform analytics and

## telecom reference model

reporting on the customer experience by using the variety of knowledge gained from all customer activity.

### **data management layer**

The data management layer is the first layer that has no direct link to the business processes. It represents purely IT centred objects: Transactions (get data x for user y and reservation z), direct read/write operations (read user profile u), etc. Its main function is the separation of data storage from business process functions. This is done by wrapping the calls to the new or legacy systems and presenting them as objects to the higher layers. Here, wrapping means transforming data in a predefined (unchangeable) format to the object representation required by the object oriented environment. This layer may also use existing data warehouse management services

### **decision support layer**

The Telecom industry has been a leader in implementing various decision support applications in order to determine who their best customers are and what best services to offer them. Regulatory changes have made this industry so competitive that many existing databases, campaign management applications, etc. exist and need to be leveraged in the upper layers of this model.

### **vertical layers**

The vertical layers of this reference model provide services that are required by all the horizontal layers.

### **distributed application and security cooperation services**

In order to support the management of objects between the various layers some generalized support will be required. The CORBA (Common Object Request Broker Architecture) of the OMG (Object Management Group) consortium's OMA (Object Management Architecture) is an example of this support. DCE-services, Name-services, etc. are other examples of distributed services. Security services establish an end-to-end secure environment for network and system infrastructure, applications (business processes and underlying activities), and the data layer. The following services have to be provided (following the definitions of ISO 7498-2): Identification and Authentication, Authorization, Protection, Management, Audit, and Non-repudiation.

**telecom  
reference  
model**

**IT service management**

All components in the model will have to be managed for availability and performance (Service Level Agreements). IT management processes and technology must be in place in order for an IT organization to deliver quality services to its customers . Please refer to Hewlett Packard's ITSM (IT Service Methodology) definition of services.

**crm  
architecture**

**technical  
white paper**

## **critical success factors**

The following critical success factors are essential in order to successfully execute implementation of CRM projects:

1. Executive Sponsorship and CRM team organization
2. Involvement of the Business users
3. Involvement of Vendor with Intellectual Capital
4. Principles-based CRM Architecture
5. Implementation of BasicCRM
6. Implementation of Customer Interaction across Channel/Touchpoints
7. Managing People, Culture and Change
8. Customer Focus



**crm  
architecture**

**technical  
white paper**

## **conclusion**

To address today's exploding e-commerce marketplace initiatives, CRM acts a foundation for any successful implementation. Furthermore, the concept of customer interaction and the ability to collect this information across any touchpoint/channel is essential as the learning e curve for "who is my customer and what is the best thing for them" is to be achieved.

Hewlett-Packard has developed various reference models and a methodology to make the CRM vision a reality.

