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Chapter 13

# **Information technology for customer relationship management**

# Chapter objectives

By the end of this chapter you will understand:

1. the range of CRM technologies
2. the role that technology plays in the achievement of CRM outcomes
3. the structure of the CRM ecosystem
4. the main application areas of CRM
5. the role that analytics play in CRM technology
6. the importance of integration, knowledge management and workflow to CRM outcomes.

## Introduction

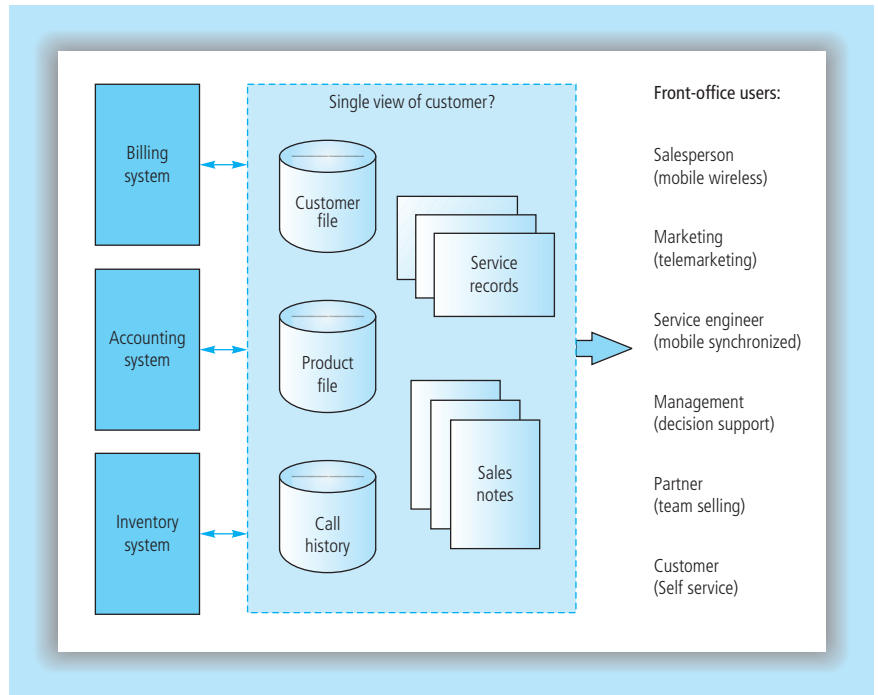
Our definition of CRM stresses that CRM is a technology-enabled approach to management of the customer interface. In this chapter we present an introduction to CRM technologies.<sup>1</sup> Subsequent chapters take a more detailed look at sales-force automation, marketing automation and service automation.

## Origins of CRM technology

The building blocks of today's CRM technology have been in place for several decades. CRM has evolved from a range of standalone technologies including call centres, sales-force automation systems and customer information files (CIF), some of which date back to the 1970s and earlier.

In the late 1980s, several organizations attempted to consolidate some of these disparate technologies. For example, the CIF that was central to many insurance companies and banks started to be seen as a source of marketing information, rather than a basic record of a customer's accounts. Call centres began being used for outbound calls such as up-selling customers rather than just responding to inbound service calls. The customer started to be recognized as a single entity across all customer-facing departments, leading to the idea of a 'single view of the customer' (Figure 13.1), whereby appropriate customer-related data is made available at all customer touchpoints and channels.

Customer expectations have also played a direct role in the emergence of CRM technology. As customers moved from one industry to the next they took their increased expectations with them. 'I am recognized by my airline', they'd say. 'So I expect to be recognized by my energy



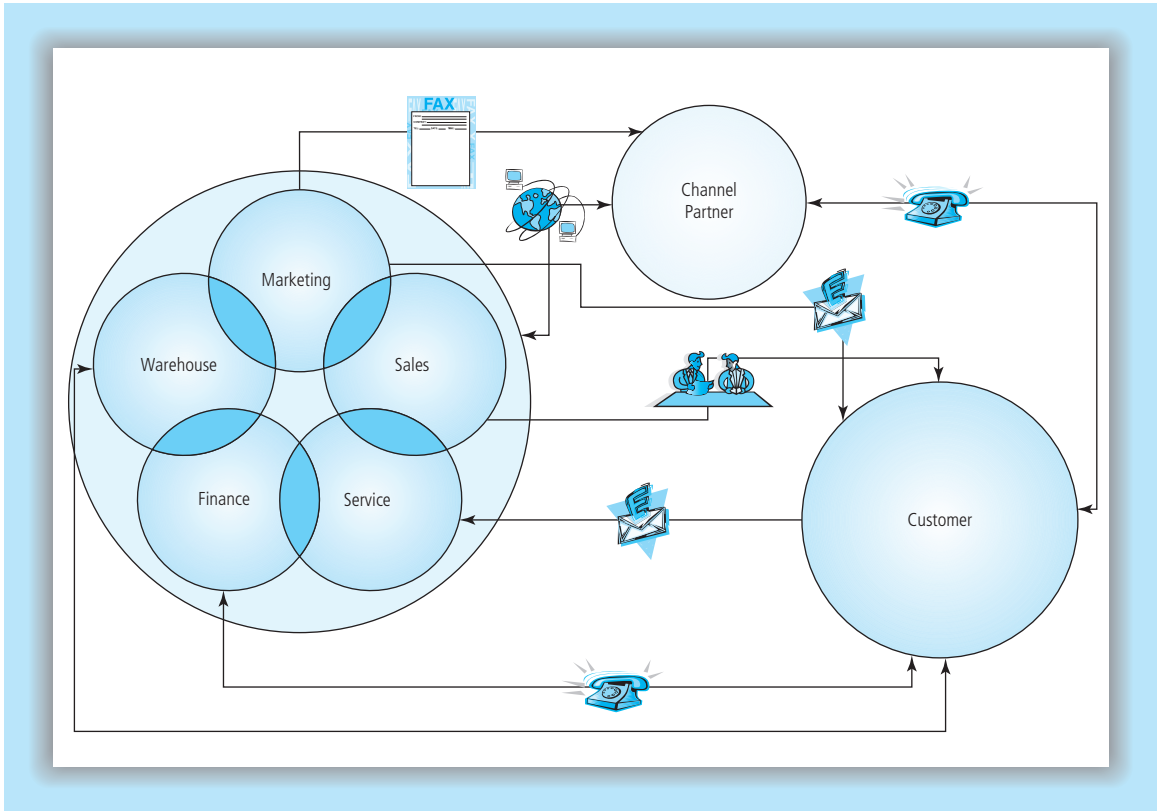
**Figure 13.1**  
A single view of the customer for front-office applications

utility'. CRM spread rapidly from the early adopter industries, such as banks and telecommunications companies, to consumer goods and healthcare. Organizations started to realize that they needed a central view of the customer, and an understanding of the value of the customer, if they were to compete effectively.

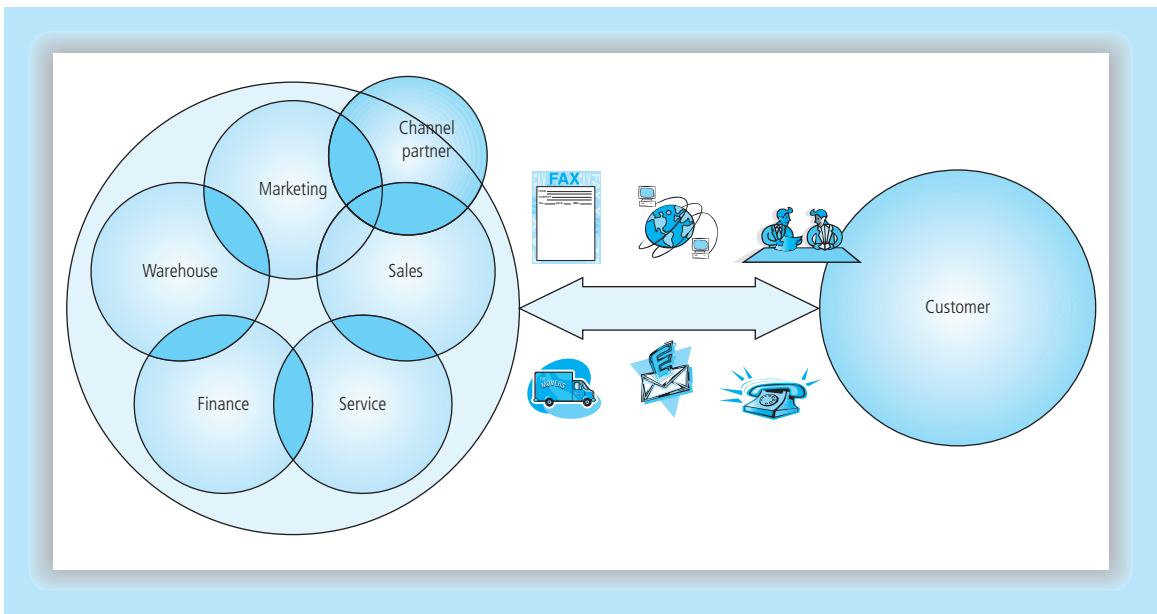
These early attempts at the creation of a consolidated customer view were often internally-focused, rather than aimed at improving customer experience. The ultimate goal became multichannel CRM, whereby customer contact channels such as sales, channel partners, marketing and the service centre were consolidated into a single view of the customer, across all touchpoints and communication media including face-to-face, voice telephony, e-mail, web and wireless (Figure 13.2). Customers, after all, expect a continuous, consistent dialogue with a company, irrespective of the systems and departments within. This is the idea of a 'single view for the customer' (Figure 13.3).

Multichannel CRM presents a significant technical challenge. The technology required to support remote field salespeople is very different to the technology required to support a large, high-volume call centre. This technical challenge made it difficult to provide technology support for all of the customer channels in one system.

The emphasis on obtaining a single view of the customer is dependent on the effective deployment of operational CRM. Recently, the emphasis has moved toward understanding the value of the customer, and increasing the value of each interaction with the customer. This requires



**Figure 13.2** The challenge of multiple different channels of communication between an organization, its partners and its customers<sup>2</sup>



**Figure 13.3** The customer expectation – consolidation of channels into a single, consistent dialogue<sup>3</sup>

sophisticated analytical tools, leading to the recent focus on analytical, rather than operational CRM.

Web technologies also had a significant role to play in the emergence of a broader conception of CRM, encompassing users other than direct employees (customers, channel partners, investors). Web browsers (Figure 13.4) allowed these external users to access and share information, without requiring specialist software to be installed on their own computers, leading to extra-enterprise CRM functions such as customer self-service, partner portals and investor portals.

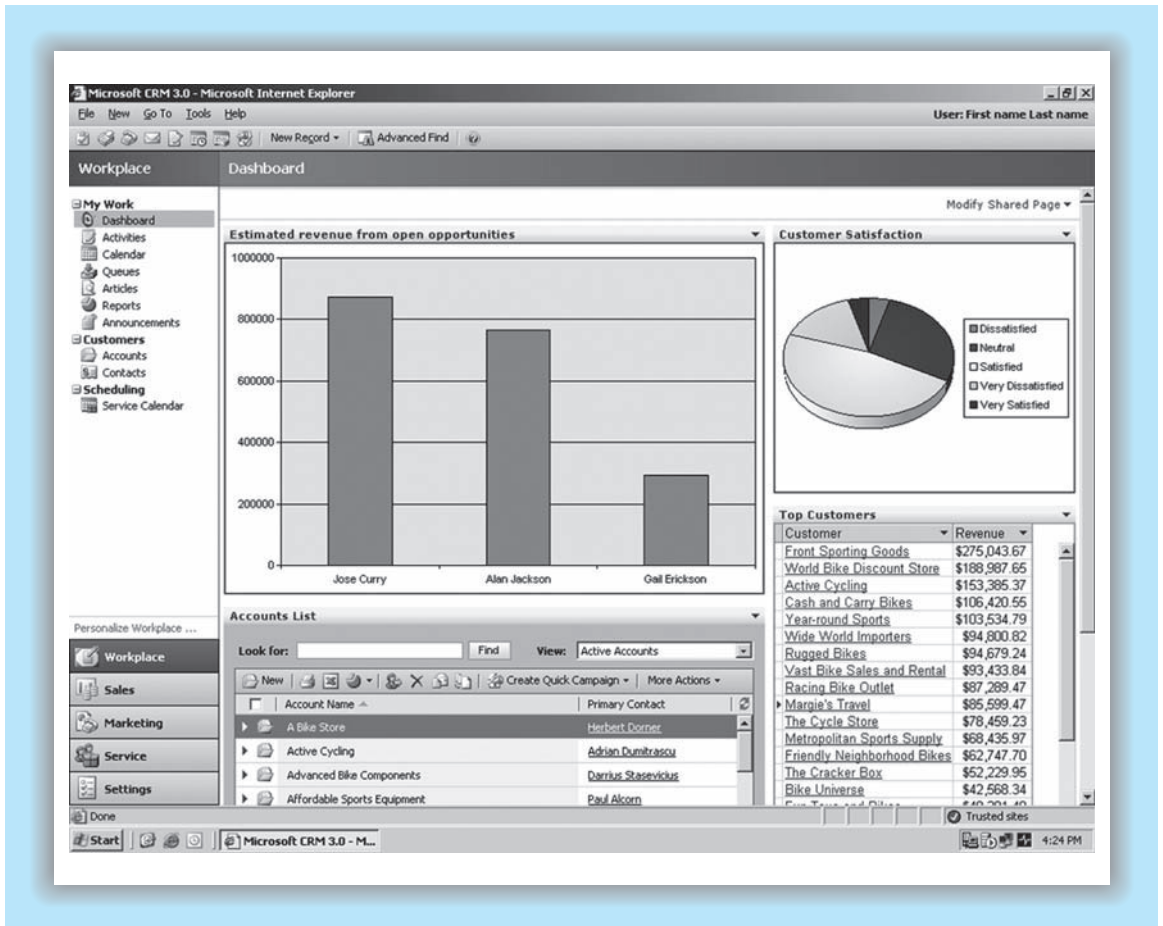


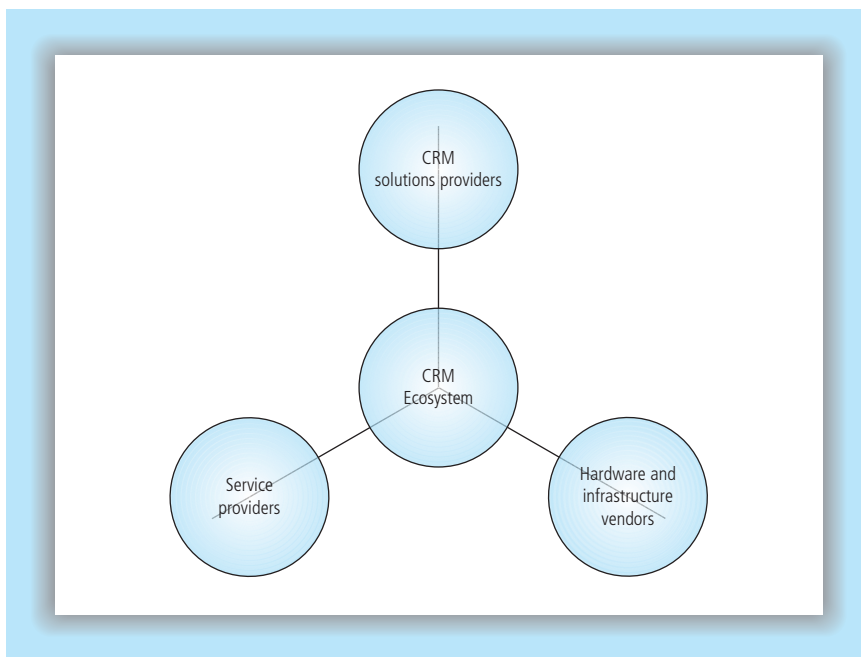
Figure 13.4 Microsoft CRM web browser interface

CRM technologies, therefore, are much more than a simple suite of applications. CRM must be flexible enough to stay in touch with a changing audience (the customer). It must reflect different requirements in different industries, as first discussed in Chapter 1. It must be accessible to external stakeholders and mobile professionals, such as salespeople and field technicians. It must operate over any communication channel, and it must integrate with other systems to provide a single view of, and for, the

customer. Finally, it must be implemented in such a way that appropriate work processes and skills are deployed, as many of the objectives of CRM cannot be solved by technology alone.

## The CRM ecosystem

The CRM ecosystem is made up of three major groups: CRM solutions providers, hardware and infrastructure vendors, and service providers (Figure 13.5).



**Figure 13.5**  
The CRM ecosystem

### CRM solutions providers

The best known members of the CRM ecosystem are the CRM solution providers. Oracle, SAP, salesforce.com, Microsoft, and E.piphany are some well known examples. The independent research organization, Forrester, reports that worldwide revenue for CRM solution providers reached US\$8.4 billion in 2006 and is forecast to grow to US\$10.9 billion by 2010.<sup>4</sup>

CRM solutions can be clustered into three groups, as discussed below and shown in Tables 13.1 and 13.2:

- **Enterprise CRM suites:** this category comprises vendor solutions primarily targeted toward organizations with revenues of more than US\$1 billion per year and/or more than 1000 employees. CRM vendors focused on enterprise class organizations typically offer a full

**Table 13.1**  
Enterprise CRM  
suites and mid-  
market CRM suites

Enterprise CRM suites	Mid-market CRM suites
Amdocs CRM	Entellium
Chordiant Cx	GoldMine Corporate Edition
Onyx CRM	Maximizer Enterprise
Oracle's E-Business Suite CRM	Microsoft Dynamics CRM
Oracle's Siebel CRM	NetSuite
Oracle's PeopleSoft CRM	Oracle's Siebel CRM Professional Edition
Infor CRM E.piphany	Oracle's Siebel CRM On Demand
Pegasystems Customer Process Manager	Pivotal CRM
mySAP CRM	RightNow
	Sugar Enterprise
	SageCRM
	salesforce.com
	Soffront CRM Suite

**Table 13.2** CRM  
speciality tools

<b>Analytics tools</b>	<b>Customer service tools</b>
SAS	ATG
SPSS	Applix
Teradata	eGain
	Graham Technologies
<b>Customer data management tools</b>	KANA
Dun & Bradstreet	KNOVA
Initiate	Unipress
Purisma	
Siperian	<b>Marketing automation tools</b>
VisionWare	Aprimo
	Unica
<b>Partner channel management and collaboration</b>	<b>Sales force automation tools</b>
BlueRoads	Sage Saleslogix
Click Commerce	Saratoga
Comergent (Sterling Commerce)	

range of functionalities, can scale to serve large user populations and offer support for many industries, languages and currencies. They offer their products primarily through the traditional on-premise license model. However, several of the leading players now offer hosted or SaaS deployment options.

- **Midmarket CRM suites:** this category comprises vendor solutions primarily targeted towards small and medium-sized businesses: organizations with revenues of less than US\$1 billion per year and/or less than 1000 employees. CRM vendors in this group also offer a breadth of CRM functionalities, but these often have more limited capabilities in specific areas and are simpler to use than solutions built for the large enterprise market. These vendors are less suitable for large-scale global deployments. Vendors in this group also offer a variety of deployment options, including on-premise license and SaaS.
- **CRM speciality tools:** this category comprises vendors that offer solutions with narrow functional breadth but deep specialty capabilities, for both enterprise and mid-market organizations. Speciality CRM tools are available for marketing automation, sales-force automation (SFA), customer service, partner channel management and collaboration, customer analytics and customer data management.<sup>5</sup>

The CRM solutions companies, however, are only a small proportion of the overall CRM ecosystem. CRM software must run on hardware platforms such as Unix or Intel-based computers and it must integrate with communications infrastructure such as telephony for call centres, web and e-mail systems. Hence, hardware and infrastructure vendors are also an important part of the CRM ecosystem.

## Hardware and infrastructure vendors

For CRM goals to be achieved there often needs to be a high level of emphasis on hardware and infrastructure. Call centres, for example, need tight integration between the software on the customer service agent's desktop and the automated call distributor (ACD) or switch hardware. Calls may need to be prioritized and routed based on CRM metrics, such as customer value or the customer's propensity to churn. Handheld devices carried by salespeople need to be synchronized with the central CRM database. Hardware vendors such as IBM, Blackberry, Dell and Hewlett-Packard provide a range of solutions across the hardware spectrum, while infrastructure vendors such as Avaya, Genesys and Siemens provide telephony and CRM-related infrastructure solutions.

## Service providers

The services component of the CRM ecosystem is the largest and the least clearly defined. The use of service providers in a CRM implementation is often a critical factor in overall success of the implementation. Much of the CRM journey involves changes to strategy, business processes, organizational structures, skills and technical infrastructure, so good external advice and implementation can mean the difference between success and failure. Furthermore, some aspects of the front office, such as the call centre, may be outsourced either technically or as an entire business process. Service providers for CRM can be segmented, as shown in Table 13.3.



Service	Details	Examples of service providers
<b>Strategy consulting</b>	Consulting support for the formulation of customer strategy, contact strategy, channel strategy, CRM strategy	McKinsey, Peppers and Rogers
<b>Business consulting</b>	Services around business process re-engineering, process improvement and best practices for CRM	Accenture, Bearing Point, CGEY
<b>Application consulting</b>	Design and development of application modifications, project management of software package implementation and training	CRM solutions companies, Accenture, CGEY, Bearing Point, IBM
<b>Technical consulting</b>	Design and implementation of technical infrastructure and integration of this infrastructure with the existing business processes and applications	Unisys, IBM, Logica
<b>Outsource service providers</b>	Technology outsourcers and business process outsourcers	EDS, IBM, CSC, Axiom

**Table 13.3** CRM service providers

## CRM solutions

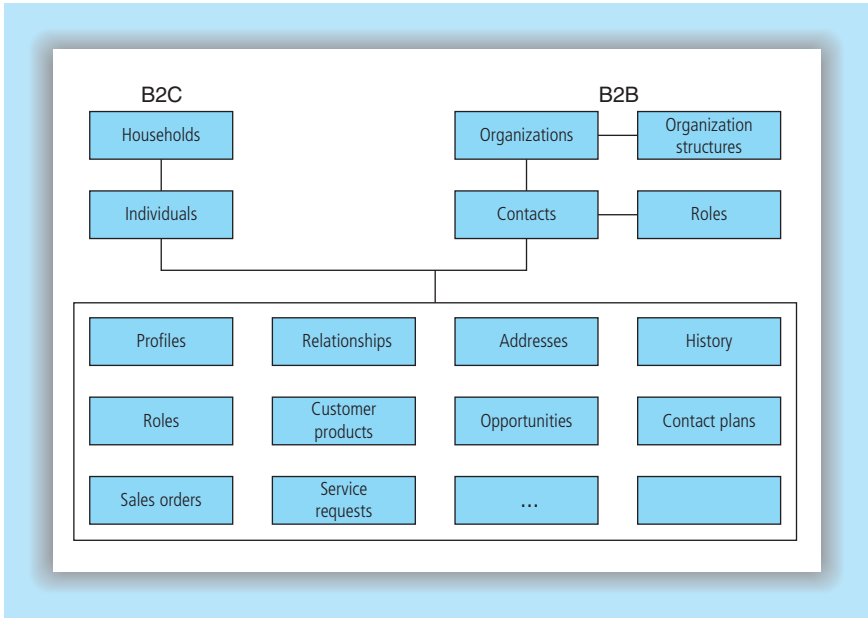
Most CRM solutions, whether from enterprise, mid-market or speciality providers, are broadly aligned with the primary front-office functions of marketing, sales and service. However, not all CRM applications sit squarely in one or other of these functional areas. For example, some CRM modules focus on customers or products, rather than the operational processes performed by the marketing, sales and service departments. Customer and product management applications offer a suite of dedicated functions and modules that sit across sales, marketing and service. Companies that market, sell or service through channel partners use PRM (partner relationship management), a module of many CRM solutions. Finally, CRM analytics are often regarded as a separate suite of applications, with specialist solutions and vendors, as noted in Table 13.2.

The following sections outline the main elements of each of these application areas. Modern CRM applications are extremely rich in features and functions, far beyond what can be practically presented here.

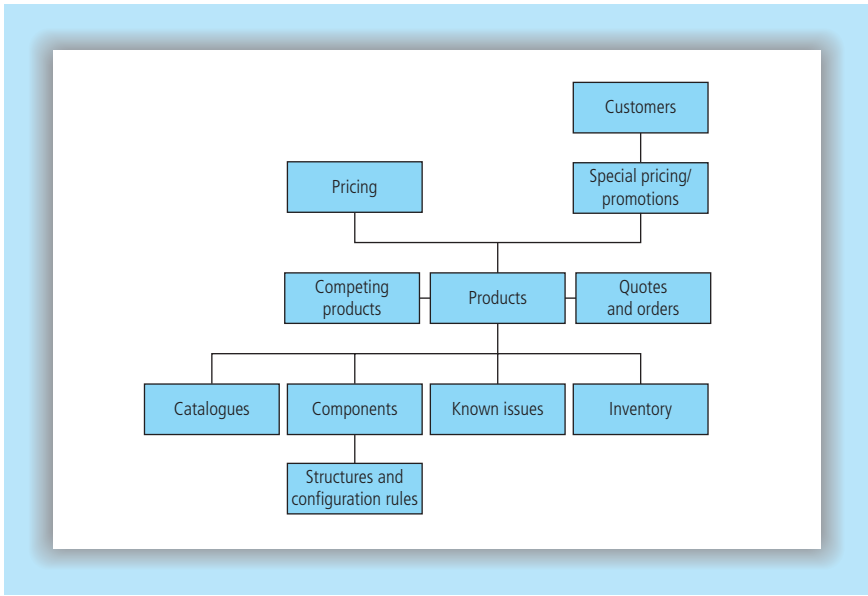
### Customer and product management

Customer and product management applications may be components of a broader CRM application, or they may be built into a focused sales, service or marketing application. It is vital that the database recognize important attributes of, variance within, and relationships

between, customers and products, as indicated in Figures 13.6 and 13.7. For example, B2B organizations are not all the same: they vary in size, structure, buying roles and transactional histories. Similarly, not all products are the same. Off the shelf retail products are simple to classify and understand, each having a unique identification number, but customizable products such as cars or computers, made of a wide range of chosen components, are less easy to classify and understand. Company and product management systems are often industry-specific or company-specific.



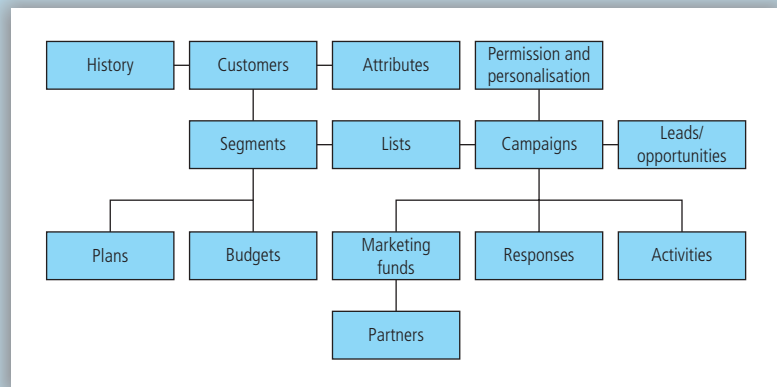
**Figure 13.6**  
CRM components – customers



**Figure 13.7**  
CRM components – products

## Marketing

CRMs deployment for marketing purposes enables customers or prospects to be segmented, lists to be generated, campaigns to be run and assessed, and leads to be allocated. Marketers also use CRM to help create marketing plans, manage marketing budgets and loyalty programmes, launch new products and administer channel partner relationships. Marketing applications must also enable customer communications to be delivered and integrated across many communication channels, including e-mail, newsletters, telemarketing, conventional direct mail and web marketing. In all cases, the CRM focus on segmenting and personalizing the marketing effort is made possible by the sophistication of the underlying applications and the availability of customer-related data. Figure 13.8 shows a number of elements that typically form part of CRMs deployment for marketing purposes.

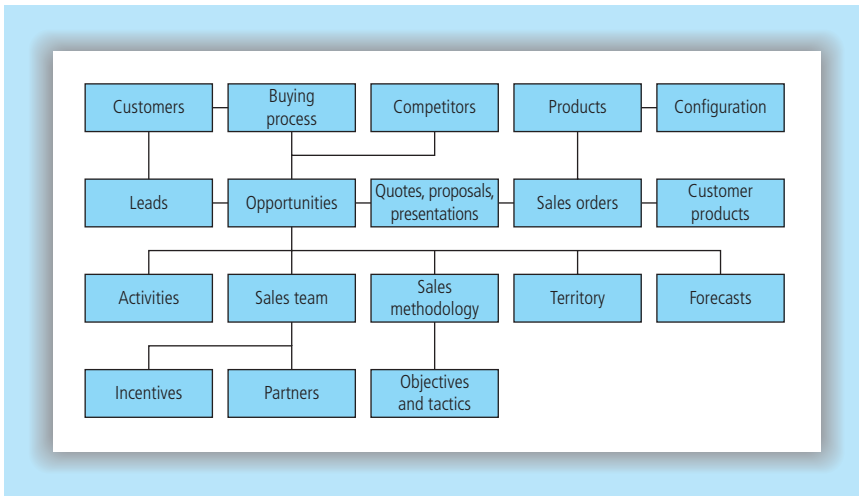


**Figure 13.8**  
CRM components –  
marketing  
automation

## Sales

CRM sales applications typically support many different types of selling, ranging from complex selling in the business-to-business environment, to business-to-consumer telesales and browser-enabled self-service sales. These different types of selling could involve a team of people over time, channel partners, specific sales methodologies and territory management. Whatever the context, however, the focus is on managing the opportunity from initial identification through to close. Opportunity management applications track the sale as it progresses along the sales pipeline, and allow quotes, orders and forecasts to be generated from a single source.

The implementation of sales-force automation technology is often accompanied by the implementation of a sales methodology (Figure 13.9). Without a methodology, salespeople will all use the system differently,



**Figure 13.9**  
CRM components – sales-force automation

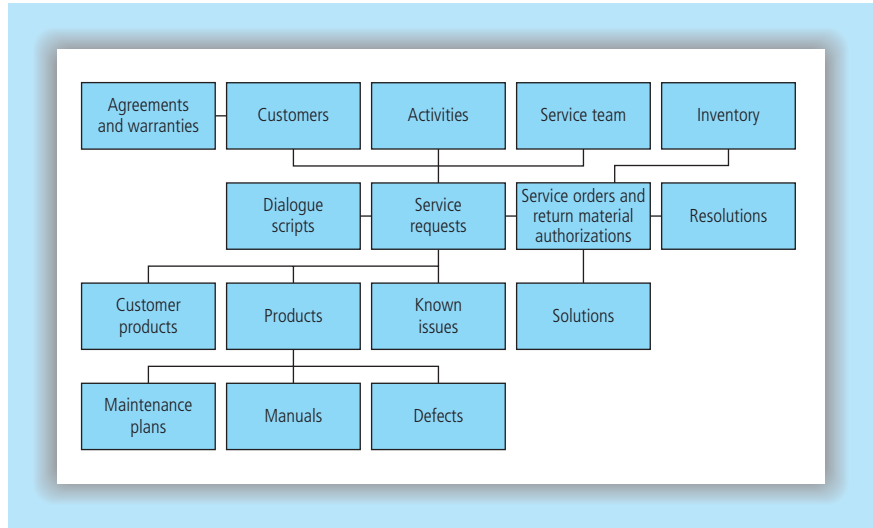
making sales management and prioritization of resources very difficult. There are a number of sales methodologies available, and some CRM solutions have them pre-integrated. Selling over the web also presents a unique set of challenges. It requires some specialist applications such as shopping carts, storefronts, graphical catalogues and secure checkout. The emergence of product configurators has made it possible to sell complex products over the web. Selling often involves complex incentive and commission schemes, and these can be modelled in the CRM application to allow salespeople to assess the impact of winning a sale on their own personal compensation.

Finally, a key technology to support selling processes is mobile synchronization or wireless, which allows salespeople access to the CRM system while out of the office and on the road.

## Service and support

Service and support applications in CRM are also highly variable. Companies that service complex industrial products employ service engineers located in the field to visit customer sites, whereas companies that service consumers with a complaint require centralized teleservicing and a current knowledge base. The central element in CRM-enabled service is the service request or trouble ticket. This is used to track the service event through to completion, including service orders and issue resolutions.

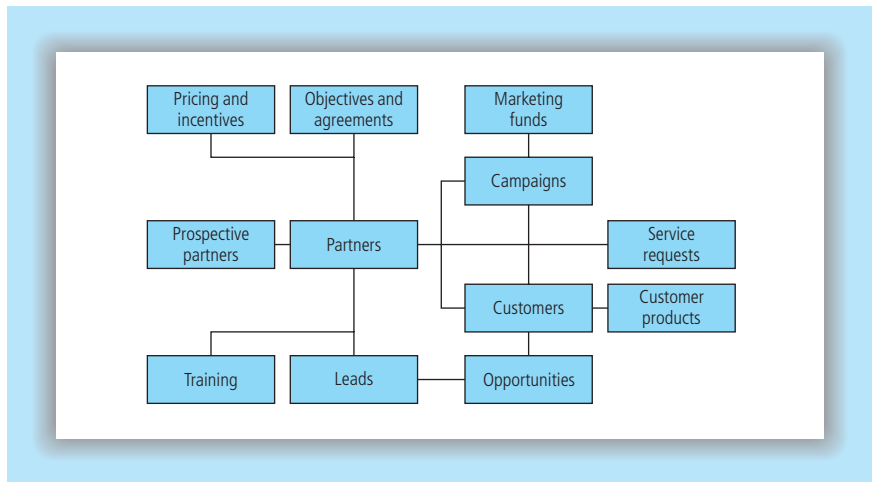
As with sales-force automation, field service also requires mobile technologies. In service, however, despatch and scheduling applications may be used. Scripts may be deployed (as in marketing and sales) in a teleservicing application to help agents to deliver a consistent customer dialogue.



**Figure 13.10**  
CRM components – service automation

### Partner relationship management (PRM)

Many companies market and sell through channel members or service through specialist partners. This is known as collaborative CRM. Channel members and partners all require support if they are to manage the relationship with the end customer effectively (Figure 13.11). In addition to sales, marketing and service functionality, as described above, managing the partner relationship requires specialist functionality such as partner qualification and sign up, developing joint business plans and objectives, measuring performance, partner training, administration of marketing funds and rebates, and specialist partner incentive schemes.



**Figure 13.11**  
CRM components – partner relationship management

PRM most often requires a portal to be established in order to give partners access to the CRM system in a controlled, secure, yet collaborative way (Figure 13.12). Data security and administration are also important functions, to ensure that competing partners cannot see each other's data and opportunities, and to enable individual partners to administer their own users through the portal.

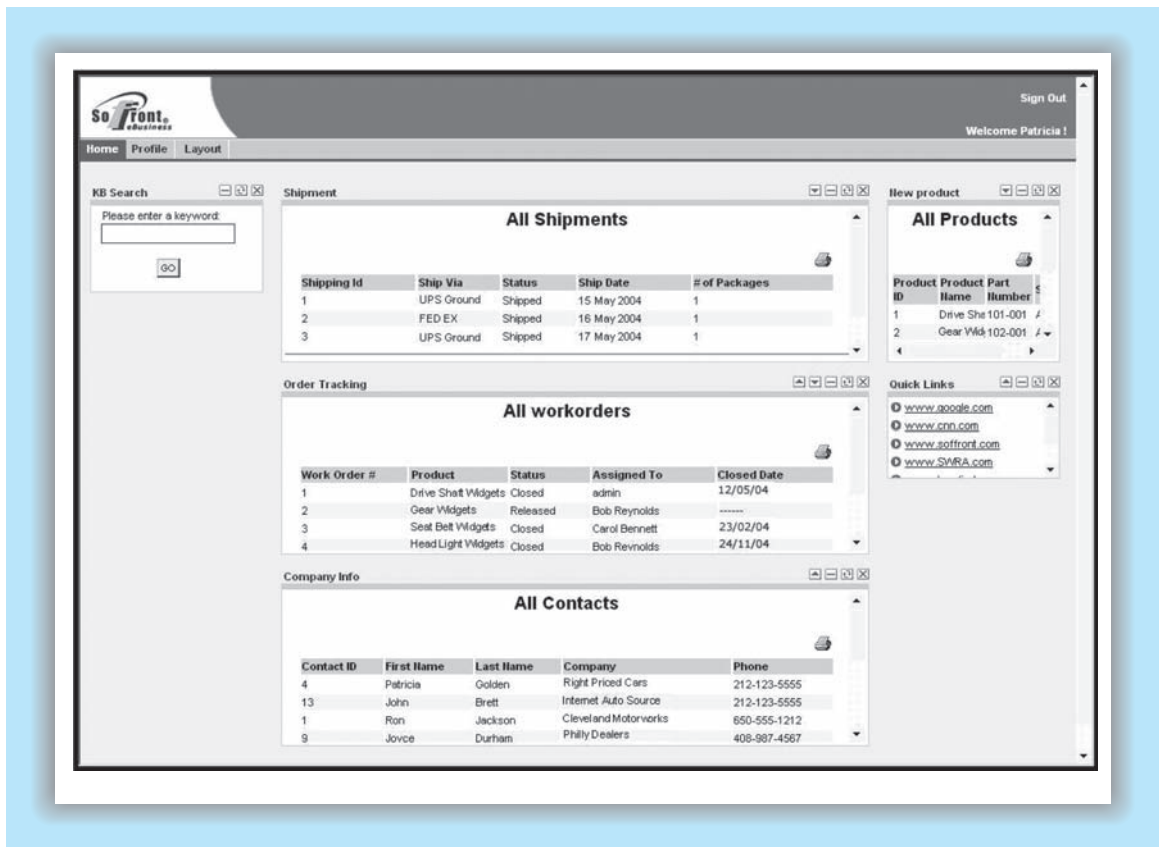


Figure 13.12 Example of a partner portal<sup>6</sup>

## CRM analytics

CRM analytics has grown in importance over the last few years. Organizations have realized that merely streamlining the customer-facing operations in sales, marketing and service is not enough. Analytics can provide a deeper insight into the customer, reflected in key CRM metrics such as customer value, satisfaction and propensity to churn. The three levels of analysis in today's CRM systems, in increasing order of complexity, are standard reporting, online analytical processing (OLAP) and data mining.

## Standard reporting

Reporting is an essential element of an effective CRM system. The foundation of CRM is an understanding and differentiation of customers – something which depends on good customer-related information. Reporting can take the form of simple lists of information, such as key accounts and annual revenues, to more sophisticated reports on certain performance metrics.

Reporting can be standardized (predefined), or query-based (ad hoc). Standardized reports are typically integrated into CRM software applications, but often need customization to suit the needs of the organization. Some customization of the report can be done when it is run, for example in selecting options or filtering criteria, but the end result is limited to what the report designers envisaged. For some industries, legislation or regulators require certain reports to be produced. Sometimes customized reports can be expensive to design and create.

Query-based reporting, on the other hand, presents the user with a selection of tools which can then be used to construct a specific report. This is far more flexible, but it is not suitable for regular, standard operational level reporting due to the time required to set up the request for information. This is a powerful tool in the right hands, as it allows specific reports to be requested, for example: ‘show me all of the customers that have expired on their maintenance agreement, in my territory, with annual revenues above \$50 000’.

As the requirement for analysis grows, the standard transactional information in the core CRM database may not be structured to deliver the best results; for this reason, online analytical processing (OLAP) has become an essential part of CRM.

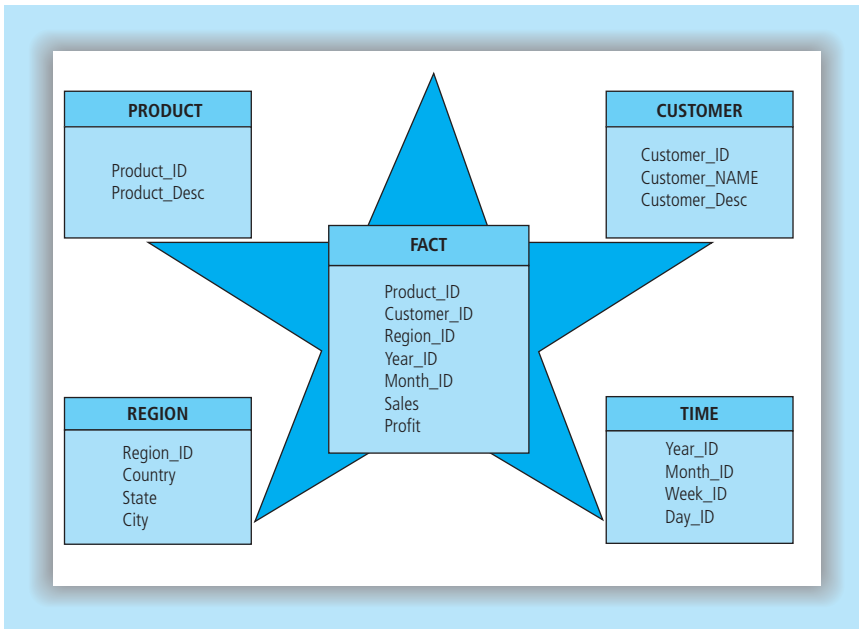
## Online analytical processing (OLAP)

OLAP technologies allow warehoused data to be subjected to analysis and ad hoc inquiry. Warehoused data is stored in one or more star schema, allowing users to drill down into graphs and tables to analyse how a certain figure or problem may have arisen. The format used is known as a star schema because it contains a central fact table surrounded by several dimension tables, giving it the appearance of a star, as in Figure 13.13.

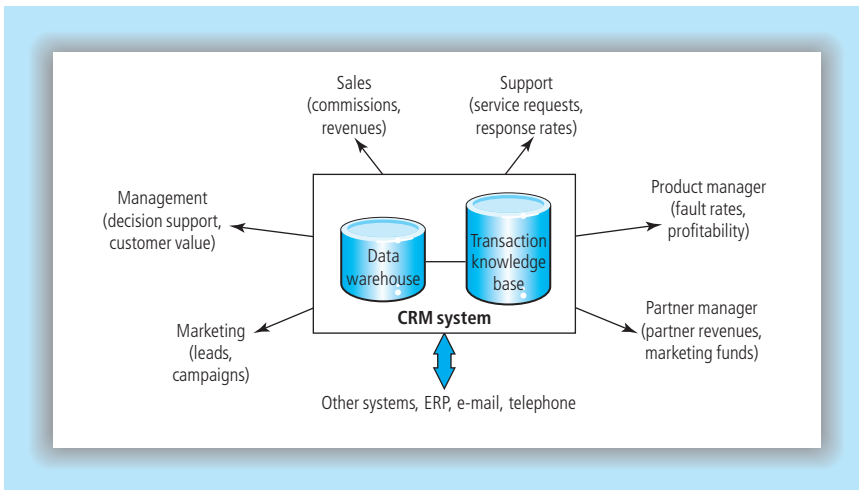
A data warehouse will typically contain several star schemas, each organized around a central fact table based on customers, opportunities, service requests, activities and so on. The customer schema, for example, may contain information such as customer sales revenue figures, volumes, cost of sales, profit margins, discounts and promotional expense. OLAP users perform analysis against one or more schemas to answer a query. The schema format lends itself to ad hoc analysis, allowing the user to drill down into summarized information to investigate the underlying detail.

Two leading OLAP products are Hyperion’s Essbase (Hyperion is now part of Oracle) and Oracle’s Express Server. Some vendors prefer to use the term business intelligence rather than OLAP.

OLAP is valuable to a range of CRM users who have different types of questions to ask of the warehoused data (Figure 13.14). Salespeople



**Figure 13.13**  
Star schema of data stored in a data warehouse<sup>7</sup>



**Figure 13.14**  
Different users demand different reports using OLAP technology<sup>8</sup>

can analyse their territory to determine revenue and profitability by customer. Service people can analyse call response rates and times. Partner managers can analyse the performance of partners by comparing marketing fund approvals to partner-generated revenues.

OLAP tools can also support decisions in real-time. For example, propensity-to-buy measures can be delivered to the call centre agent while the customer is on the telephone. This allows a tailored offer to be made that is more likely to receive a positive response from the customer. Real-time CRM is the result, an approach advocated by specialist vendors such as E.piphany (Figure 13.15).



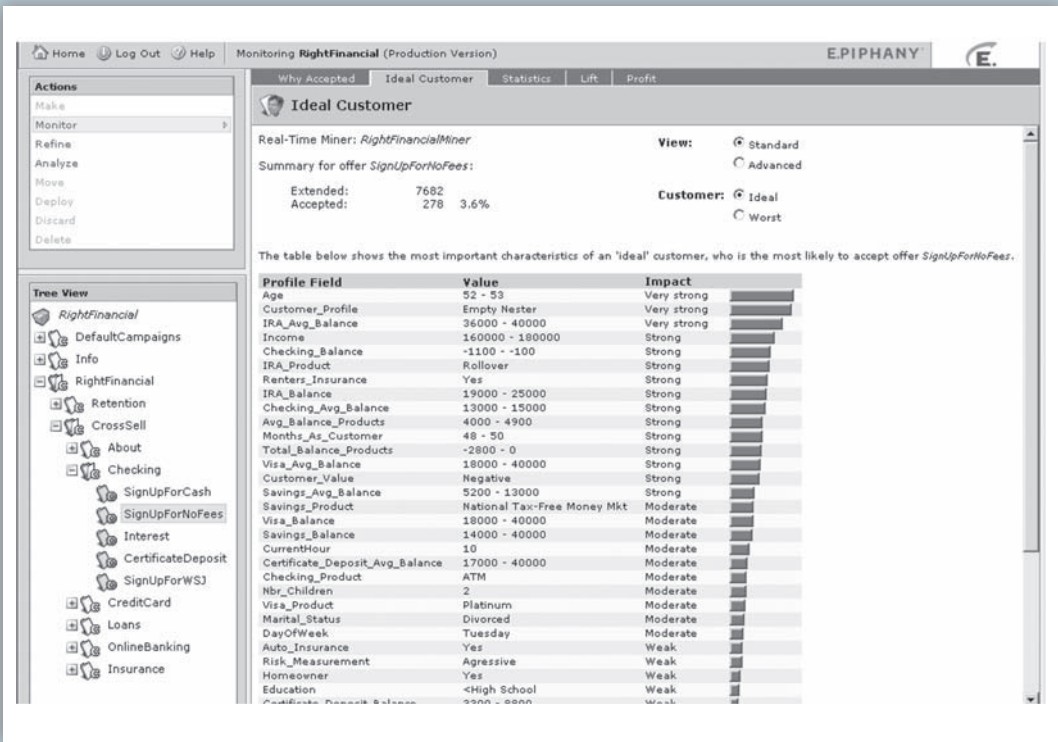


Figure 13.15 Real-time CRM analytics<sup>9</sup>

An important element in CRM analytics is the information delivery mechanism. Information can be made available on the desktop in a web browser interface with graphical layout and drill-down. This approach requires the user to search for a result. Another method of delivery involves setting trigger points (e.g. when a customer logs more than a certain number of service calls in a month). The analytics application then pushes the related information to the user via e-mail or another alert mechanism. This approach, also known as ‘publish and subscribe’, is a powerful management tool.

### Data mining

Data mining provides considerable CRM analytical power that is highly valued in some industries. Banking, telecommunications, insurance, public sector, retail and utilities all require analysis of huge volumes of consumer data, a task that is very difficult without data mining. The data mining process seeks to identify patterns and relationships in the data, using selection, exploration and modelling processes. The results include, for example, churn scoring (likelihood that the customer will

leave), fraud propensity or credit risk, customer value scoring and campaign effectiveness scoring.

A number of CRM vendors specialize in advanced analytical and data mining applications (Table 13.2). SAS Institute, for example, markets an 'Intelligence Architecture' which comprises:

- data warehousing (storage)
- business intelligence (delivery)
- analytical intelligence (data mining, predictive modelling, forecasting, simulation and optimization).

Analytical applications such as these are important in CRM. For example, customer profitability can only be used as a performance metric if it can be measured. Data mining in conjunction with an activity-based costing system allows performance against this KPI to be assessed. Operational CRM applications can also draw upon customer value or churn scores during customer dialogue, to assist in targeting and prioritizing customer offers.

## CRM architecture

A key consideration in effective CRM is the way in which the system is constructed, or the 'architecture'. Unlike purely internal systems, CRM systems must be able to operate in the office, out of the office and over the web. They must tie together multiple communication channels, each using very different technologies (web, e-mail, telephone), and they must perform well enough, and be flexible enough, to suit a constantly changing, potentially growing user community.

Very few CRM implementations are standalone; they are nearly always integrated with other inhouse systems, including back-office systems. The challenges faced by the CRM architecture, therefore, are significant. CRM architecture can become a major limitation to the delivery of desired CRM outcomes. CRM project managers must consider architectural issues, as it can be very difficult and costly, and perhaps impossible, to change the architecture of a system once it is installed.

## Multichannel CRM

There are two perspectives on multichannel CRM that have developed over the last decade: multiple communication technology channels and multiple organizational touchpoints

The challenge here is that customers may choose to browse your website for information, e-mail you for pricing, and call you to discuss discounts – expecting consistency across the whole dialogue. Multichannel CRM technology is necessary in order to deliver an enhanced customer experience, including a feeling of recognition and consistency of service across all channels and touchpoints.

## Multiple communication technology channels

Whether the customer chooses to communicate with your organization by telephone, e-mail, web chat or face-to-face, CRM technology lets you create and track a consistent dialogue that reflects the value of the customer. Strategically significant customers may expect to get priority, irrespective of the communication channel they choose. They expect their inbound telephone calls and e-mails to go to the top of the list. To achieve this, in particular where e-mails from high value customers take priority over telephone calls from lower value customers, requires a central CRM database and a technology known as universal queuing. Universal queuing lists all communications in a single queue, irrespective of their origin or technology medium, and prioritizes response based on customer value or some other variable. In order to be effectively implemented, universal queuing requires the integration of the communications infrastructure (telephone, e-mail and web systems) with the CRM application (source of customer value metrics).

## Multiple organizational touchpoints

The communications with a customer take place not only in different technology channels, but also with different people within your organization. Marketing sends out customer offers, sales representatives call to negotiate terms, and the customer calls the service desk for assistance. The marketing offer should be visible in order for the customer service agent to treat the customer correctly. This is even more important if the service desk is to perform a blended function, and cross-sell the customer an offer at the end of the service call. Finally, channel partners must be included in the communication loop if channel conflict over pricing, leads and commissions is to be avoided. The technology solution for multiple contact channels includes an integrated suite of applications for all departments, customer and external partner web portals, universal implementation across the organization, synchronization technology (to get the information into the field), and a central knowledge base for products, pricing and customer activity. While the technology challenges here are significant, the most difficult aspect of multiple contact channels is often the implementation of business processes across the departments, and externally, to allow a consistent customer dialogue.

## Case 13.1

### Channel integration at Dow Chemical

Dow Chemical, a leading science and technology organization, handles tens of thousands of customer inquiries each day across a large number of channels such as face-to-face, telephone, e-mail and the Internet. However, customer information being received through these channels was rarely consolidated. Without a comprehensive view of its customers Dow had difficulty in delivering consistent levels of service and in cross-selling other products and services.

To address this problem Dow implemented a major CRM strategy utilizing Siebel software in conjunction with a new call centre. The implementation of the strategy involved substantial redesign of Dow’s operations and IT infrastructure. The management consulting firm Accenture was also involved in implementing the strategy, which took 18 months to complete.

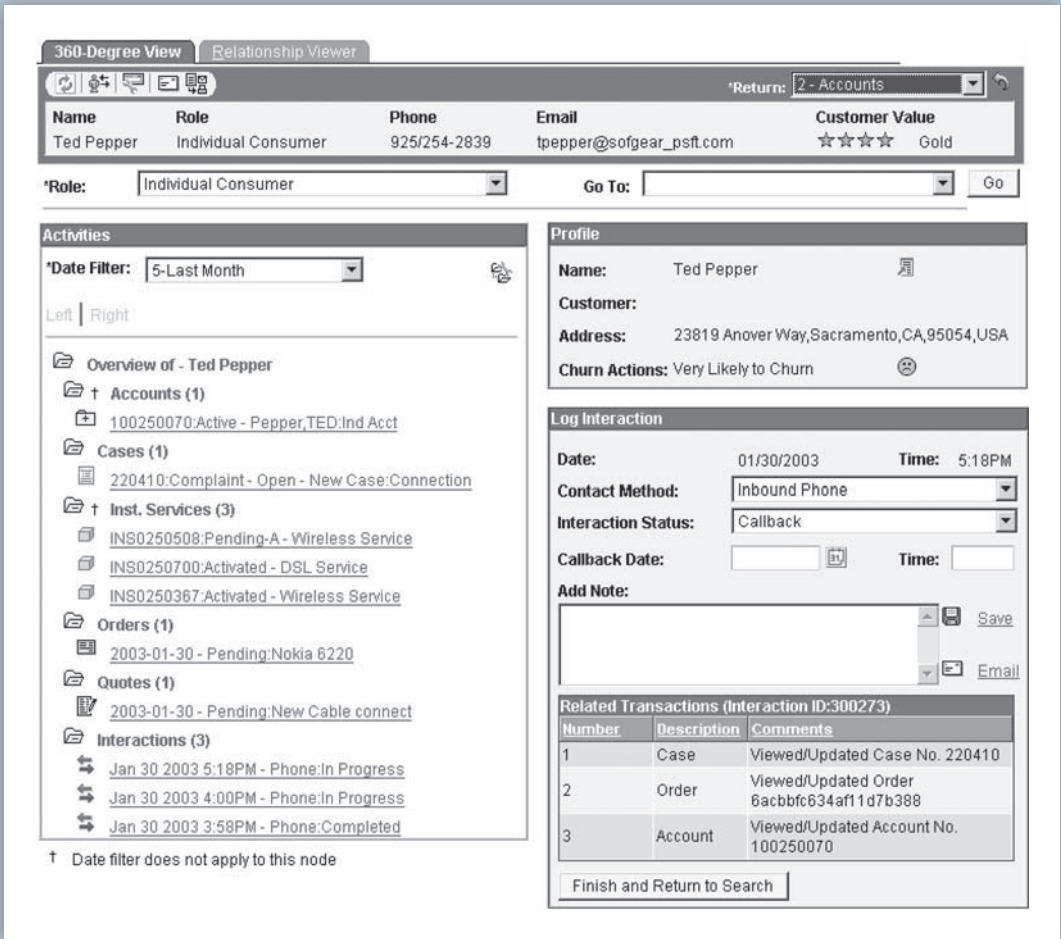


Figure 13.16 Multichannel (360 degree) view of the customer<sup>10</sup>

## Mobile and wireless solutions

Many businesses operate in the field, with salespeople, merchandisers, meter readers and service technicians making calls on customers’ home

or business premises. These people play a significant role in delivering excellent customer experience. They can only do this if they are equipped with the latest customer, product and technical information. The two main technologies that are available to support such mobile professionals are mobile (synchronized) and wireless (online).

- **Mobile synchronized** solutions include a handheld or laptop device with a small resident database that is a replica of the particular individual's information in the main CRM system. These systems are not online or permanently connected, but they rely on sophisticated synchronization technology to filter the information that flows onto the relatively small handheld device. The user synchronizes the device when convenient, for example before leaving home, office or depot in the morning. The advantage of such systems is that they operate in environments that could not otherwise sustain a permanent connection, such as aeroplanes, remote areas and basements. Mobile CRM clients can be as functional as their connected in-the-office counterparts. The disadvantage of mobile is that the synchronization process can be complex and unreliable, or may not scale well to large numbers of users with some vendor technologies. The mobile client may employ different technology to the connected client, and so may be functionally inferior. Another disadvantage is that information is only as current as the last time it was synchronized. Despite this, the mobile synchronized solution is currently the most widespread and accepted for mobile professionals.
- **Wireless online** solutions also typically involve a handheld device. However, this device is connected to the main system using a wireless data connection. Technologies such as 3G, 4G and Bluetooth have enhanced the wireless online experience. Modern wireless broadband networks have largely removed the cost and performance penalties that were previously associated with wireless online solutions, especially in metropolitan areas. The advantage of being continuously online, with all the ensuing benefits of data currency, may offset the relatively minor connection and data cost differences.

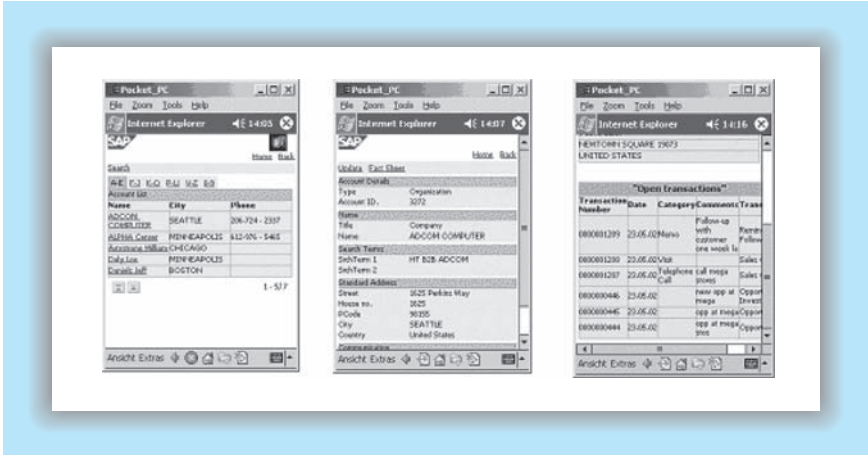


Figure 13.17  
Sample handheld  
screen views<sup>11</sup>

# Integration

Integration is a major IT topic in its own right. Specialist integration middleware providers, such as Webmethods, IBM, SeeBeyond and Tibco, play an essential role in large-scale, complex CRM projects.<sup>12</sup> However, not all CRM integration requirements are complex. The integration challenge is largely a function of the complexity of the applications environment and the need for timeliness of information transfer. This gives rise to the two main types of integration: batch and real-time.

- **Batch processing** is technically simpler than real-time, and can handle larger volumes with less impact on system performance. Batch processing stores information in a file or batch, and then moves the information across the interface into the destination system in one go. However, the delay in moving the information may be costly in terms of revenues lost and inadequate customer experience. Many batch processes only run overnight, meaning the information is always a day old in the destination system. International organizations that trade across time zones face a more complicated task, in that batch processing has to be synchronized with night time in different geographies. In general, it is preferable to use batch integration where it will suffice, for example when transferring information that does not change often, such as part number details.
- **Real-time integration** takes place immediately. For example once a customer record is updated in one system, the change is immediately reflected in the destination system. Some forms of integration, for example telephony integration, must always be real-time, as the customer is on the phone at the time.

Whatever the integration method – batch or real-time – CRM systems generally face four integration challenges.

## Application integration

Application integration ties together the CRM system and other business systems, such as accounting, billing, inventory and human resources. This type of integration can be either batch (for example, all records are changed at the end of day) or real-time (when an order comes in, it is put through to the warehouse immediately).

Application integration can be provided as standard by the CRM or other system vendors. However, in many cases this standard integration requires modification. Integration can also be handbuilt, although this becomes costly over time, as the interface between systems must be rebuilt each time a software upgrade is performed. Complex integration situations, where there are many applications requiring integration, normally require specialist integration middleware solutions that handle the flow of information or messages between applications. These solutions typically deploy standard systems connectors for the most common applications.

## Telephony integration

Telephony integration ties the CRM application into the telephone system, allowing inbound calls to be routed to the right person based on caller profile, and outbound calls to be automatically made from the call centre desktop. At financial services organization Capital One, this has meant that calls from customers who have not used their credit card for the last two months are routed to a customer retention specialist. At Qantas Airlines, if the call is from a customer who has recently made a booking, it is routed to reservations; otherwise it goes to general customer service. The effectiveness of the integration solution for telephony is essential to the success of large-scale contact centres. In addition, technologies such as universal queuing and predictive dialling can be deployed to further refine the contact handling process.

Predictive dialling technologies are aimed at optimizing the productivity of call centre agents. These technologies monitor the call times, and predict when an agent is likely to complete the current call. The system will then dial the number of the next call, anticipating a pickup by the customer at the precise moment that an agent will complete the current call, hence minimizing unproductive time. While these systems can increase call rates, they must be carefully managed to ensure the quality and effectiveness of the customer interaction are satisfactory, and that agents do not suffer burnout from the increased workload.

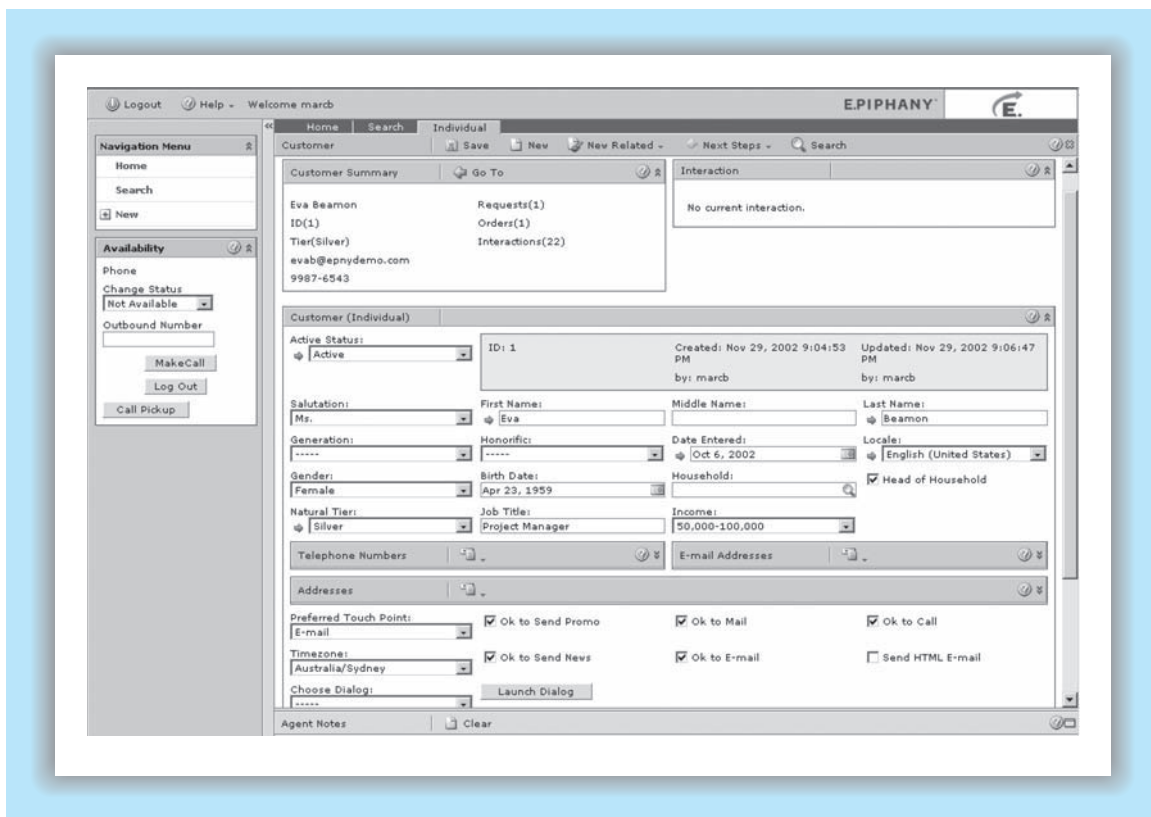
## E-mail integration

This is a similar form of integration to telephony in that it streamlines communications with the customer. It normally requires quite different technologies to be deployed. E-mail integration can involve both the generation of e-mails as a result of an internal workflow process (e.g. once an order is ready for shipment, automatically e-mail the customer to advise despatch details), and automated e-mail routing and response.

E-mail response applications have developed quite sophisticated capabilities. Simple applications include automatic acknowledgements, such as responding to an inbound e-mail to the service desk, advising that the e-mail has been received, and the associated service request tracking number. More sophisticated applications can be designed to read inbound e-mails, recognize key phrases or patterns and automatically respond with the most probable answer (see Figure 13.19). These systems can learn over time. However, they can create a negative customer experience when the customer receives a response that does not address their issue.

## Web integration

A significant challenge for many organizations implementing CRM is the integration of the website. Most modern business have a website, and



**Figure 13.18** Call centre service application showing telephony integration on the left, in the window titled 'Availability'<sup>13</sup>

this website contains large amounts of content that is duplicated in the CRM system (customer registration details, solution knowledge base, product information, price lists, etc). The ideal position is for the website to draw this information from the CRM system, using integration technologies, or for the web application to be part of the core CRM system. Any unnecessary duplication of information will most likely result in errors and increased work, not to mention an unsatisfactory experience for the customer when, for example, the call centre advises a different price to the one on the website.

Web integration may also involve web chat or web collaboration. These technologies allow an organization to assist the customer over the web, without them having to leave the web page they are in. Examples include a simple call back over a telephone line, using a number provided by the customer, web text chat whereby the customer and the agent can have a dialogue over the web using chat windows, and interactive collaboration where the agent can effectively take control of the customer's mouse pointer and help them to fill in a form or find a document.



**Approve Email**

11/09/01 10:58:21 AM PDT My Time Zone

Email ID	Email Subject	Date Due	Customer	Status
34568	Help! My printer deos not work.	05/31/2002	Joe Smith	Open

**Profile**

Name: Joe Smith

Role: Contact

Customer: Smith Associates

Customer Value: 1000

Primary Phone: 415-777-2459

Primary Address: 4460 Hacienda Blvd, Pleasanton, CA 94588

Primary Email: citicorp@citicorp.com

**Related Objects**

Type	Object ID	Summary
Lead	56789	Printer Model 2005 Lead
Case	98765	Printer Driver Problem

Relate New Object:

Date Due: 05/31/2002

Date Received: 05/29/2002 08:00:00 AM PDT

To: joe@smith.com

From: printers@ecme.com

Subject: RE: Help! My printer won't work.

Response Template: Header and Footer

Message:

Dear Joe,

A Customer Support case has been created for your problem, CaseID 99999. You might want to consider buying a new printer too. If you are interested, please call our Sales Hotline at 1-800-222-3434.

For future correspondence related to this email, please respond with all previous text included.

Attachments: warranty.doc

Include Suggested Responses				
Select	Relevance	Response ID	Summary	Source
<input checked="" type="checkbox"/>	95%	87543445	Drivers for printer model 2002	Case
<input type="checkbox"/>	70%	34478783	Buy a new printer	Sales
<input type="checkbox"/>	50%	46798765	Add paper to the paper tray	Support
<input type="checkbox"/>	25%	96455425	Replace ink cartridge	Support

Figure 13.19 E-mail response screenshot<sup>14</sup>

## Web browsers

Web browser technology has become an essential ingredient of modern CRM systems, because of their ubiquitous accessibility to customers and channel partners. Conventional client/server technologies are not suitable for customers or partners, as they require the customer or partner client PC to have CRM software installed on it. An organization can neither expect, nor support, large numbers of customers having to install and maintain the company's CRM software. Browser-based systems, on the other hand, require only a standard browser (perhaps of a certain release level) to be installed on the client machine. The CRM application then typically communicates with the web browser using HTML (hypertext markup language) or DHTML (dynamic HTML).

Browser technologies have other benefits that are important to CRM. The hyperlink-driven user interface is ideal for the loosely structured flow of most customer-facing dialogues. The ubiquitous nature of the web also makes it relatively easy for people to learn how to navigate in such an application. This is particularly important with customer- and partner-facing applications.

Web technologies also play an important role in integration and mobile solutions. XML (extensible markup language), a standard, flexible format for the description of documents over the web, is becoming a standard language for integration between applications. The CRM application may communicate with the accounting system, for example, using XML. Wireless mobile solutions are also implemented using web servers and WML (a compact, wireless form of HTML) as a means of transferring information to and from the mobile device.

## Knowledge management

A central contributor to effective CRM is storing and leveraging customer-related knowledge. Note the use of the expression 'customer-related'. We are not just talking about customer knowledge. Knowledge about customers includes not only structured data such as contact history and account balances, but unstructured information such as letters and faxes from the customer, and notes on telephone conversations. Customer-related data also includes a wealth of other types of information that is useful in marketing, selling and servicing the customer. This ranges across product features and benefits, price lists, competitors' offerings, market research, service issues, business processes, company policies and much more.

Knowledge management can be defined as follows:

Knowledge management is the organizational practice of consciously gathering, organizing, storing, interpreting, distributing and judiciously applying that knowledge to fulfil the mission of the organization.

The achievement of the CRM vision depends largely on how well knowledge is deployed at customer touchpoints. In Chapter 4 you read about six attributes of good quality data, captured in the mnemonic STARTS: shareable, transportable, accurate, relevant, timely, and secure. Information available at the touchpoints needs to satisfy those six same criteria.

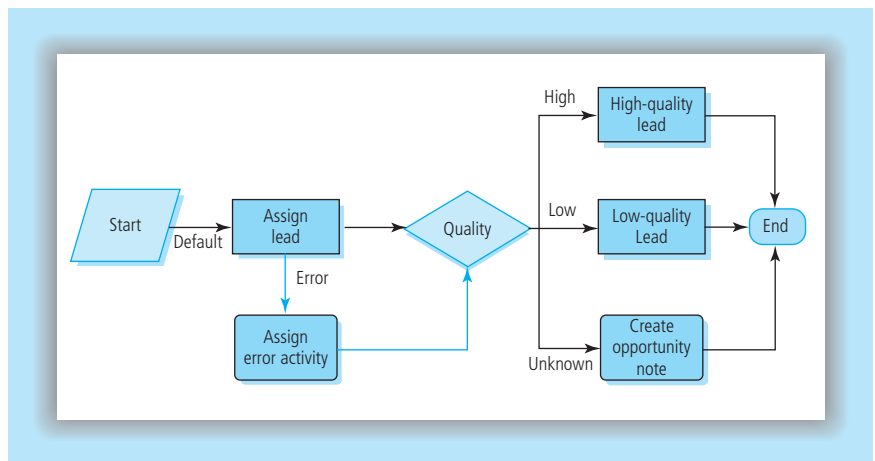
Information needs to be **shareable** if several users require access to the same data at the same time, as might happen in the case of product specification data. Information also needs to be **transportable** from storage location to user. Data need to be made available wherever and whenever users require, on the website and on a service engineer's laptop. Information also needs to be suitably **accurate**. Price lists and transaction histories need to be absolutely up to date, whereas it might be acceptable for market-related data such as industry sales forecasts to be 12 months out of date. **Relevant** information needs to be available at the touchpoints. Sales representatives do not want to wade through

masses of irrelevant information before they find what they need. **Timely** knowledge is available when needed. Knowledge that is important for competitive advantage needs to be **secure**.

The STARTS attributes have driven many companies to develop an IT-based knowledge management system which is capable of capturing, storing, organizing, interpreting (using data-mining tools) and distributing knowledge to users at customer touchpoints, so that marketing, sales and service objectives are accomplished. Knowledge bases need to be quickly accessed and searched for answers to ad hoc queries. Without a shareable, editable and searchable knowledge base, service people may resolve an issue but never share this solution with colleagues. A key element in being able to solve future customer issues is a way of storing symptoms verses resolutions, and categorizing service requests so they can be filtered and analysed. This knowledge base can be used for solution searching and issue resolution in the future, by service agents, partners and customers over the web on an intranet or extranet.

## Automated workflow

Many customer-related processes can be predefined and automated in modern CRM applications, meaning that business rules that are critical to the success of sales, marketing and service no longer need to be manually managed. Workflow technologies can also be programmed to monitor for predefined conditions. They then respond to these conditions in a predictable and satisfactory manner (Figure 13.20).



**Figure 13.20**  
Example of a workflow process for lead assignment<sup>15</sup>

Automated workflow engineering applies to many CRM processes, including the following:

- **Service enquiry escalation:** 'if a service call is 20 hours old and is high severity, and is for a high value customer, and the status is not resolved, page the service manager'

- **E-mail response:** ‘when an e-mail comes in from a customer in the southern region, automatically respond with the following...’
- **Lead assignment:** ‘when a lead comes in from the website, look at the product being offered, the territory, and the current workloads of my salespeople, and assign the lead to the best person’
- **Dialogue scripting:** ‘when a customer calls in, prompt the call centre agent with a standard welcome script. Register the customer’s response, then determine the best course of action, and offer the agent a script accordingly. Continue this process to increase the chance of up-selling the customer’
- **Log-in navigation:** ‘if the customer does not offer their password, automatically navigate the user to the customer identification screen’
- **System integration:** ‘if the customer submits a confirmed order, automatically post it to the fulfilment system for verification and despatch’.

Workflow functionality is usually embedded into enterprise and mid-market CRM applications, and speciality CRM applications such as sales, marketing and service automation.

## Summary

In this chapter you’ve learned about the technologies that support the achievement of CRM outcomes. Today’s CRM technology has evolved from a range of standalone technologies, some of which date back to the 1970s and earlier. However, since the 1980s, some organizations have consolidated these disparate technologies into unified CRM offerings. The CRM ecosystem is made up of three major groups: CRM solutions providers, hardware and infrastructure vendors, and service providers. Most CRM solutions, whether from enterprise, mid-market or speciality providers, are broadly aligned with the primary front-office functions of marketing, sales and service. CRM analytics has grown in importance over the last few years. Organizations have realized that analytics can provide a deeper insight into customers, for example, their value, satisfaction and propensity to churn. Most CRM technologies allow users to receive a number of forms of management report, based, in order of complexity, on standard reporting formats, online analytical processing (OLAP) and data mining.

A key consideration in effective CRM is the system’s architecture. Unlike internal systems, CRM systems must be able to operate in the office, out of the office, over the web, and they must tie together multiple communication channels using technologies such as the web, e-mail and telephone. Very few CRM implementations standalone – they are nearly always integrated with other inhouse systems, including back-office systems. Many marketing, selling and service processes are predefined and automated in modern CRM applications, using workflow technologies. Another important technological contribution to effective CRM is storing and leveraging customer-related knowledge. Many companies have invested in knowledge management systems as a consequence.

In sum, CRM information technology enables consistent customer interaction across multiple channels of communication, encompasses mobile and web technologies, customer knowledge management and analytics, process automation through workflow technologies, integration with other systems and technologies, and a broad suite of applications, over marketing, sales, service and partners, all of which may be customized or pre-configured for industry-specific requirements.

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