

Airline Customer-Centric E-Business (CCEB) System Meta Model
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Airline Customer-Centric E-Business (CCEB) System Meta Model and Data Warehouse

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Abstract

Most Airlines are in business to win, to outperform their competitors. They are in business to make money. They adopt new business models and technologies to fend off new competitors, reinforce an existing competitive advantage, leapfrog competitors, or to just make money in new markets.

This paper aims to develop a Customer-Centric E-Business (CCEB) System Meta Model for airline to achieve long-term performance, and the relationship between CCEB and Data Warehouse. System engineering method and information technology are used in this model. According to system engineering hierarchical system model, CCEB model has four layers: Passenger Interactive Layer; Passenger Data Warehouse Layer; Airline Business Function Layer and Effective Layer. Data warehousing technology play a very important role in CCEB model, Data warehousing is a valuable, proven approach to providing airline managers at all levels of an airline with the information they need to make high-impact decisions – only if the right technologies, architecture, and techniques are used. In essence, a data warehouse is managed data beyond the every day operational system structure. It consists of airline business related data obtained from various sources and then formatted to meet airline's customer management strategy. The data warehouse technology facilitates informed business decisions by providing a means for the collection, consolidation and organisation of data for reports and analysis. The key of data warehousing is that data is stored for business purposes or for analysis can be more efficiently used if stored outside the operational system.

KEY WORDS: AIRLINE E-BUSINESS, AIRLINE E-CRM, AIRLINE DATA WAREHOUSE, CCEB SYSTEM

INTRODUCTION

The impact of the Internet on airlines' competitive advantage has been phenomenal. At the same time and reflecting its importance, the phrase "business model" has also found its way into the vocabulary of just about everyone who must manage or work in airline industry with an Internet content.

Survival in the new E-economy seems to be the key priority for business today.

Over the past few years the pace of change in business has radically accelerated - and the principal driver behind this change has been communication. Technology such as the Internet has contributed to the emergence of the global economy whilst information technology now allows companies to engage in far richer and relevant communication to customers to strengthen and enhance business relationships (NCR, 1999).

Based on the analysis of drivers for airlines to change from traditional business model to e-business model; Coupled with this are massive advances in e-Business with initiatives in the customer relationship management, such as Frequent Flyer Program (FFP), which allow airlines to meet the increasing pace of today's business and achieve far greater operational efficiency.

DEFINITION OF AIRLINE E-BUSINESS MODEL

E-business and *e-commerce* are often used concepts in conjunction with the use of Internet technology by enterprises and end consumers. There is a subtle but important difference between e-commerce and e-business. To explain the difference, Hartman et al. (2000) use the following definition (similar definitions exist, e.g. Turban et al. (2002)):

An e-business initiative is any Internet initiative - tactical or strategic - that transforms business relationships, whether those relationships be business-to-consumer, business-to-business, intra-business, or consumer-to-consumer. An e-commerce initiative is a particular type of e-business initiative that is focused around individual business transactions that use the Internet as medium of exchange, including business-to-business as well as business-to-consumer.

These definitions differ mainly in scope: e-business is about supporting and enabling business relationships in general, while e-commerce is about business transactions between different companies and/or end-consumers.

Airline e-business model is the strategy by which an airline plans to make money long-term using the Internet. Airline e-business model can be conceptualized as a system that is made up of components, linkages amongst the components, and dynamics—that takes advantage of the properties of the Internet to make money. It takes advantage of the properties of the Internet in the way it builds each of the components—value, scope, revenue sources, pricing, connected activities, implementation, capabilities and sustainability—and crafts the linkages among these components. It is what, preferably, enables an airline to have a sustainable competitive advantage.

Airline business model is about the value that an airline offers its customers, what segment of customers it targets to offer the value to, what scope of products/services it offers to which segment of customers, what its sources of revenue are, how it prices the value that it offers its customers, what activities it must perform in offering the value, what capabilities these activities rest on, what the airline must do to sustain any advantage that it has, and how well it can execute (implement) these elements of the business model. It is a system, and how well a system works is not only a function of the type of components, it is also a function of the relationships amongst the components. Thus, if the value that an airline offers its customers is low cost, then the activities that it performs should reflect that. Take the bricks-and-mortar example of Southwest Airlines. In the 1980s and 1990s, it offered its customers low cost frequent flights (Porter, 1996, Afuah, 2001). Two of the activities that the firm performed—no meals on its flights, and flying only out of uncongested

airports—were consistent with this low cost strategy. In addition to the relationships amongst the components of an airline's business model, there are also the relationship between the business model and its environment. A good business model is always trying to take advantage of any opportunities in its environment while trying to dampen the effects of threats from it. The right business model components and linkages do not last forever. Managers often have to change some components or relationships before competitors do it for them.

DRIVERS FOR AIRLINES TO CHANGE TO E-BUSINESS

Developments in information technology including the Internet, together with the wider availability and ownership of cheaper personal computers, have been driving the penetration of electronic business in many service sectors and industries of which air transport is only one. Paul Coby, CIO of British Airways, made the case very powerfully in June 2004. *'I believe that technology is changing the face of the airline. In this, IT is fundamental and it is frontline'* (*Airline Business July 2004*).

The first driver for change has been the need to *cut distribution costs*. In 2002, Ticketing, sales and promotion costs, taken together, presented 14 percent of IATA member airlines' total operating costs (Dogsnis, 2005)

More dramatic cost reductions could be achieved by maximising the opportunities offered by e-business. By selling direct to customers, whether passengers or freight forwarders, airlines could cut out commissions altogether for that part of their inventory that was sold in this way. Avoiding commission payments could reduce total distribution costs by up to 43 per cent. If, while selling online, ticketing is provided through automatic ticketing machines then ticketing costs can also be reduced. Or one can go all the way and provide ticketless (E-ticket) travel. For example, America West, a medium-sized US domestic airline, claimed in 1999 that direct distribution costs could be reduced from \$23 to \$6 per ticket by online sales (*Airline Business, July 1999*).

Massive investment in both business-to-business (B2B) and business-to-customer (B2C) information systems is expected to translate into important cost savings in procurement, sales, billing and other support activities. The airline's fully automatic ordering system, for example, should reduce order processing costs by 90%, according to Chairman/CEO Juergen Weber of Lufthansa Aviation Group. (*Aviation Week & Space Technology/May 15, 2000, p40*).

The second major driver for change is the strong trend towards *disintermediation*, which aims to bypass travel and freight agents, or other intermediaries, so as to link the airlines directly to their customers.

While the ability of travel agents to influence customers' choice of airline is declining, effective use of the Internet provides airlines with *increased marketing power*. The need to take advantage of the unique opportunities offered by the Internet is the third driver pushing airlines into e-commerce. The Internet enables them to market their services worldwide, cheaply and effectively to anyone who has access to an online computer, without having to deal with and through hundreds, if not thousands, of travel agents. Travel information on their website can be clear, correct, precise and uncluttered. Changes to services, schedules, prices or other information can be made available to customers or potential customers anywhere in the world instantaneously.

In fact, effective use of the Internet to interact directly with customers can help airlines create new markets, particularly those based on last-minute impulse buying.

It should be borne in mind that the Internet can be much more effective as a direct marketing tool than the telephone because customers can view things on their screens that they cannot 'see' on the phone. They can be shown photographs or even films of locations, hotels or airports.

AIRLINE FROM TRADITIONAL BUSINESS MODEL TO E-BUSINESS MODEL

Airlines in today's global marketplace are faced with increased competition and shirking profit margins. The challenge is sustaining and creating profits in the face of heavier competition and

product homogenisation. The opportunities are in managing customer relationships, controlling costs and applying customer profitability to the entire business.

To be effective in today's turbulent markets, airlines must put the customer to the forefront, sometimes referred to being customer-centric. Airlines should define customer-centric models that give greater recognition to customer needs, the channels open to them and the products and services available through them. Figure 1 and Figure 2 illustrate the difference between traditional model (airline-centric) and new business model (passenger-centric).

Significance derived from Customer-Centric E-Business (CCEB) implementation will allow for new business model, based on the wide availability of information and its direct distribution to end-customers.

- Directly connect airlines and passengers.
- Support fully digital information exchange between airlines and customers, reduced cost of a customer contact
- Suppress time and place limits
- Support interactivity and therefore can dynamically adapt to customer behaviour
- To be able to satisfy customers' need, build customer confidence and retention.
- Can be updated in real-time, therefore always up-to-date.
- Enhance airlines competitive advantages over its rivals
- Profitable and sustainable revenue growth.

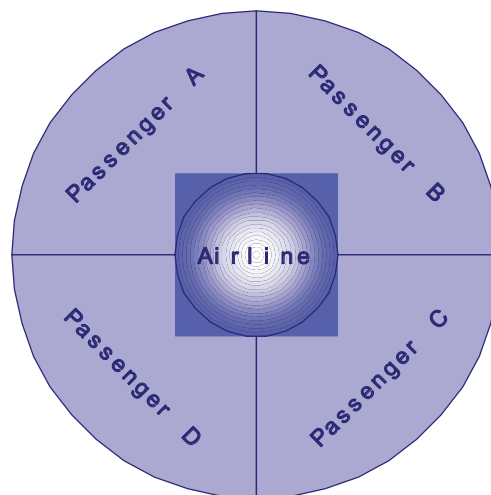


Figure 1: Traditional airline business model

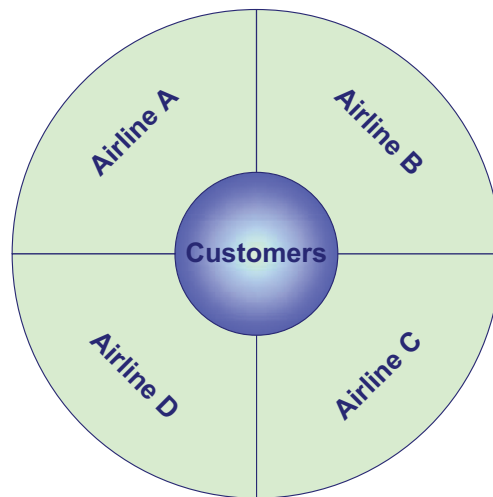


Figure 2: Customer centric airline business model

AIRLINE CUSTOMER CENTRIC E-BUSINESS (CCEB) META MODEL

For this research, the B2C and a number of hierarchical system components are integrated together to design to the CCEB system. Figures 3 to 7 illustrate the CCEB system building blocks which give insight into its system hierarchy. The hierarchy identifies sub-systems and their functions at various system levels.

Passenger Interactive Subsystem (Figure 3)

An airline must be able to touch its customers and prospects in a myriad of ways, including call centre, site visits, IVR (Interactive Voice Response), digital TV, and fixed and mobile Internet.

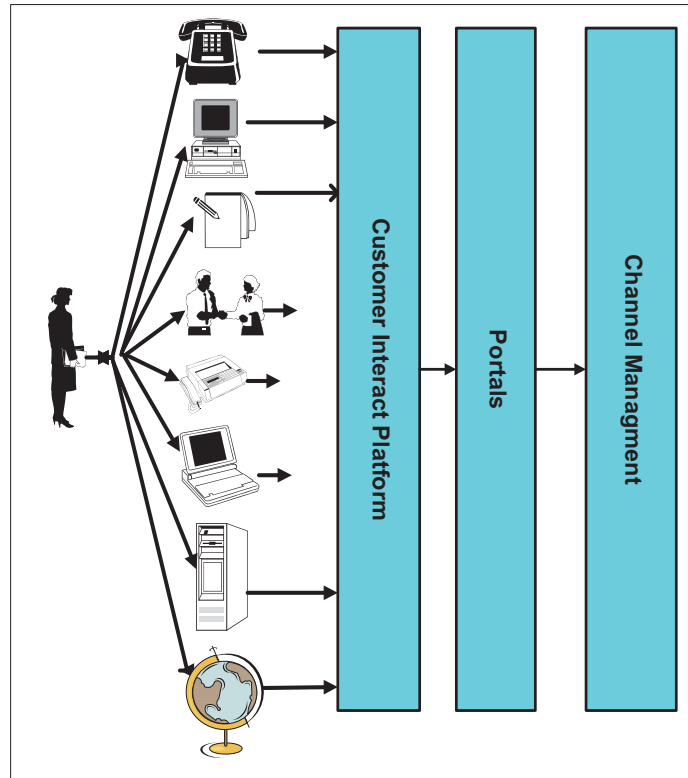


Figure 3: Passenger Interactive Subsystem

Passenger Data Warehouse Subsystem (Figure 4)

Passenger data warehouse collect data from passenger computer reservation system, web booking system, check-in system, cargo system, etc.

Most airlines are data rich and information poor. Data streams in to and through, multiple operational systems every second of every day. In the sense that it is not used for good purpose, most of this information is wasted. Some is even discarded. As a result, the right questions are being asked, but the answers are not readily available.

Data warehousing use OLAP (Online Analytical Processing) and data mining technique to transfer passengers' information to Customer Operation Data Store, it is the base for airline business operations.

A customer's information enters an airline's data warehouse after they contact an airline. The data warehouse treats this information to become data, which form the Customer Operation Data Store though OLAP and data mining.

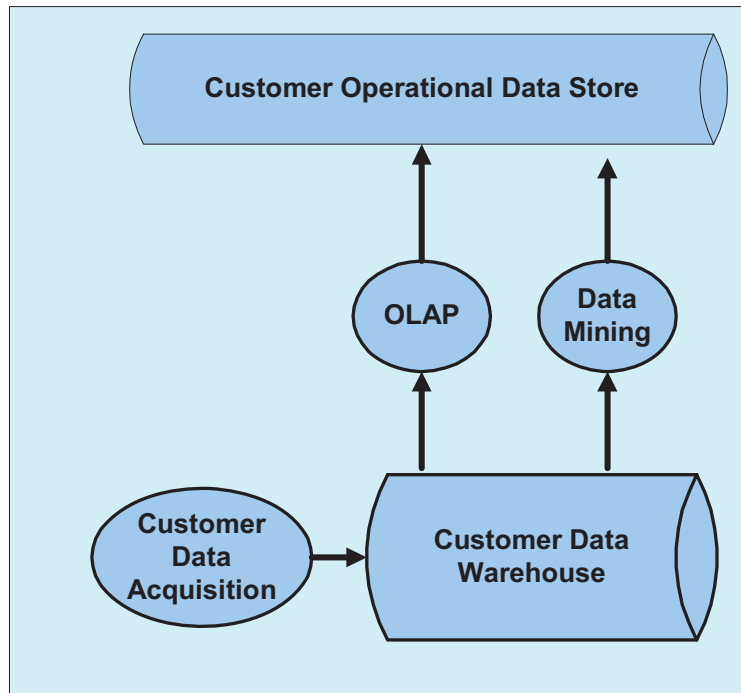


Figure 4: Passenger Data Warehouse Subsystem

Airline Business Function Subsystem (Figure 5)

In general, airline business operation function includes:

- Customer analysis
 - Know your customer portfolio
 - Know your customers' value
 - Know your customers' behaviour
 - Know your customers' satisfaction
- Marketing
 - Product
 - Price
 - Promotion
 - Place
- Sales
 - Cross-over sale
 - Up-over sale
- Services
 - Pre-departure service
 - In-flight service
 - After-arrival service

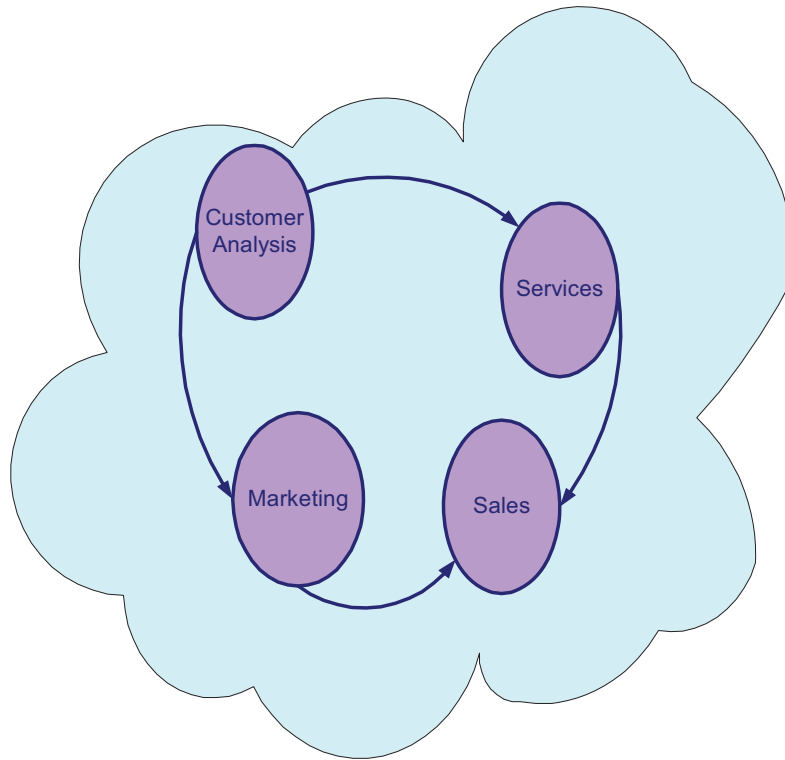


Figure 5: Airline CCEB Operations Subsystem

Effective Subsystem (Figure 6)

Today, more and more airlines are using the Internet to implement e-business applications and these applications can be very resource intensive.

With CCEB, airlines can increase sales and customer loyalty. This strategy can improve sales effectiveness, bring higher value to all of airline's key business relationships, help airline to understand what each client relationship is truly worth, develop and reinforce a consistent experience for customers, improve management effectiveness, improve tactical and strategic planning, respond faster to competitive challenges, use critical resources more efficiently, and reduce administrative burdens and overall cost.

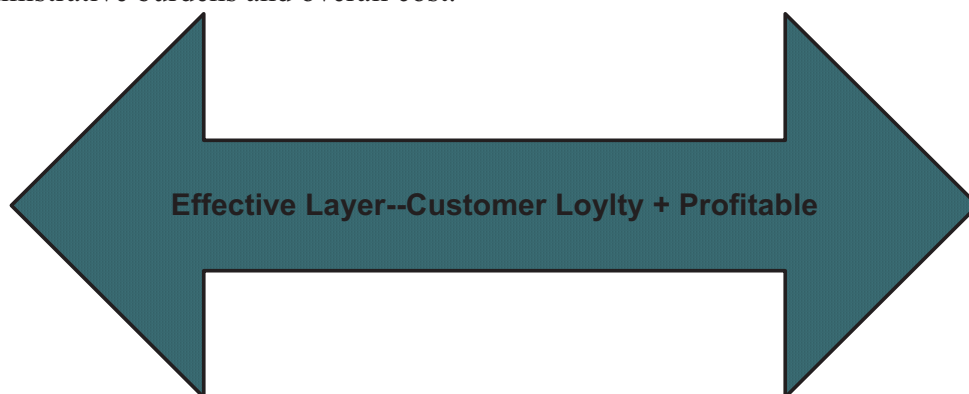


Figure 6: Effective Subsystem

Put four layers together (Figure 7)

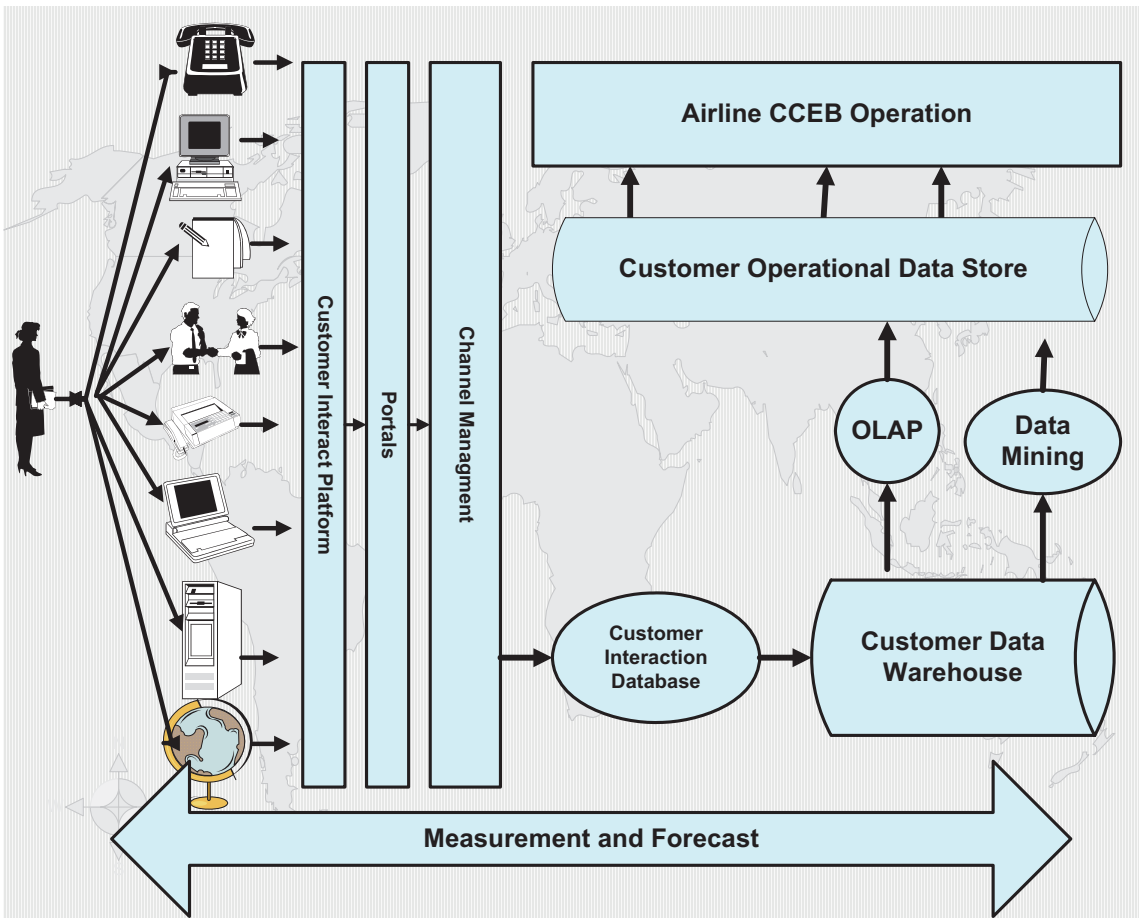


Figure 7: Integrated CCEB system

CCEB Process Flowchart

Figure 8 illustrates CCEB process for passenger and Figure 9 shows the complete CCEB process for airline users.

When a passenger needs to travel by air (Figure 8) they may start with an airline’s homepage through Internet portals e.g. search engines. Most airline websites ask passengers to register or for membership numbers. This means airlines can access passenger information once they become a member, and track travel frequency and ticket purchase history, even frequency of log ins. Airline web pages therefore become the contact point between airlines and passengers. There are three options for passengers who use an airline’s web page:

1. Some passengers may need information such as timetables or airfares.
2. Others want to book a ticket (paper or e-ticket) though the Internet.
3. Others want to pay for their ticket through the Internet (B-pay) or use the Internet to check in (e-check in) by themselves.

Once an airline gets a passenger’s information through the Internet, they can analyse the passenger’s data and put them into the CCEB operation subsystem. The CCEB Operation subsystem includes three sub-subsystems: Marketing, Sales, and Service. All are based on data from the Data Warehouse subsystem.

If passenger needs are satisfied by the airline’s web pages, passengers will tend to move onto an airline’s other products. This satisfaction leads to added value for airlines.

Airlines then need set up some performance indicators to measure e-CRM’s effects. The loop ends with feedback from passengers and finishes at system exit. Figure 10 shows the CCEB process

flowchart for airline users. For security reasons, each is assigned a username and password to enter the system and access database. The system user can edit and analyse the passenger database, which hold critical information for CCEB. After providing CCEB operations including marketing, sales, and service, the system user may choose System maintenance, System upgrade or System disposal to end the system's life cycle.

User interfaces for passengers and airline users must be friendly and easy to navigate.

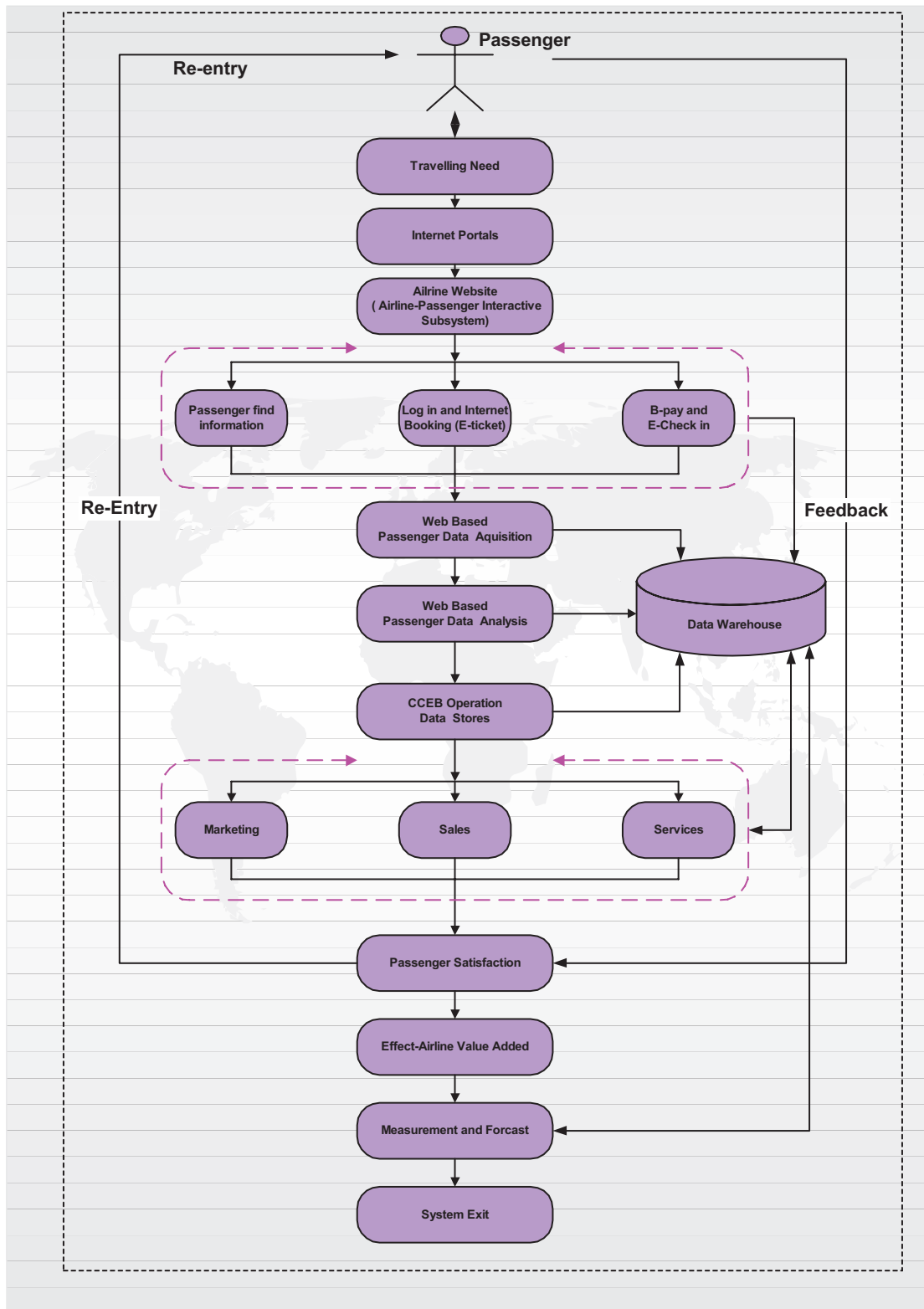


Figure 8: CCEB process for passengers

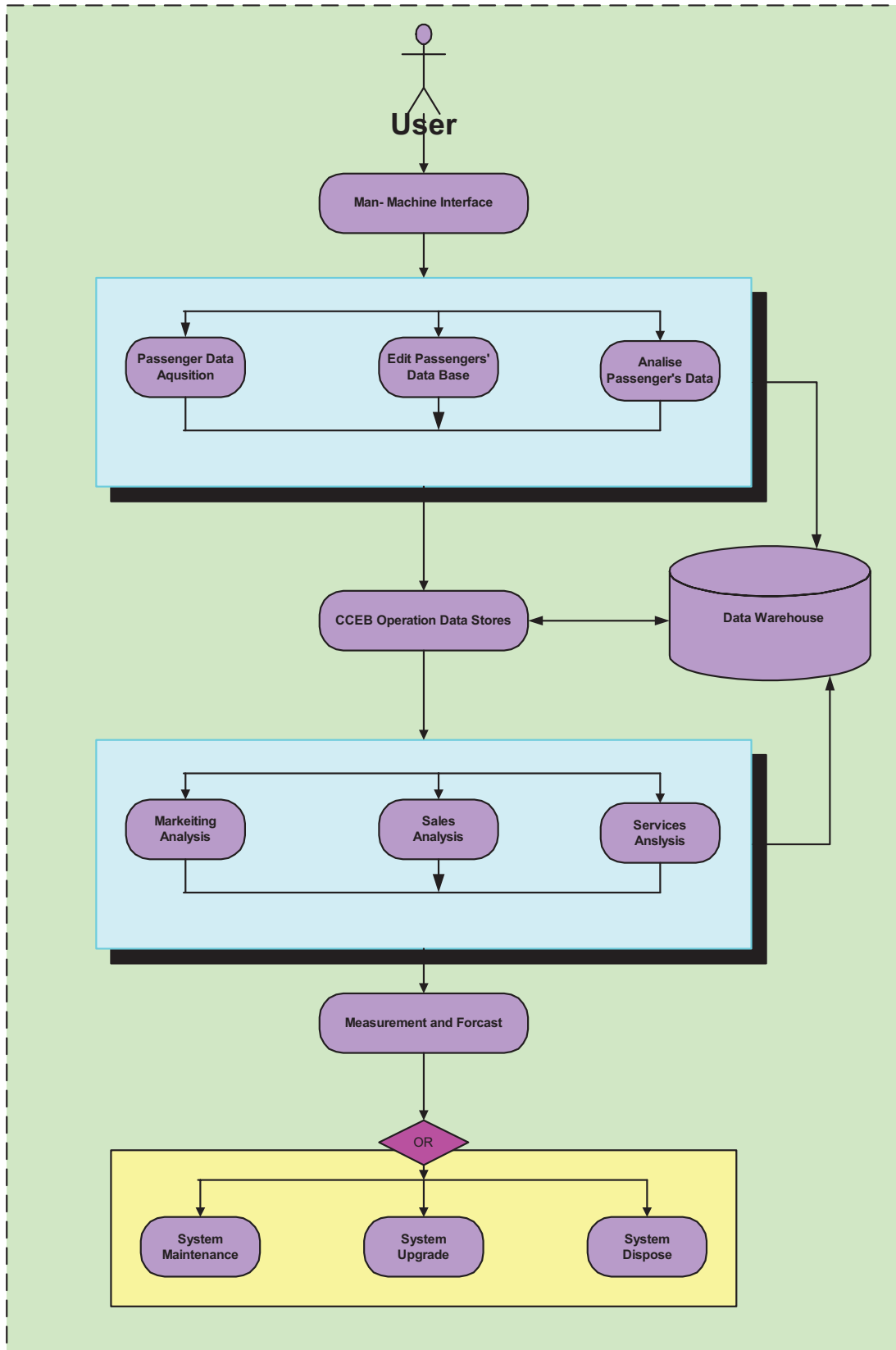


Figure 9: CCEB process for airline CCEB System users

DATA WAREHOUSES DEFINED

Data warehousing is the process of integrating enterprise-wide corporate data into a single repository. The resulting data warehouse may then support a variety of decision analysis functions

as well as strategic operational functions. These data often originate from a variety of sources, formats, and types, and are generally consolidated, transformed, and loaded into one or more instances of a database management system, usually an RDBMS, to facilitate a broad range of analytical applications. The data warehouse may consist of a single large enterprise-wide database, to which users and administrators connect directly, or it may incorporate several smaller systems, called data marts, each of which addresses a specific subject area within the overall warehouse. Data warehouses enable airlines to move all of the decision support and analysis functions off of OLTP systems, and onto a separate machine specialized for OLAP or decision support (Microsoft, SQL Server 2000).

RELATIONSHIP OF AIRLINE CCEB META MODEL AND DATA WAREHOUSE

Increasingly, data warehousing capabilities are playing a significant role in airline customer relationship management.

At many airlines, the data resides on multiple, incompatible systems and databases. To be effective, the architecture demands high-speed data transfer to and from the warehouse from all back- and front-office systems, including e-business. Server-centric storage complicates the process, as data transfer may require costly and complex point-to-point solutions among all the different systems. And by using the production network for the large and frequent data transfers that may be required to and from the warehouse, network and application performance can suffer.

Most airlines today are realizing that data warehouses sourced from a suite of internal applications and other external data sources provide the complete decision support environment for EECB requirements.

Airline can have the following benefits with Data Warehousing application

GIVE AIRLINES APPLICATIONS THE HIGH-PERFORMANCE ENGINE THEY NEED

Staying competitive is all about optimizing airlines' use of information—and that means effective data warehousing.

EASY INFORMATION SHARING

All of airline's information is centralized, regardless of platform or system. Airline gets full access to business intelligence across its whole enterprise, so that strategic decisions are based on the same data.

FAST, FREQUENT DATA REFRESHING

Decisions are only as good as airline's information is current. With data warehousing, database replication takes minutes—not hours—allowing you to refresh daily or even hourly, so airline can base its decisions on the latest information.

UNLIMITED GROWTH

Inability to scale is the leading cause of data warehousing failure. With data warehousing, airline can grow as fast and as big as it wants: flexible, integrated infrastructure guarantees that airline get peak performance, regardless of whether it jump from terabytes to petabytes.

CONSTANT AVAILABILITY

Some data warehousing products were developed with zero downtime as a core capability, so airline is guaranteed system availability 24/7/forever.

ACCELERATED TESTING AND DEPLOYMENT

Some vendors such as EMC's point-in-time copying and mirroring solutions enable airline to test with the full data warehouse—without impacting operations. Testing is more accurate, time-to-market is faster (<http://www.emc.com>).

In sum, data warehousing can transform collected data into meaningful information. Data warehousing is performed by using a multi-step process that includes collecting data, cleansing data, and storing data for use in analyses and reporting applications. The data can originate from a

variety of different sources, including different database systems and even different operating systems. The primary goal of the data analysis is to identify patterns and trends, to help airline make better decisions about its Customer-Centric E-Business strategy.

CONCLUSION

Airlines are in business to make money and a business model plays a critical role in doing so. The type of environment in which the airline operates as well as the type of changes that it faces also play important roles. The Internet stands to establish new game strategies for business as it renders existing bricks-and-mortar strategies obsolete while creating opportunities for wealth creation. Taking advantage of it entails conceiving of and executing a good Internet business model. Such a model not only has the right components, it also has the right linkages among them and its environment. It also has the resilience and flexibility to take advantage of change. Airlines realise that an integrated CCEB and Data Warehouse strategy will allow them to manage customer and supplier relationships more effectively than ever before, allowing them to build long-term customer relationships, brand loyalty and repeat sales that result in increased, sustained profitability.

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