Guidelines for Improving Airport Services for International Customers

DETAILS

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP RESEARCH REPORT 161

Guidelines for Improving Airport Services for International Customers

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

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FOREWORD

By Theresia H. Schatz
Staff Officer
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ACRP Research Report 161: Guidelines for Improving Airport Services for International Customers is a guidebook to assist airport practitioners in implementing departure and arrival processes, passenger services, and wayfinding techniques for international travelers navigating through U.S. airports. The guidelines assist with improving overall communication with international travelers and identify acceptable service and levels of service expected by international passengers. The report covers processing from origin through gateway airports to the ultimate destination. The guidelines include an identification of key elements of the international customer experience that can influence satisfaction in light of the customers' diverse backgrounds. It defines acceptable service levels for each key element of each process that an international passenger experiences (i.e., wait times, walking distance, etc.). The guidelines also provide service metrics for passenger processing based upon internationally acceptable wait times to aid U.S. airports in coordinating staffing and delivery of services. The benefits of this report are an enhanced understanding of international customers and their needs, and strategies that airports and other stakeholders could employ to meet those needs.

The international share of passengers traveling through U.S. airports continues to increase. New air service agreements, larger and longer-range aircraft, expanding global alliances, and growing middle-classes from emerging and developing nations are just some of the factors contributing to the increase. Much of the passenger growth is occurring from non-European nations that can present formidable cultural and language challenges to the arriving passengers and to the airports serving them.

There are significant economic benefits to be generated from international air service that airports and local jurisdictions are working hard to achieve. Experience at U.S. airports has shown that many international travelers have difficulty moving around in unfamiliar environments. The United States has different processes for arriving and departing passengers than many other nations. Airport wayfinding, signage and symbols, and even levels and locations of automation vary among countries and among U.S. airports. Understanding and responding to processes is a major challenge for international passengers. For example, where and how to retrieve baggage and the need for rechecking may be significantly different from other nations' international gateways. This research identifies ways to make passage more comfortable and information more accessible.

Under ACRP Project 03-35, research was conducted by Landrum & Brown in association with Gresham, Smith and Partners, Human Factors North, Arora Engineers, John Duval, A.A.E., and Matt Farrell. Data were collected from a variety of international airports in the United States that include Atlanta, New York JFK, Miami, Chicago ORD, San Francisco, Dallas DFW, Boston BOS, and Los Angeles. Overseas airports include Beijing, Incheon,

Munich, Amsterdam, London LHR, and Toronto. As an alternate resource, a cruise terminal at Port Everglades, FL was also included. Observations focused on the physical environment and stakeholder meetings that collected perspectives about the critical elements of delivering customer service to international passengers. The staff at these airports and cruise port provided a valuable contribution to this research effort.

CONTENTS

SUMMARY

Guidelines for Improving Airport Services for International Customers

This report presents guidelines for improving airport services for international customers that are intended for use by all airport stakeholders—airport terminal owners and operators, airlines, government agencies, and other service providers—responsible for interacting with international customers on a person-to-person basis or by providing the terminal facilities for customers during their airport journey. The airport services discussed in this guidebook range from in-person customer service provided by a wide range of entities to emerging technologies that airports are using to deliver information to individual travelers. The physical environment in which those services are provided and the means for conveying information also is discussed.

The purpose of the guidelines is to provide relevant tools and appropriate information to stakeholders at U.S. airports to improve the airport experience for international customers. The guidance includes a comprehensive description of the essential elements every terminal should have to create a cohesive and predictable experience for international departing, arriving, and connecting passengers at U.S. airports. It also identifies notable innovations that have been implemented at airports in the United States and worldwide to enhance the customer experience.

The guidebook is organized around the passenger journey to allow stakeholders to examine the essential elements for a particular part of the passenger journey that they would like to improve. The journey segments include the following:

- International departing passengers
- International arriving passengers
- Connecting passengers
- Precleared arriving passengers

Each of these journey segments is broken down into each step of the passenger's experience at the airport. The customer's needs and expectations are described at the beginning of each journey segment. Within each step, a description of the basic requirements and notable innovations is provided for each component of the customer experience: customer service, physical environment, and information dissemination.

The guidebook provides the following tools to facilitate the review of the international passenger experience at an individual airport and support decision-making for implementing new services.

- Journey segment evaluation tool: provides a graphical illustration of the basic requirements and notable innovations for every step of each journey segment. This graphic can be used by airport stakeholders to perform a high-level examination of the facilities and services provided at their airport.

- Implementation considerations: provides a high-level description of the costs and benefits associated with each notable innovation so that stakeholders can make a preliminary determination whether the notable innovation should be considered for implementation at their airport.

The guidebook concludes with a description of the "Gateway of the Future" which summarizes the basic requirements and notable innovations that airports could implement to enhance the customer experience.

Because wayfinding signage and digital information play an important role in the international customer experience, Appendix A is a detailed description of common sign design elements and Appendix B is a primer on planning, deploying, operating, and maintaining a digital information program.

CHAPTER 1

Introduction

International air passenger travel to and from the United States is a crucial component of the U.S. economy. (International air travel is defined as passengers traveling by air to and from the United States.) U.S. airport terminals can be the first or last impression international passengers have of their destination or of our country as a whole. Improving the airport experience for the wide range of travelers who comprise this ever-important international air travel segment is paramount to maintaining and enhancing the reputation of the United States as a world-class business and leisure destination.

1.1 Background

International air travel to and from the United States dates back to the 1920s with Charles Lindbergh and Juan Trippe creating a global network of air travel routes (Branson 1998). In the years since, international travel has become commonplace for much of the world's population and now accounts for approximately 42 percent of global air travel based on 2014 global passenger traffic data (Airports Council International 2014). (Global air travel is defined as passengers traveling by air to and from any country in the world.)

As the growth of global air travel has evolved so has the interaction of service providers with passengers (i.e., customers). The entities providing the end-to-end travel experience are as diverse as the travelers themselves. At the core of the travel experience are the airlines that move passengers from their origin to their destination. Others having an important role in the travel experience are the owners/operators of the airport terminals, third-party service providers, and federal agencies. In many cases, the passengers' impression of a destination is greatly influenced by their experience in the airport terminal.

In May 2012, the White House released the *National Travel and Tourism Strategy* that set a goal of drawing 100 million international visitors to the United States by 2021, an increase of more than 60 percent from 2011. It is expected that these visitors will generate $250 billion annually in spending (U.S. Department of Commerce 2012). To achieve this goal, airlines and airports need to provide a world-class travel experience and the federal agencies responsible for security and border protection must implement efficient processes to deliver a seamless travel experience.

1.2 Research Objective

The objective of this research was to develop guidelines to assist airports in implementing departure and arrival processes, passenger services, and wayfinding techniques for international travelers navigating through U.S. airports. These guidelines aim to improve communication and information services for international travelers, and identify the desired amenities and levels of service expected by international passengers. The guidance contained hereafter considers the

passengers' journey from origin through gateway airports to their final destination, including processing, wayfinding, and customer services.

1.3 Purpose of the Guidelines

The purpose of the guidelines is to provide relevant tools and appropriate information to U.S. airports to improve the airport experience for international customers. The guidance includes a comprehensive description of the essential elements every terminal should have to create a cohesive and predictable experience for international departing and arriving passengers across U.S. airports. Terminology is a key focus. The consistent use of key terms and descriptions will promote a cohesive customer experience.

This guidance uses a customer-centric approach to facilities and services for international passengers rather than the traditional process-oriented approach. The needs of passengers have evolved with the universal use of personal technology; therefore, it is important to put the passenger at the center of the experience rather than building the experience around the process. Many of the most well-regarded airports across the world use this approach and it is becoming more commonplace at U.S. airports.

Notable customer service innovations from around the world are included in these guidelines along with how to implement those improvements. These cutting-edge examples show how airports are creating a customer-centric experience through technology, facilities, and personal service. These innovative approaches provide the U.S. airport stakeholders with a consolidated resource guide of customer experience enhancements to consider implementing at their airport.

1.4 How to Use the Guidelines

1.4.1 Terminology

A current trend in the global airport industry is to refer to travelers as customers rather than passengers. This guidebook reflects that trend by referring to travelers as customers. However, in some instances, the term passenger is used to distinguish between the processing of travelers and the act of providing customer service or enhancements to the customer experience.

The term stakeholder refers to all entities responsible for the customer experience: airlines, airports, federal agencies, and other service providers. Throughout this guidebook, these entities are named individually, and also referred to as a collective whole.

1.4.2 Organization of the Guidebook

The guidelines were developed based on the customer's experience at the airport. Four journey segments were established to reflect the customer's journey through the airport facilities. These journey segments describe the experience for departing, arriving, precleared arriving, and connecting international passengers. Precleared arriving international passengers, traveling on international itineraries, arrive in the United States as domestic passengers because they were precleared by U.S. Customs and Border Protection at a foreign airport.

Within each of the journey segments, the discussion uses a what, why, and how structure to guide the stakeholder through the development of their own customer experience enhancements. The what defines the problem or need. It typically relates to passenger needs or the essential facility requirements. The why provides the justification for improving the customer experience and why it will make a difference to the customer. The how provides a framework for implementing the improvement along with examples of where it has been implemented or is being considered.

1.4.3 Iconography

Distinct icons highlight the key elements of the guidelines. Figure 1-1 identifies the icon for data collection from the passenger experience survey. This icon reinforces that the information collected was from the customers themselves.

Source: ACRP 03-35 Research Team

Figure 1-1. Icon for passenger survey data.

In some cases, performance guidelines are presented to establish a benchmark for delivering customer service at a world-class level. The performance guidelines are identified by the icon in Figure 1-2.

Source: ACRP 03-35 Research Team

Figure 1-2. Icon for performance guidelines.

Notable innovations for each part of a passenger's journey were identified through research and on-site investigation at some of the world's most well-regarded airports. The icon in Figure 1-3 identifies these items. It signifies the advancement in customer service that each one represents.

Source: ACRP 03-35 Research Team

Figure 1-3. Icon for notable innovations.

1.4.4 Implementation Considerations

The guidebook provides a framework highlighting the key considerations for implementing the notable innovations to improve the customer experience. The implementation sections of the guidebook builds upon the what, why, and how organization of the guidelines. The introduction to each implementation section begins with a concise description of the notable innovation (what) followed by a narrative description of the benefits (why), costs (how), and other factors, to be considered in the decision-making process. The primary purpose of the implementation considerations is to allow stakeholders to make a preliminary determination whether or not the innovation should be examined further at their airport through detailed planning or design studies and a formal benefit-cost analysis.

The key factors to be considered when evaluating each notable innovation for implementation are described. Each description includes the applicability to various types of international terminals, implementation complexity, capital and operating costs, customer and stakeholder benefits, stakeholders involved in the implementation, the beneficiaries, and relevance to the airport's brand.

Applicability: While some innovations may be applicable to any type of airport terminal, additional descriptors identifying the type of airport terminal building suitable for each notable innovation are provided because terminals serving international passengers vary in size and in the type and number of airlines.

Implementation Complexity: The complexity of implementation description considers a number of factors, including: the entities involved in implementing the recommended improvements, modifications to existing processes, and the timeframe for implementing the improvement. It also considers whether the innovation has been implemented in the United States or only at foreign airports.

Capital and Operating Cost Considerations: Airports have two distinct funding sources for implementing new services or projects: capital and operating budgets. The capital and operating cost considerations for each innovation are identified so stakeholders can determine if implementing the innovation is feasible, given the financial environment at their airport.

Customer and Stakeholder Benefits: While customers are the primary beneficiaries of most service enhancements and improvement projects, various stakeholders may also receive some form of benefit from the innovation. Those stakeholder benefits may include operational improvements, which have a positive effect on operational costs. The benefits for customers and stakeholders are identified to provide a comprehensive description of the benefits of each innovation.

Entities Involved: The implementation matrix includes a list of the entities involved in the implementation of the notable innovation.

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Table 1-1. Implementation considerations matrix example.

Notable Innovation	
Applicability: All international arrivals terminals	**Capital Cost Considerations:** • Building modifications to accommodate new process
Implementation Complexity: Requires detailed planning and design	**Operating Cost Considerations:** • Additional staff
Customer Benefits: • Reduced wait times • More calming environment	
Stakeholder Benefits: • Customers have more time to shop and dine	
Entities Involved: • Airport departments • Government entities	**Beneficiaries:** • International arriving passengers • Airlines • Government entities • Service providers
Brand Relevance: • Efficient passenger processing	**Representative Airport(s):** • Foreign airport • U.S. airport

Beneficiaries: The implementation considerations identify beneficiaries (the passenger types) affected by the notable innovation, including arriving passengers, connecting passengers, and departing passengers. It also identifies the stakeholders likely to benefit from the implementation, such as airlines, concessionaires, federal agencies, or the terminal operator/owner.

Brand Relevance: The use of brand relevance descriptors recognizes that each airport has its own identity (or brand) to convey its image to the traveling public. In many cases, the brand is based on a specific customer experience an airport or the stakeholders want to convey. The degree to which a notable innovation aligns with a brand may be a significant indicator of whether it is considered for implementation. The implementation section provides key phrases to help stakeholders determine if a recommended guideline aligns with their brand. Examples of these phrases include:

- Customer-centric airport: focus on developing services and processes around customers' needs
- Global connecting hub: focus on efficient movement of passengers
- Connected airport: focus on personal technology
- Personalized customer experience: focus on personal interaction
- Sense of place: focus on bringing aspects of the airport's geographic location into the terminal

A matrix for each notable innovation recommended depicts the key considerations. Table 1-1 is an example of the implementation considerations matrix.

1.5 Research Approach

The research for the guidelines was conducted via three major activities. The first activity included an extensive review of existing literature from industry organizations, federal agencies, airport websites, and other published material related to international air travel. The key sources of information included:

- Future Travel Experience
- Airports Council International (ACI)

- International Air Transport Association (IATA)
- Transportation Research Board (TRB) Airport Cooperative Research Program (ACRP)
- U.S. Customs and Border Protection (CBP)
- U.S. Department of Commerce
- SITA

The second activity consisted of on-site investigations at eight airports in the United States and four overseas airports. The site visits were conducted from November 2014 through May 2015 and included the following airports:

- Hartsfield-Jackson Atlanta International Airport (ATL) – International Terminal and Concourse E
- Boston Logan International Airport (BOS) – Terminal E
- Dallas/Ft. Worth International Airport (DFW) – Terminal D
- John F. Kennedy International Airport (JFK) – Terminal 4
- Los Angeles International Airport (LAX) – Tom Bradley International Terminal (TBIT)
- Miami International Airport (MIA) – North Terminal and South Terminal
- Chicago O'Hare International Airport (ORD) – Terminal 5
- San Francisco International Airport (SFO) – International Terminal
- Incheon International Airport (ICN) – Seoul, South Korea
- Beijing Capital International Airport (PEK) – Beijing, China
- Munich Airport (MUC) – Munich, Germany
- Amsterdam Airport Schiphol (AMS) – Amsterdam, Netherlands

The U.S. airports were selected because they represent the largest volumes of international passengers and because different types of operations—airline hub, multi-carrier, and origin and destination-based—can influence the customers' airport experience. They also serve different regions of the world that provide diverse responses to the customer survey. The overseas airports were selected based on their customer service ratings from sources such as the ACI Airport Service Quality (ASQ) survey and the SkyTrax rankings. They are also major gateways to the United States, which means passengers will compare the experience they have at these airports to their experience at the U.S. airport.

The on-site investigations included meetings with airport, airline, and federal agency representatives. During the site visits, the research team took a tour of the terminal to conduct an Unfamiliar Traveler Wayfinding Assessment (UTWA). The purpose of the UTWA was to experience the terminal as an unfamiliar traveler who would rely heavily on the information provided to guide them through the terminal. The UTWA consisted of photo documentation of the passengers' journey through the following key processes:

- International departures
- International arrivals
- Connections to other flights or terminals

The third activity included a customer experience survey administered to passengers departing on international flights who were waiting in the gate hold rooms prior to departure. The purpose of the survey was to establish what is important to a wide variety of passengers when traveling internationally. The survey was conducted only at the U.S. airports and was modeled after the ACI ASQ survey with questions specific and relevant to this research project. Approximately 1,000 surveys were completed and the findings from the passenger survey are referenced throughout the document.

CHAPTER 2

The Customer Experience

The airport customer experience is heavily influenced by the processes and activities they engage in along their journey. Further, during each stage of the journey, various stakeholders have substantial interaction with each customer, whether in person or through technology. This chapter documents the key elements of the customers' journey, identifies the stakeholders involved in each segment of the journey, and describes the factors affecting the customer experience at the airport. Notable innovations for improving the customer experience are identified in subsequent chapters that include detailed descriptions of each of the journey segments.

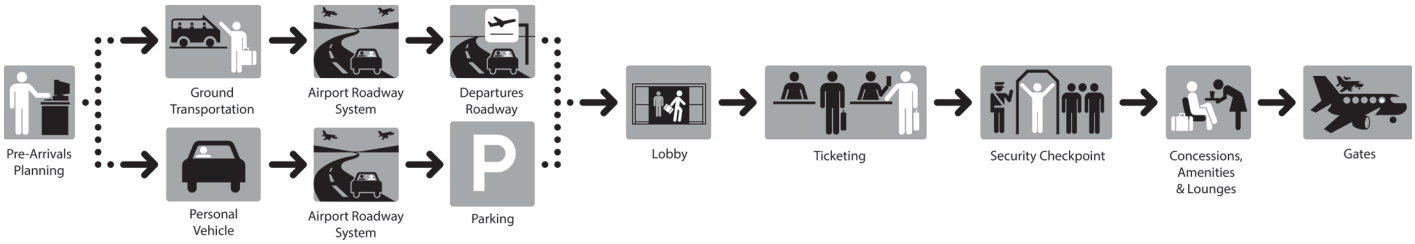
2.1 Journey Segments

The international air passenger's journey at U.S. airports consists of one or more of the following segments: international departures, international arrivals, precleared arrivals, and connecting passengers. International departures in the United States are handled similarly to domestic departures with the addition of travel documentation confirmation prior to boarding the flight. Unlike in many countries in Europe, the Middle East, or Asia, all passengers arriving from locations outside the United States are subject to U.S. CBP examination. There is no distinction made for passengers who may be connecting to other destinations outside the United States. Precleared arriving passengers are subject to U.S. CBP examination at their point of departure and therefore arrive in the United States cleared to enter the country. In some cases, the precleared passengers arrive at domestic terminals in the United States.

2.1.1 International Departing Passengers

The international departures journey segment begins with the pre-trip planning and ends at the gate holdroom (see Figure 2-1). The key functions and activities of the international departures process include:

- Pre-trip planning
- Journey to the airport
- Airport roadway access (including parking)
- Terminal departures roadway
- Pre-security services and amenities
- Ticketing/check-in
- Security screening
- Post-security concessions and amenities
- Boarding



Source: ACRP 03-35 Research Team

Figure 2-1. International departing passenger journey.

Pre-Trip Planning: Pre-trip planning is the time spent by customers to prepare themselves for the air travel portion of their journey. Customers most likely use airport and airline websites or mobile apps to become familiar with what to expect during the travel experience. The crucial information customers need at this step in the journey includes:

- Mode of transportation to the airport
- Airline location (terminal/concourse)
- Baggage allowances and fees
- Check-in options
- Security screening procedures and availability of special services such as TSA Pre✓
- Concessions, services, and amenities available pre- and post-security

Journey to the Airport: Customers may choose to drive themselves to the airport or use a variety of for-hire or public transportation services. Airport websites should provide a wealth of information about the various ways customers can arrive at the airport, including registered ground transportation service providers, approximate cost, and drop-off locations.

Airport Access Roadway: The airport operator is responsible for maintaining the airport access roadway and signage. Signage is a key element of the customer experience. It should provide information about each terminal, the location of the airlines, and the available parking options. *ACRP Report 52, Wayfinding and Signing Guidelines for Airport Terminals and Landside*, provides guidance for airport access roadway signage.

Parking: The airport operator and independent off-airport parking operators typically provide a wide range of parking options for travelers. International departing passengers driving themselves to the airport are likely to use long-term parking due to the lower cost and the length of their trip. The drop-off points for the parking shuttle should allow customers to easily navigate to the ticketing-check-in area.

International departing passengers being dropped-off by family members or friends will likely use the terminal parking garage. Airport operators should consider providing hourly parking in the terminal parking garage to allow well-wishers to drop-off their party without incurring the daily parking rate.

Terminal Departures Roadway: The terminal departures roadway and signage presents the first opportunity for multiple parties to influence the customer experience. Clear wayfinding signage should direct customers arriving by private vehicles and commercial or public ground transportation services to the appropriate roadway.

Wayfinding signage also should direct customers arriving via commercial or public ground transportation services who are not dropped-off at the departures roadway. These customers may need directions from a consolidated ground transportation center or from other facilities remote from the terminal.

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Traffic enforcement on the terminal departures roadway is another key component of the customer experience. Law enforcement officers often must be firm and direct in maintaining orderly and safe roadway operations. Officers need to recognize the diversity of the passenger demographic associated with international departures and their training should include procedures to learn how to effectively communicate with customers who may have limited English capabilities.

Curbside check-in is not as common at terminals that primarily serve international departures as at domestic terminals. This is mainly due to the limited number of flights each foreign airline provides on a daily basis. Single-airline terminals or those with both international and domestic flights will likely have curbside check-in. When provided, it is the responsibility of the airline or their contract service provider to maintain a helpful and courteous attitude just as passengers should expect to experience inside the terminal. Information about the cost of utilizing curbside check-in services is necessary to establish the customers' expectations as prices vary from airline to airline and airport to airport.

Pre-security Services and Amenities: International travel requires substantial documentation and passengers typically arrive at the terminal two or more hours before their flights or as advised by the airport or airline. Customers needing to conduct personal or commercial business before entering the secure area may require amenities such as a business center. This type of amenity is typically a commercial service provided by the terminal owner/operator.

Departing passengers visiting the United States and staying at a hotel may have a flight departure time several hours after the hotel's checkout time. These customers may require baggage storage services or pre-security amenities such as food and beverage outlets. These types of amenities are typically commercial services provided by the terminal owner/operator.

Pre-security information counters provide another important customer service. These counters are typically staffed by employees of the terminal owner/operator or volunteers. They provide personal assistance to customers needing information about the airport and/or local region.

Ticketing/Check-in: Ticketing and check-in processes and options vary significantly at airports across the world. European airports place a high level of focus on providing a variety of self-service check-in options as the primary means of check-in. Middle East and Asian airports still rely heavily on full-service agent-based check-in. Most airports serving large volumes of international travelers also provide separate or distinct ticketing/check-in facilities for premium passengers.

U.S. airport terminal owners/operators and airlines need to understand the check-in preferences of their customers and provide a variety of options to meet the myriad needs. This may be more difficult to implement in terminals where international air service is provided by a variety of foreign carriers with one or two flights per day and therefore, are less inclined to make the investment in additional self-service check-in options. Alternatively, the focus may be about providing a premium experience for every customer regardless of travel class. In a multi-carrier terminal, it may be necessary for the terminal owner/operator to take the lead in establishing the type of check-in options that will be provided.

The attitude and availability of check-in staff is another key component of the customer experience. Airlines typically have the primary responsibility for customer service during the check-in process, whether through airline staff or contract service providers. Airlines understand their customer demographics and can provide staff with the necessary cultural understanding and language capabilities to serve their customers.

Wayfinding in the departures hall is associated with two key elements: airline check-in location and security checkpoint location. It is the terminal owner/operator responsibility to ensure the signage is clearly visible from all entry points. In a common-use environment, dynamic information displays may be necessary to identify the airline check-in locations as the assignments change throughout the day.

Security Screening: Security screening in U.S. airports is a major source of stress for customers, primarily stemming from concern about wait times and screening procedures. While security screening procedures in the United States are relatively consistent from airport to airport, they differ substantially from airports outside the United States. In particular, U.S. government policy requires the airlines to confirm that passengers have the appropriate travel documentation, eliminating the need for a government-operated passport control or visa check prior to or after security screening. Communicating the security screening procedures is important in reducing customer anxiety and improving the customer experience. This is particularly true for foreign visitors who have not traveled to the United States before and have not processed through a security checkpoint at a U.S. airport.

More and more terminal owner/operators in the United States are providing wait time information for security checkpoints. This information may be provided on the airport's website, on a mobile app, or in real-time on terminal signage. Wait time information helps to calm customers' anxiety about whether they have enough time to make it to their gate or do some pre-planned shopping before departure.

The attitudes of security screening personnel are another important factor in the customer experience. With the TSA responsible for operating the security checkpoints at most U.S. airport terminals, the terminal owner/operator, airline, and TSA stakeholders must work collaboratively to understand the passenger demographics to create an environment that facilitates efficient processing while maintaining a comfortable environment for customers.

Post-Security Concessions and Amenities: Concessions and amenities provided post-security vary widely from airport to airport, not just in the United States but also across the world. The types of these offerings are driven in large part by the passenger demographics served by each terminal. A common trend among U.S. airports is to create a sense of place by providing food and beverage outlets reflective of the surrounding community. While this gives connecting passengers a chance to experience the culture of the region, the personal needs of the customers should be accommodated by providing appropriate options, such as restaurants serving global cuisine. Prayer or worship rooms are another important cultural consideration. Terminal owners/operators are primarily responsible for identifying the concessions and amenities best suited to their customer demographics.

The attitudes of concessions and amenities staff also influence the customer experience. Terminal owners/operators should develop customer service training programs and service objectives in conjunction with concession providers to ensure a uniform approach is taken so the delivery of customer service aligns with both parties' brand.

The availability of free WiFi is probably one of the most important amenities customers desire and have come to expect. Some airports provide limited access to free WiFi while others provided unlimited access through commercial sponsorships while others just require some basic information about the passenger. International passengers are especially interested in WiFi as it may be their only means of contacting family and friends while traveling in the United States.

Information booths provide another important post-security customer service function. These are commonly staffed by employees of the terminal owner/operator or volunteers who provide personal assistance to customers who need information about their airport journey. The location and visibility of information booths or customer assistance staff is important. They should generally be positioned in intersections where customers have to make a decision about which direction to walk or after key processes, such as the security checkpoint. Staff should be capable of providing a wide variety of information and language assistance.

Flight Information Displays (FIDS) and static/dynamic directories provide customers with a self-service source of information to assist with navigation through the airport. These items should be located at key intersections, such as after the security checkpoint, connecting corridors

between terminals or concourses, and at the entrance and exit to automated people movers or underground corridors.

Post-security restrooms are some of the most heavily utilized facilities in the terminal and have a major influence on the customer experience. Restroom availability (location and operability), ambience (design and environment), and maintainability (cleanliness) are important factors to consider. *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design* is a comprehensive reference for providing restrooms in terminal buildings. Restrooms are the responsibility of the terminal owner/operator and their contract maintenance and janitorial staff.

Boarding: The departure gate holdrooms are primarily the responsibility of the airlines. Each airline has its own boarding process so the airlines and airport terminal owner/operator must work collaboratively to integrate the boarding process into the terminal building layout. Some terminal's aircraft apron can accommodate larger aircraft even though the holdroom design cannot handle the higher load factors. When this occurs, the boarding process can take up the entire holdroom or spill into the adjacent circulation areas or commercial areas creating a sense of confusion, diminishing the customer experience.

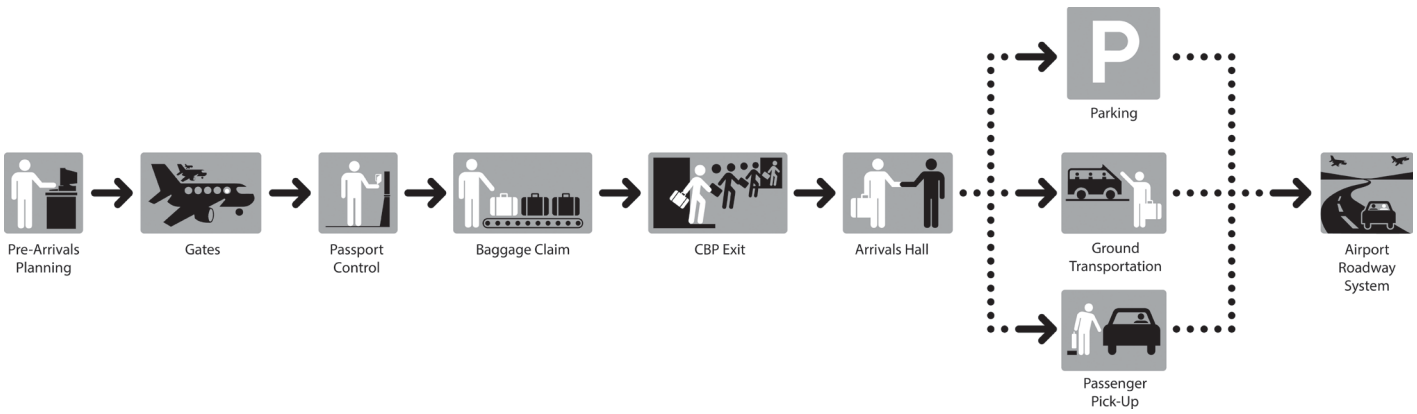
The amenities provided in gate holdrooms have evolved with the proliferation of smartphones and mobile devices such as tablets. Holdroom seating often provides device charging and at some airports it has been integrated with adjacent concession offerings. Terminal owners/operators should work collaboratively with the concession providers and airlines to develop the best strategy for integrating amenities with gate holdrooms.

The TSA and CBP, and in some cases the airlines (e.g., El Al), may also conduct additional screening at the gate prior to boarding. Terminals with gates used for international departures should provide the necessary facilities to conduct these activities with minimal disruption to the boarding process and without creating large queues in the boarding area.

2.1.2 International Arriving Passengers

The journey segment for international arriving passengers begins with pre-trip planning and ends at the local destination or after the security checkpoint for connecting passengers, at which point they become departing international or domestic passengers (see Figure 2-2). The key functions and activities of the international arrivals process include:

- Pre-trip planning
- International arrivals corridor



Source: ACRP 03-35 Research Team

Figure 2-2. International arriving passenger journey.

- Passport control
- International baggage claim
- CBP exit control
- Arrivals hall or airline recheck and security screening
- Terminal arrivals roadway/ground transportation
- Airport egress roadway
- Journey from the airport

During the arrivals journey, passengers encounter multiple organizations responsible for providing customer service. It is especially important during this journey segment for these organizations to coordinate their efforts to minimize lapses in customer service. Changes in policies or procedures can not only affect the person-to-person delivery of customer service but may also create problems for the infrastructure that may require significant investment to resolve. Developing adaptable approaches to customer service and designing flexible facilities is an important consideration.

Pre-Trip Planning: Pre-trip planning has historically taken place during the flight and included the completion of the U.S. CBP I-94 and Customs declaration forms. However, foreign visitors no longer need to complete the I-94 paper forms and U.S., Canadian and eligible Visa Waiver Program passengers may use the Automated Passport Control (APC) kiosks rather than filling out a paper Customs declaration form (CBP 2015a). The CBP Mobile Passport Control (MPC) allows U.S. citizens and Canadian visitors to complete the Customs declaration on their mobile device prior to entering the Passport Control area (CBP 2015c). Passengers enrolled in trusted passenger programs such as Global Entry, NEXUS and SENTRI may forego completing the Customs declaration form.

Airlines typically provide passengers with pre-arrival instructions but these vary by airline and by airport. Airports and airlines should work collaboratively to produce content that informs passengers of the entry documentation requirements and of the border inspection process, including videos and graphics describing the process and facilities at that airport.

International Arrivals Corridor: Commonly referred to as the "sterile corridor" due to its separation from the secure areas of the terminal, the international arrivals corridor provides the customer with their first impression of the United States, the airport, and the surrounding community. Several factors significantly influence the customer experience in this area:

- Walking distance from the arrival gate to the passport control
- Ambience, including the architecture, interior design and cleanliness
- Availability of restrooms
- Wayfinding signage
- While the U.S. CBP technically controls the international arrivals corridor, the terminal owner/operator is responsible for providing the facility.

Passport Control: Passport Control is the first step in the border protection process that occurs at the airport. The primary components of this process include queuing for one of the various primary inspection methods and interaction with a CBP officer. Some of the key elements of the customer experience include:

- Identification of appropriate queue location based on classification
- Logical and easy to understand organization of the queues
- Availability and attitude of the staff responsible for managing the queues and providing kiosk assistance
- Availability of support for completing the paper customs declaration form or other required entry documents

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- Amount of time spent waiting to be processed
- Physical environment that provides a distraction from the time spent waiting in the queue
- Availability and attitude of the CBP officers

While the CBP officers are primarily responsible for the passport control process, the terminal owner/operator is responsible for providing the facility and in many cases the customer service staff managing the queues and providing kiosk assistance.

Amenities and services, such as coffee shops or currency exchange kiosks, are not allowed in the CBP areas. This is not the case at many overseas airports where small amenities are provided along with large duty free shops. The design of new international arrivals facilities should consider the possible addition of these amenities in the future.

International Baggage Claim: International baggage claim most commonly occurs after Passport Control. Some airports, such as Fort Lauderdale-Hollywood International Airport and Austin-Bergstrom International Airport, have implemented international arrivals facilities where baggage claim is located prior to Passport Control. This configuration may become more widely implemented as it combines Passport Control and CBP Secondary Inspection creating substantial staffing efficiencies for CBP officers. Some of the key elements of the customer experience include:

- Identification of the baggage claim carousel assigned to their flight
- Clear wayfinding signage directing customers to the baggage claim carousel
- Clearly identified baggage claim carousel numbers with information regarding the flights assigned to each carousel
- Information about when the first bag will be delivered
- Amount of time spent waiting for the first bag to be delivered
- Availability of airline staff to assist with missing baggage
- Availability of baggage carts (commonly free for international arriving passengers)
- Availability of baggage porters
- Ability of the claim devices to handle the number of bags without some of them being placed on the floor
- Type of claim device and the customers' ability to remove their bags
- Availability of seating areas
- Availability of restrooms

The international baggage claim area is part of the international arrivals facility and is under control of the U.S. CBP. The terminal owner/operator is responsible for providing and maintaining the facility. Airlines, or their contractors, are responsible for delivering the baggage and providing baggage services. The airlines or the terminal owner/operator may provide porters to assist with baggage through commercial service contracts. Baggage carts are commonly provided by the terminal owner/operator through a commercial service contract. Carts can be used for free (most common) or there may be a charge.

CBP Exit Control: CBP Exit Control is the last step in the border control process and consists of podiums for officers to interview passengers prior to them entering the United States. The U.S. CBP is conducting at least one trial at a U.S. airport to replace this process, which often creates a bottleneck, with a new procedure to eliminate the customer interview and use other forms of customer surveillance. This new process could potentially reduce the area needed for this function and reduce, or eliminate, the wait time. Some of the key elements of the CBP Exit Control customer experience include:

- Identification of appropriate queue location based on classification
- Amount of time spent waiting to be processed
- Availability and attitude of the CBP officers

The CBP officers are solely responsible for the CBP exit control process. The terminal owner/operator is responsible for providing the facility to conduct the interviews.

Arrivals Hall: The Arrivals Hall is the first public portion of the terminal experience for international arriving passengers. It typically consists of a large open area for meeters and greeters to wait for arriving passengers, ground transportation services, amenities such as concessions, restrooms, and other commercial services such as business centers and baggage storage. This area also provides an opportunity to make a strong first impression of the local area for passengers who have reached their destination or for those connecting to other flights. Some of the key elements of the Arrivals Hall customer experience include:

- Ability to locate meeters and greeters
- Availability of amenities and commercial services
- Visibility and proximity of ground transportation services
- Proximity to the terminal arrivals roadway
- Physical environment that conveys a sense of place reflective of the local area

The terminal owner/operator is responsible for providing the arrivals hall facility, commercial services, and ground transportation functions. One of the key focuses of the arrivals hall should be to provide an orderly process for joining passengers with meeters and greeters and providing the necessary information about ground transportation services. It is important to accommodate meeters and greeters and to view them as customers.

Terminal Arrivals Roadway/Ground Transportation: The Terminal Arrivals Roadway typically consists of an inner and outer roadway with private vehicles and commercial vehicles separated by an island sidewalk. This area is used exclusively for loading arriving passengers and their baggage. Certain ground transportation services, such as public transportation or scheduled shuttles, may be located within walking distance of the terminal or in a ground transportation center integrated with the parking garage or located in an adjacent facility. The terminal arrivals roadway is commonly located below the departures roadway, which provides a substantial covered area but may also block much of the available natural light, creating a relatively dark environment, especially in the evening. Some of the key elements of the Terminal Arrivals Roadway/Ground Transportation customer experience include:

- Ease of finding their way from the terminal exit to the appropriate location on the terminal arrivals roadway
- Physical environment providing sufficient natural and artificial lighting
- Availability of for-hire commercial vehicles, such as taxis and limos
- Taxi queue management
- Attitude of commercial vehicle operators, taxi queue managers and law enforcement officers

The terminal owner/operator is responsible for providing the terminal arrivals roadway and ground transportation Center in coordination with the commercial and public ground transportation service providers. Airport police or local law enforcement enforce traffic regulations on the terminal arrivals roadway.

Airport Egress Roadway: The airport operator is responsible for maintaining the airport egress roadway. Signage is a key element in the customer's experience and it should provide clear directions to the arterial roadways connecting the airport to the surrounding community. *ACRP Report 52: Wayfinding and Signing Guidelines for Airport Terminals and Landside*, provides guidance for airport egress roadway signage.

Journey from the Airport: Customers may choose to drive themselves from the airport or use a variety of for-hire or public transportation services. Airport websites should provide a

wealth of information about the various ways customers can depart from the airport, including registered ground transportation service providers, and approximate costs based on regions or zones of the local area.

2.1.3 Connecting Passengers

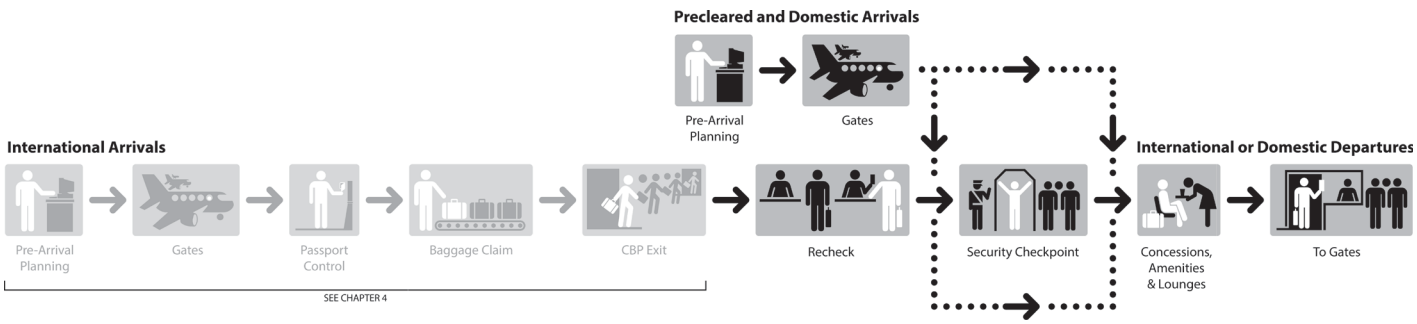
Many international passengers who arrive at U.S. airports are connecting to domestic flights to reach their final destination. A much smaller percentage connect to other international flights. The customer experience for either of these passengers is essentially the same. However, in the United States, the experience for international arriving passengers connecting to domestic or international flights is very different from other countries. In the United States, they are treated the same as international arriving passengers (described in a previous section) and must go through the entire border inspection process. The difference for connecting passengers is that, upon exiting the CBP facility, they need to recheck their baggage and proceed to the gate for their connecting flight (see Figure 2-3). In many other countries, connecting passengers are only required to go through a security check and passport control before entering the departures area; they do not have to collect and recheck their baggage.

The key functions and activities of the connecting passenger process include:

- Pre-arrival planning
- International arrivals corridor
- Passport control
- International baggage claim
- CBP exit control
- Airline recheck
- Security screening
- Post-security concessions and amenities
- Departure gate

Prior to the formation of the Department of Homeland Security, the predecessor agencies to CBP allowed for international passengers connecting to international flights to remain in a sterile intransit lounge rather than go through the international arrivals process. Based on the information collected during this research, no intransit lounges are currently in operation at U.S. airports and there has been no indication these types of facilities will be allowed in the future.

The customer experience considerations for the connecting passenger are the same for the international arriving passenger with the exception of the airline recheck and security screening functions directly after CBP exit control.



Source: ACRP 03-35 Research Team

Figure 2-3. Connecting passenger journey.

Airline Recheck and Security Screening: Since connecting passengers must reclaim their checked baggage, airlines commonly provide recheck counters immediately after the CBP Exit so passengers can deposit their baggage with the airline. The airline recheck area typically consists of a conveyor belt where passengers can drop their baggage that has been tagged for their final destination. There are also counters where customers who have to change flight arrangements can work with an airline agent. It is common for carriers with only a few daily flights to require customers to take their baggage to the check-in counters to check it for their final destination.

ACRP Report 61 examines the opportunities and implications of eliminating baggage recheck. According to the report, a few U.S. airports have implemented procedures that allow for international-to-international connecting bags to be directly connected from the arriving flight to the departing flight without being claimed by the passenger. While the elimination of baggage recheck for international-to-domestic connecting baggage has not yet been implemented in the United States, it was examined in the report and has been considered by CBP. Further developments of this opportunity would have a significant impact on the international baggage reclaim and airline recheck facility requirements.

The security screening checkpoint for connecting passengers is located in the terminal in which the passengers arrive (if all terminals are connected via a post-security corridor or automated people mover) or in the terminal from which their connecting flights is scheduled to depart. In either scenario, customers need clear wayfinding information to guide them to the correct location.

The key factors influencing the customer experience in this area include:

- Providing information about the need to collect and recheck their bags
- Availability and location of airline recheck counters in proximity to the CBP exit
- Wayfinding from airline recheck to the security checkpoint for the departure gates
- Attitudes of security screening personnel

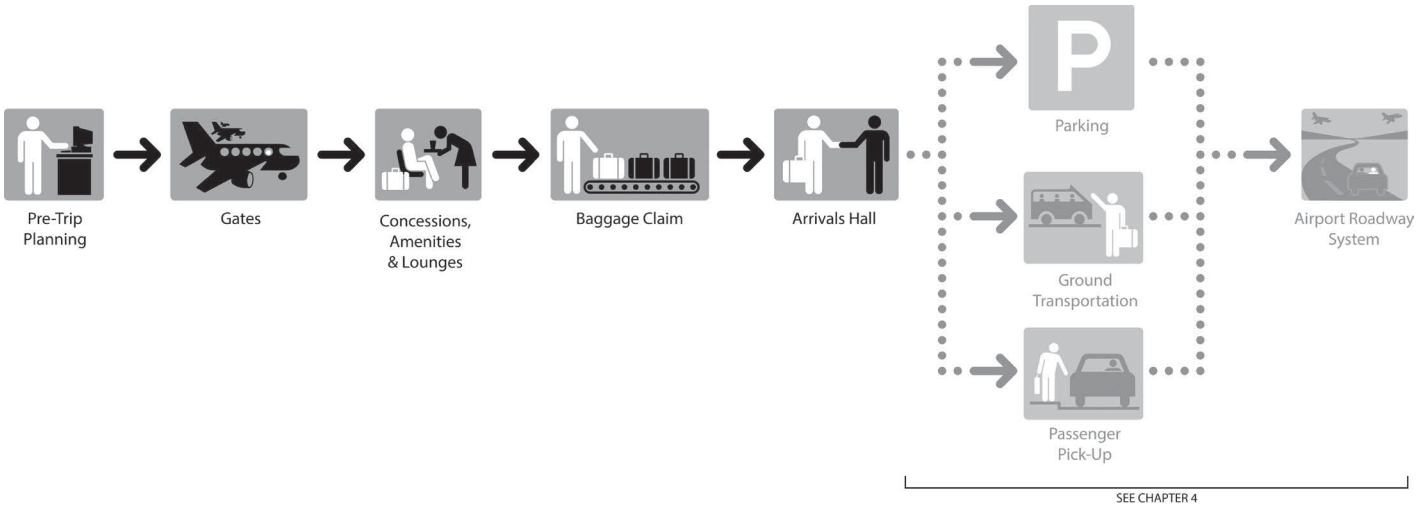
Once connecting passengers process through the security screening checkpoint, they become departing passengers. While these passengers may be considered departing domestic passengers, they still are international passengers and therefore have different needs from domestic passengers, such as multilingual information or cultural requirements.

2.1.4 Precleared Arriving Passengers

Some international passengers arrive at U.S. airports after processing through U.S. CBP preclearance facilities at their point of departure. While these passengers are processed in the United States similar to domestic arriving passengers, they are still international passengers and have many of the same needs as international arriving passengers. As of December 2015, preclearance takes place at 15 foreign airports in six different countries and CBP has invited foreign governments or airports to accommodate new locations in the coming years (CBP 2015b). Precleared passengers receive the same immigration, customs, and agricultural inspections at the point of departure as performed on international arriving passengers upon arrival in the United States.

The precleared arriving passenger journey is similar to international arriving passengers with the exception that the border protection process occurs at the point of departure and arriving passengers are handled like domestic arriving passengers in the United States (see Figure 2-4). The key functions and activities of the precleared arriving passenger process include:

- Pre-trip planning
- CBP preclearance facility (point of departure)
- Arrival gate (domestic or international terminal)
- Connecting flight



Source: ACRP 03-35 Research Team

Figure 2-4. Precleared arriving passenger journey.

- Domestic baggage claim
- Arrivals hall
- Terminal arrivals roadway/ground transportation
- Airport egress roadway
- Journey from the airport

Pre-Trip Planning: Pre-trip planning for U.S.-bound international passengers begins with understanding the preclearance procedures at the point of departure. The preclearance process is different from the international arrivals process at U.S. airports because passengers remain in possession of their check baggage through the CBP Primary and Exit Control inspections. Once passengers clear Exit Control, they deposit their check baggage with the airlines.

Airport websites are the primary source of information about the preclearance procedures and requirements at each preclearance facility.

CBP Preclearance Facility: CBP provides detailed design guidance for preclearance facilities. It is the responsibility of the foreign airport to provide the facility for the preclearance processes. Some airports, such as Toronto Pearson International Airport, have adapted existing terminal facilities to incorporate the preclearance functions while others, such as Abu Dhabi International Airport, have constructed new buildings dedicated to housing the preclearance facilities.

Since departing passengers show up to the airport at a slower, more constant rate, the size of the CBP Primary Processing area at preclearance locations is substantially smaller than at U.S. airports where large volumes of passengers arrive all at once. In addition, because there is no international baggage claim, the passenger flow from primary inspection to Exit Control is metered by the capacity of primary inspection, creating a much more constant flow of passengers and reducing the large queues that often occur at international arrivals facilities in U.S. airports.

Arrivals Gate: Precleared arriving passengers are treated the same as domestic arriving passengers. Precleared flights may utilize gates in international or domestic terminals. Because international terminals process international departing passengers, the secure areas of the terminal should provide all of the necessary services and amenities including multilingual wayfinding for precleared passengers. The international departing passengers section provides information about the post-security concessions and amenities considerations for international passengers.

One important difference is the need for wayfinding signage to guide preclearance passengers to the domestic baggage claim area.

Domestic Baggage Claim: Precleared arriving passengers use the domestic baggage claim areas in the international or the domestic terminal. Because preclearance flights may involve long-haul travel on wide-body aircraft, the domestic bag claim facilities should be designed similar to the international bag claim areas to be able to handle the number of passengers and checked baggage associated with international flights. It is also important to consider the meeters and greeters and the pre-arranged ground transportation services that are common to international arriving passengers. The same services provided in the Arrivals Hall are needed for precleared arriving passengers. The key factors influencing the customer experience in this area include:

- Baggage claim carousels sized to accommodate wide-body aircraft and large volumes of checked baggage
- Availability of luggage carts (commonly free for international arriving passengers)
- Adequate space for meeters and greeters and pre-arranged ground transportation services
- Availability of restrooms
- Availability of information services
- Availability of airline baggage services
- Wayfinding signage to ground transportation services or connecting gates
- Proximity to airline recheck facilities for connecting passengers

The terminal owner/operator is responsible for providing adequate arrivals facilities for precleared arriving passengers. Airlines operating precleared flights provide baggage services and recheck capabilities adjacent to the domestic baggage claim area, as part of the international arrivals facility, or at the ticketing and check-in area.

The customer experience considerations for the remaining elements of the precleared arriving passenger journey (arrivals hall or airline recheck and security screening, terminal arrivals roadway/ground transportation, airport roadway and journey from the airport) are the same as for international arriving passengers or connecting passengers.

2.2 Factors Affecting the Customer Experience

2.2.1 Customer Expectations

Air travel customers want airports to be well organized with clear signage and essential facilities such as restrooms, concessions, and restaurants. Each airport is unique and while the same essential processes are carried out (check-in, security checkpoint, border protection), there may be subtle, but significant and unexpected, differences.

Customers anticipate what they will encounter at a new place based on their prior experiences. Even before arriving, passengers visualize themselves in that setting based on their expectations. If the new place is similar to places that they have already visited, customers will have an easier time adjusting; the more different the new place is, the more difficult it will be for the customer to cope with their environment (Gunn 1997).

Customers with difficulties coping with a new environment are likely to become frustrated and have a negative experience. For example, at some U.S. airports passengers connecting from a domestic flight to an international flight cannot go to the departure gate without going through security due to the terminal configuration. In the survey, passengers connecting from a domestic flight and who were about to board an international flight were asked if they expected to go through a security checkpoint at that airport. Customer satisfaction with security wait times and

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helpfulness of security staff was twice as positive when passengers were expecting to go through security (67 percent to 71 percent) as compared to those passengers who were not expecting to through security (27 percent to 35 percent).

Customer expectations change over time as advances in consumer technology have evolved. An increasing number of passengers are using airport websites to inform their pre-trip planning or airline websites and mobile applications to speed up the check-in and boarding process by foregoing the traditional paper-based ticketing process. Furthermore, access to WiFi, once a premium service, is now perceived by customers to be an essential utility; in the survey nearly 70 percent of international passengers indicated that free WiFi was very important and a further 26 percent indicated that it was somewhat important. In a globally connected world, international passengers require WiFi for communication and information acquisition. Various business models identify systems for the delivery of WiFi and, according to the survey results, international passengers express dissatisfaction when WiFi is difficult to access or free for a limited period of time.

2.2.2 Customer Challenges

Travel Anxiety: One in three Americans experiences a fear of flying (Dean and Whitaker 1982). These customers make two-thirds fewer trips by air than those who are not afraid. Although nearly half of passenger anxiety is experienced during takeoff and landing, about one-third who experience air travel anxiety identified customs and baggage claim processes as the source of their anxiety (McIntosh et al. 1998). The FAA reports that medical emergencies are generally caused by stresses related to flight delays, CBP inspection, security clearance, and luggage handling (McIntosh et al. 1998). Overall, airport physicians believe the airport segment of travel may be more hazardous than the in-flight segment (McIntosh et al. 1998).

As would be expected, there is an effect of culture on perceived travel risk (Reisinger and Mavondo 2006) and an effect of culture on user anxiety at security checkpoints (Ergün et al. 2014). Security screening and border protection processes often create the most stress for customers while post-security concession areas and gate holdrooms provide the most stress relief (ACI Europe 2014). Baggage claim is another area of stress as customers worry if their baggage will be delivered or if it was lost by the airline (McIntosh et al. 1998). Uncertainty about what information customers need or what the next step in the process entails significantly influences the amount of stress customers experience. Flight delays are another major source of anxiety for customers as they may disrupt other parts of their travel itinerary. Some customers have anxiety being in an unfamiliar airport environment (Fewings 2001) and may have a stressful or enjoyable experience depending on the effectiveness of the wayfinding system (Cave et al. 2013). Transfers between trains are a main cause of anxiety in rail travel; therefore, transfers between flights would also be expected to be a main cause of anxiety in air travel (Cheng 2010).

Effect of Jet Lag and Travel Fatigue: Long-haul international passengers arriving or making a connection at a U.S. airport will have likely spent from 6 to 16 hours on an overseas flight spanning multiple time zones. Long-haul travel affects passengers' ability to function normally, causing them to experience jet lag. Jet lag causes passengers to feel tired and disoriented, decreasing the ability to concentrate and carry out the physical and mental tasks essential to wayfinding in large environments, such as airports (Waterhouse et al. 2007).

Effect of Culture and Language: International passengers may experience culture shock caused by a language barrier, a lack of understanding of local technology, and information overload (Macionis and Gerber 2010). A wayfinding study of tourists not familiar with the local language found that the level of anxiety was correlated with negative wayfinding performance (Chang 2013).

Effect of Building Complexity: Large airports have many gates often located in several buildings. Research shows that decision points that require a change in level make it more difficult for customers to find their way as compared to decision points on the same level (Dada and Wirasinghe 1999). This is because it can be difficult to re-orient following the change in level, especially if one needs to turn around after changing levels.

Information Overload: When carrying out a task such as finding ones way in an airport, customers are continuously perceiving their environment (e.g., sight, sounds, etc.), mentally interpreting this information, and then making decisions based on the task at hand. Due to limitations in human information processing, performing one task at a time results in the best performance (Granjean 1998). When faced with more than two choices, objective measures of performance declines.

Getting Lost: According to the survey results, the most important feature of an airport for customers is ease of finding their way inside the airport. When people get lost or have difficulty finding their way, the common emotional response is as follows (Arthur and Passini 1992). First, customers blame themselves for not being able to understand their environment. Second, customers feel frustrated because they are lost and anxious because being lost may cause delay or potentially miss their flight. Third, customers may feel anger or resentment that such a simple and obvious task should be so difficult to carry out.

Elderly and Disabled Passengers: Age, mental cognizance, and physical ability have a significant impact on the passengers' ability to navigate the terminal. Much research has been conducted by the ACRP on this subject, including *ACRP Synthesis 51* and ACRP Project 07-13.

2.2.3 Airport User Categories

Regarding the airport user, a number of different categories should be considered to manage expectations and understand the potential limitations. These include the following:

- Purpose of trip: international passengers traveling for business or leisure
- Journey segment: international passengers departing, arriving, or making a connection at a given airport
- Frequency of travel: international passengers visit a particular airport frequently, occasionally, or it may be their first time
- Premium or high value customers: international passengers in the top-tiers of an airline's frequent flier program or who are flying in business or first class
- Special needs: passengers requiring additional attention may include families, aging passengers (see *ACRP Report 51*), or passengers with special needs
- Non-passengers: airport visitors accompanying departing passengers or greeting arriving passengers

Each category of user should be considered systematically to ensure their needs and expectations are met with an understanding of their potential limitations.

2.2.4 Interaction with Airport Stakeholders

The customer's airport experience is directly influenced by interaction with a number of different entities. According to the survey, 81 percent of passengers rate helpful staff as very important. In most cases, customers do not realize that the people they interact with are from separate organizations and have separate responsibilities nor are the customers aware that there is a transition of responsibility for customer service from one point to the next in their airport journey. Creating a seamless transition of customer service is key to improving the customer's airport experience.

The transition of responsibility for providing customer service is much like a relay race where members of the team pass a baton from one to the other during the race. If one member drops

the baton or fails to make a clean hand-off, the entire team is affected. The same holds true for the customer's airport experience. If one entity fails to deliver the service that the customer needs or expects, then the entire experience is diminished.

All of the airports included in the research conduct some form of customer service stakeholder coordination meetings. The meetings commonly included the following entities:

- Terminal management and customer service managers
- Airline managers
- U.S. CBP port director and supervisors
- TSA Federal Security Director and supervisors
- Law enforcement officers (particularly terminal roadway enforcement)
- Concessions providers
- Janitorial service providers
- Wheelchair service providers
- Operations staff
- Ground support service providers

These stakeholder meetings typically are conducted on a monthly basis but in some cases, such as at Hartsfield-Jackson Atlanta International Airport, more frequent meetings (weekly or bi-weekly) are conducted with key stakeholders, such as terminal management and customer service managers and CBP officials. These more frequent meetings were established to enhance the coordination between the entities and address issues as they arise rather than weeks after they occur.

Creating a culture of customer service excellence among all of the stakeholders is a key element in improving the customer experience. *ACRP Report 157: Improving the Airport Customer Experience* (2016) provides a thorough description of the components of successful airport customer service programs that seek to deliver a "wow" experience. Those components include:

- Education and training
- Monitoring and managing performance of airport staff
- Rewards and incentives for airport staff
- Information dissemination
- Engaging tenants and contractors

ACRP Report 157 also describes a variety of methods through which airport stakeholders can interact with customers, including:

- Information technology and smartphone
- Information technology and processing automation
- Digital signage
- Virtual assistants and robots
- Concession information
- Arrivals information
- Social media

Examples of how these customer interactions are or could be utilized for interacting with international passengers are provided in the following chapters describing each of the passenger journey segments.

2.2.5 Physical Environment

Another important aspect of the customer's airport experience is the physical environment where the airport processes are contained. The passenger terminal buildings and the terminal

roadways are two of the primary physical environments through which customers pass during their time at the airport. According to ACI Europe (2014), the key elements of the airport terminal physical environment that affect the customer experience include:

- Ambience
- Natural wayfinding
- Cleanliness and maintenance
- Walking distances
- Adequate space

Ambience: The visual, sensual, and social atmosphere of an airport terminal influences the customer experience. The terminal ambience includes physical elements (such as the architecture, structure, and interior design), sights, sounds, and interaction with other customers and employees. International terminals, particularly those at the leading global airports, provide a unique ambience that represents the diverse nature of the region it serves and the passengers that travel through it.

The visual component of a terminal's ambience is conveyed by the architecture, structure, and interior design. This begins with the exterior of the terminal, setting the stage for what customers can expect inside. The exterior can establish a sense of order among the many elements that helps to ease the customer's anxiety about traveling. The architectural design and layout of the terminal are important in terms of the appropriate space and scale of each functional area. Passengers may feel boxed-in if they are too small. The structure of the terminal creates sightlines and repetitive elements that enhance the customer's ability to understand the flow and organization of the terminal. The interior design can be used to create specific moods or environments appropriate for different areas of the terminal, for example, creating a relaxing environment for the security checkpoint process, more vibrant environments for shopping areas, or a calm and quiet environment for waiting areas.

Creating a unique sense of place is another trend that has become commonplace in U.S. airport terminals. This includes using the architecture, culture, cuisine, and the local community served by the airport to create a differentiated ambience (Boudreau et al. 2016). Examples of features that create a unique sense of place include live music events at Austin-Bergstrom International Airport, distinctive architecture at Denver International Airport, and the incorporation of popular local cuisine that is trending at many airports in the United States.

Natural Wayfinding: While many airport terminals rely heavily on various forms of informational signage to guide customers from one point to another, the creation of an environment that promotes natural wayfinding is an important consideration in improving the customer experience. According to the survey, 82 percent of passengers indicated that the ease of finding their way inside the airport was "very important." In addition, wayfinding research has shown the number one impact on wayfinding in complex spaces is the architecture of the physical space (Andre 1991; O'Neill 1991; Fewings 2001). A well-designed space with open architecture with direct lines of sight to the destination provide a more intuitive wayfinding experience and reduces the need to rely on signs.

Natural wayfinding utilizes the architectural properties of a terminal to guide passengers from one process to another rather than directing them with signage. Minimizing level changes and sharp turns in direction and creating clear sightlines enhance natural wayfinding. The use of transparent materials to separate spaces also aids in natural wayfinding because customers can see what lies ahead and confirm that they are walking in the right direction. Another important premise of natural wayfinding is leveraging predictability by organizing the terminal functions in a logical manner that is similar to other airports that international passengers may frequent.

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Creating unique passenger flows or process arrangements requires customers to adapt from their previous experience to the new arrangement and may create doubt and confusion.

Another architectural element that can make things difficult for customers to maintain their orientation is vertical transition (e.g., via elevators). Glass elevators (see Figure 2-5) are one way to provide a constant visual connection with the customers' surroundings and allow them to establish a line of sight with their surroundings before they need to exit the elevator cab. Flow-through elevators are more functional for customers with baggage carts or strollers or customers in wheelchairs. Flow-through elevators also allow customers to continue traveling in the same direction without having to make U-turns, which can be disorienting.

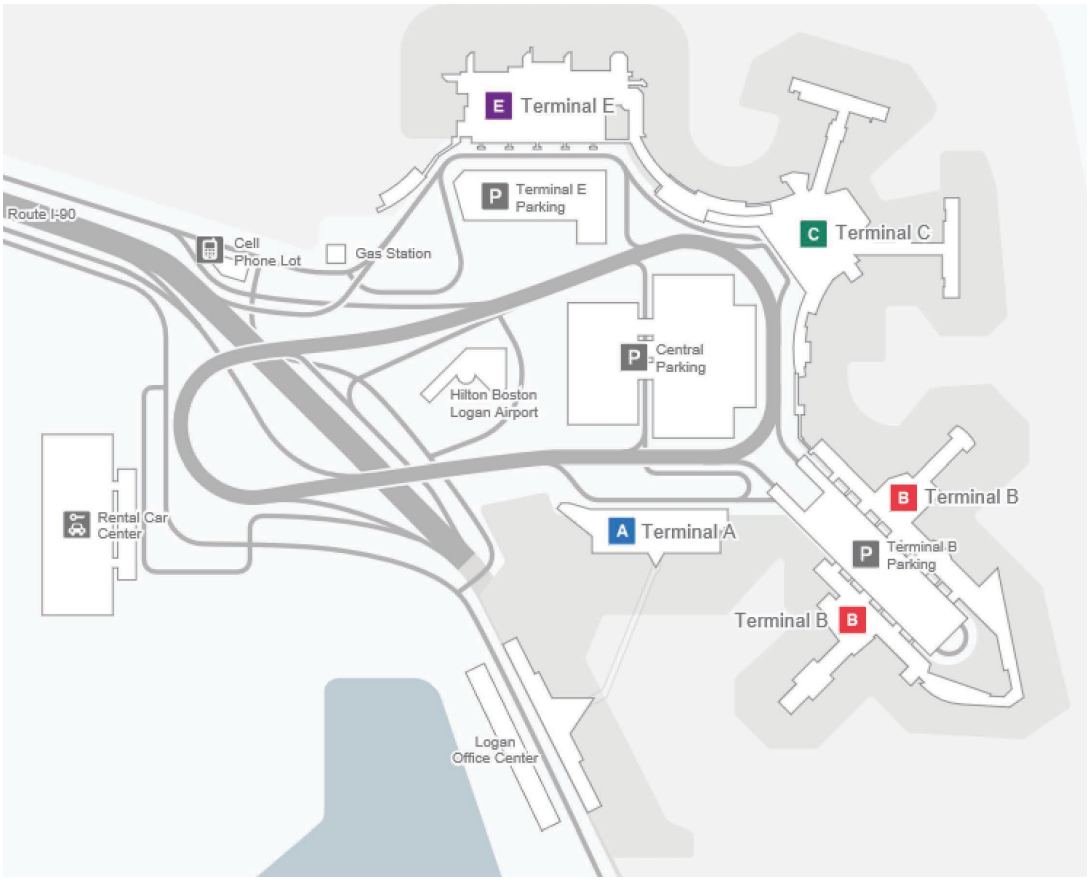
The goal of any airport planning process should include a design that delivers the desired results of creating intuitive spaces that rely less on signage. Reducing decision points assures that quality objectives are met by reducing opportunities for problems to occur. For example, the pathway for customers to connect to their next gate or to the terminal is an important factor in the customer experience. Non-linear terminal configurations (see Figure 2-6) create a challenging wayfinding scenario for international arriving passengers connecting to flights in another terminal. Conversely, linear configurations (see Figure 2-7) have a simple linear path of travel for passengers connecting via the automated people mover (APM). The non-linear pathways found at airports like Boston Logan International Airport with complex circulation require a higher level of effort and resources focused on the wayfinding to overcome these types of challenges.

Cleanliness and Maintenance: Clean and well-maintained facilities are a core element of customer satisfaction. According to the survey, 78 percent of passengers indicated that the cleanliness of the airport is "very important." This perspective is supported by the results from other globally implemented airport customer surveys, including ACI's ASQ and Skytrax. Within the terminal, restroom cleanliness is of particular importance.

The terminal's design should facilitate cleanliness and maintenance. Materials should be selected that are easy to clean, are not damaged easily, and can be replaced in smaller pieces if necessary. The design details should consider how the space will be used by customers so janitorial services are not needed on an ongoing basis. Consultation with the terminal operations and janitorial services providers should be conducted as part of the design process to gain a better understanding of the factors that influence cleanliness and maintainability.

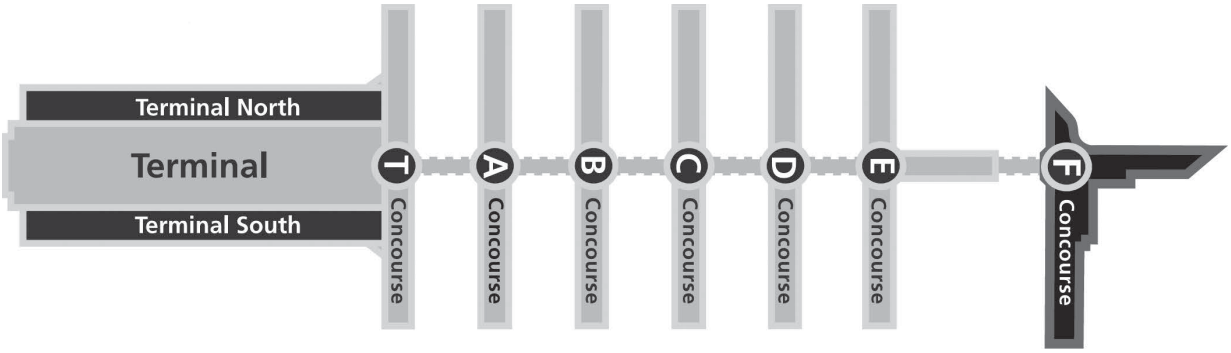
Source: ACRP 03-35 Research Team

Figure 2-5. Glass elevators at Munich Airport Terminal 2.



Source: Boston Logan International Airport website. www.massport.com/logan-airport

Figure 2-6. Non-linear terminal configuration – Boston Logan International Airport.



Source: Hartsfield-Jackson Atlanta International Airport website. www.atlanta-airport.com

Figure 2-7. Linear terminal configuration – Atlanta International Airport.

Walking Distances: Every airport terminal is unique in its design and layout, which are highly influenced by the constraints of the site upon which the terminal has been constructed. It is not unusual for international terminals at U.S. airports to provide some type of mechanical passenger conveyance to mitigate the longer walking distances commonly associated with these facilities due to their size. While 41 percent of passengers surveyed identified short walking distances as "very important," airports with very long walking distances often receive complaints from customers.

One of the key considerations when examining walking distances is whether customers have claimed their checked baggage, especially because international passengers commonly have more and larger pieces of baggage than domestic passengers. Walking distances from terminal parking garages to the ticketing/check-in area are important to consider because customers generally have to carry their own baggage because luggage trolleys are not typically available in the terminal parking garages. Providing curbside check-in services on the terminal departures roadway allows departing passengers to drop-off their check baggage before parking their vehicle.

Inside the terminal building the primary walking distances that should be evaluated are the security checkpoint to the departure gates, arrival gate to the passport control hall, CBP Exit to the airline recheck counters or to the terminal departures roadway or ground transportation services. While walking distances between these points should be minimized to the greatest extent possible, IATA recommends that some type of mechanized automation, such as moving walkways, be provided for distances over 1,000 feet. Moving walkways or electric carts should also be considered for shorter distances as the elderly greatly benefit from such assistance.

In some cases, long walk distances, including the use of moving walkways, may be unavoidable. Ambience becomes a more important consideration in this situation because art and interior design can be utilized to distract customers from the long distances and make it a more enjoyable part of the journey. This is especially important in underground connectors where it may not be possible to provide natural light and views of the outside or inside the terminal (see Figure 2-8). Another consideration is to provide customers with information about the walk distance, specifically the amount of time it will likely take to reach the next point in their journey. This reduces the anxiety from the unknown walking time and it may allow them to use other terminal services and amenities available along the way.

Source: ACRP 03-35 Research Team

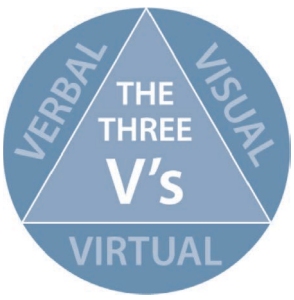
Figure 2-8. Artwork in underground connector at Atlanta International Airport.

Spatial Requirements: Terminal planning and design spatial requirements play an important role in influencing the customer experience. Two of the most notable sources of terminal planning spatial requirements are *ACRP Report 25: Airport Passenger Terminal Planning and Design* and IATA's *Airport Development Reference Manual* (ADRM). Foreign airports have historically utilized the ADRM as the basis for their spatial requirements. The differences in spatial provisions among foreign airports lies primarily in the selection of the target level of service, with some of the most well-regarded airports choosing to base their terminal designs on Level of Service B (now referred to as Over Design) or above. U.S. airports on the other hand, which historically have been significantly influenced by the dominant U.S. airlines serving a particular airport, have taken a more conservative approach by basing their terminal designs on Level of Service C or below (now referred to as Optimum and Suboptimum, respectively) for the peak periods of activity. Ultimately, the decision about which Level of Service to base new projects on rests with the airport operator and key stakeholders, such as the airlines. Airport terminal planners and designers should work collaboratively with these stakeholders to define and evaluate the target level of service. The cost of providing a higher level of service will certainly be a major consideration.

While these sources provide relevant guidance for spatial requirements, several factors continue to evolve or are unique to each airport that must be considered prior to establishing the appropriate spatial requirements:

- Distribution of passengers among check-in modes
- Passenger segmentation and customer service objectives for each airline
- Actual processing times at each function
- Target maximum wait times and number of passengers in queue at each function
- Size of the largest aircraft in terms of seats available
- Regularly occurring load factors for each airline
- Check baggage allowances and size limitations for each airline
- Number of check bags per passenger for each airline
- APC and MPC eligibility
- Frequency of peak periods compared to average activity levels
- Preferred flight arrival and departure times for the regions that the airport serves or may serve in the future
- Distribution of passengers by travel purpose (business, pleasure, personal, etc.) and average group size

Being identified as a world-class airport is about more than spatial requirements. It involves offering a wide variety of amenities and services that passengers need during their journey along with available and helpful customer service. However, international travel is often a luxury experience and therefore U.S. international terminals need to consider a higher level of investment compared to domestic terminals. Ample space at key processing points should be considered in new terminal designs to achieve a high level of service. Using the most recent IATA ADRM as a basis, key functional areas should at minimum achieve the Optimal level of service during the peak periods. Spaces used for processing premium passengers, such as first and business class, may exceed the Optimal level of service.



2.2.6 Information Communication and Dissemination

A major part of the international customer experience is about how to find their way through the airport, which is directly related to how effectively the information is communicated. Information for airport customers can be categorized into one of three Vs of communication: verbal, visual and virtual.

What are the benefits of wayfinding and why is this communication so important? One-hundred percent of respondents from the survey rated ease of finding way inside airport as somewhat important or very important. Of the top 10 features measured, the ease of finding their way inside the airport ranked number one among all international passengers surveyed. Conversely, respondents were asked to describe their best experience at that airport that occurred on the day of the survey; ease of wayfinding ranked last.

Additional customer survey research about wayfinding conducted by Gresham, Smith and Partners (2013) has shown that approximately 10 percent of customers will ask for assistance. At an airport with an annual volume of 10 million passengers, 10 percent equates to one million passengers looking for someone to provide them with assistance. Based on the survey, one-third of customers speaking a foreign language can read little or no English, which means these passengers likely will need verbal assistance to compensate for signage and other information posted only in English.

Understanding why the information must be correctly communicated and disseminated is demonstrated by the verbal communication example where the survey results showed that only helpfulness of staff ranked higher than ease of wayfinding. This example also underscores that verbal communication is still extremely important in today's digital age.

Understanding how information is communicated and disseminated is crucial to the customer's experience as demonstrated. The backbone of the three Vs of communication is consistency. In a complex airport this can be challenging because the responsibilities for the various forms of communication often reside in different departments (see Figure 2-9). For example, verbal communication provided at information desks staffed by volunteers may be part of customer service, while full-time employees that staff the ground transportation information counters may be part of a contract service. While staffed and managed by different groups, the customer sees no distinction and expects a consistent level of service.

Therefore, a major key about how to provide consistent information using all forms of communication is for the airport to establish a policy and process to require all responsible parties to coordinate efforts on a regular and ongoing basis regardless of department.

The following outlines how each of the three Vs of communication are used in an airport environment and the primary methods for communicating with passengers along with the responsible parties that should be involved.

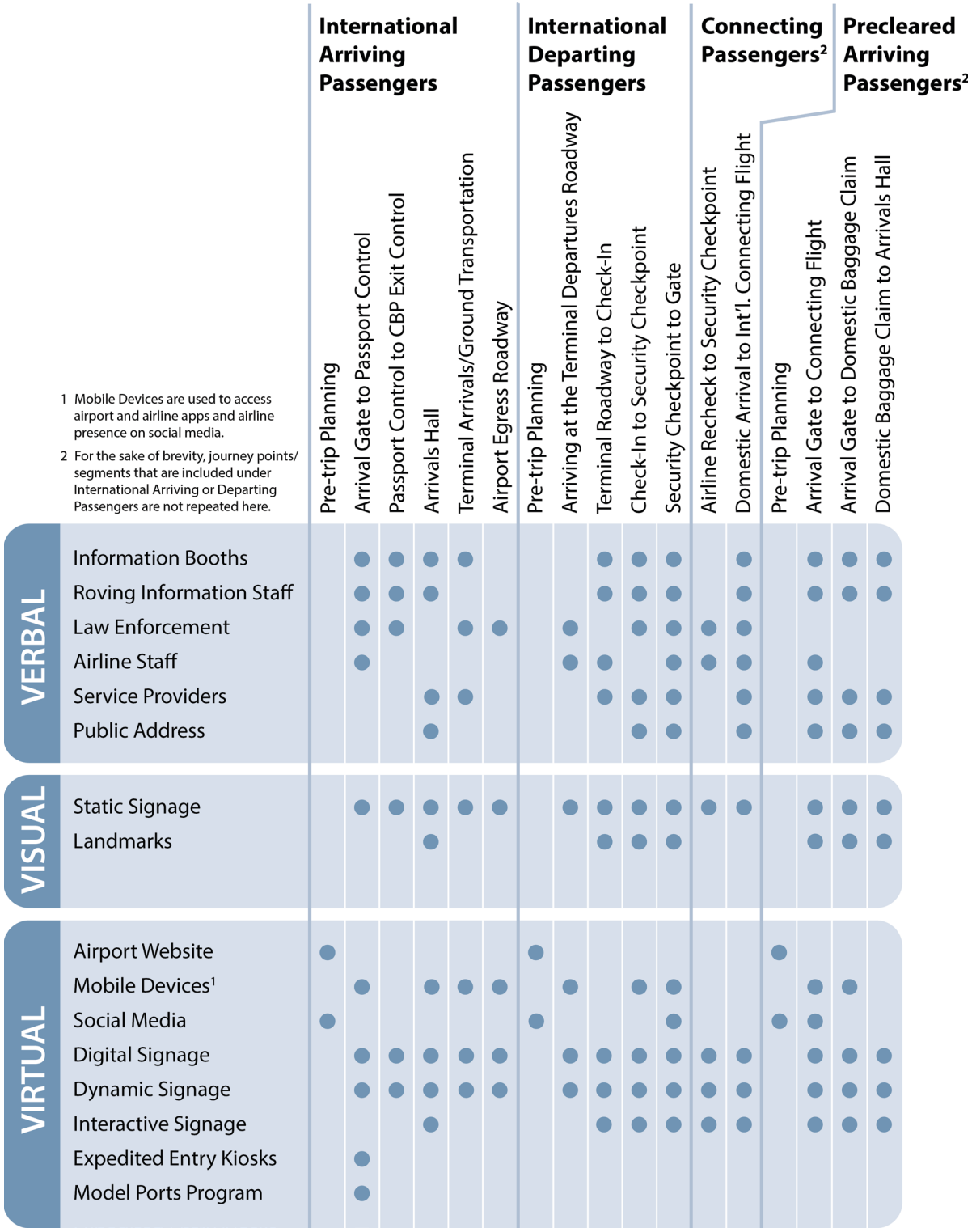
Verbal Communication

Verbal communication is exactly what it sounds like: live, person-to-person communication. Lost or confused passengers can ask for help at an information booth, from roving information staff, or from non-frontline personnel that are badged and have occasional contact with customers. Studies show that 10 to 15 percent of people are not helped by signage and depend on verbal assistance.

The survey gathered data on the importance of helpful staff. While 81 percent of respondents said very important, 65 percent of respondents rated staff helpfulness as excellent or very good.

The verbal communication responsibility matrix in Figure 2-10 illustrates how the role of verbal communication essentially belongs to everyone at the airport, beginning with the airport operator. Stakeholder interviews conducted at each airport provided good insight into customer service philosophies and best practices on verbal communication:

- There is a real focus on customer service; it is everyone's responsibility. Anyone with an airport ID badge is a customer service representative. Several airports have a customer service training program in which all airport employees must participate.



Source: ACRP 03-35 Research Team.

Figure 2-9. 3 V's communication matrix.

AIRPORT OPERATOR	LAW ENFORCEMENT	AIRLINES	OTHER SERVICE PROVIDERS
Customer Service Staff	Public Safety	Passenger Service Agents	Concessions
Contractors	Transportation Security Administration	Flight Crews	Ground Transportation
Volunteers	U.S. Customs & Border Protection	Baggage Handling Staff	Premium Lounges
			Janitorial

Source: ACRP 03-35 Research Team.

Figure 2-10. Verbal communication responsibility matrix.

- Passengers seem to leave their brains at home when traveling. Human interaction is a much more effective means of communication than providing information via kiosks.
- The availability of friendly staff makes a significant difference in the customer experience; passengers need an outlet to voice complaints or to just confirm what they need to do.
- Adequate wayfinding is paramount and must be supplemented with human interaction. No terminal design is so intuitive or passengers so smart that when a crowd forms passengers do not get confused.
- All airport or airline employees have to take the view that passengers ultimately pay everyone's salary, a service-oriented perspective. Achieving consistency is very difficult. Everyone is responsible for the customer experience.
- Human interaction in the arrivals process is very important as many people are intimidated by the APC kiosks.
- Airport employee training programs should be developed with the thought that every employee should know a little more about the airport and be prepared to provide customer service. It is an active approach to customer service by looking for passengers who need help rather than waiting for them to ask for help.

Information Counters: The staff at information counters (see Figure 2-11) can provide more detailed and more personalized information to passengers than is available through signage,

Source: Zurich Airport (http://www.zurich-airport.com/passengers-and-visitors/airport-services-en/information-desks)

Figure 2-11. Airport information counter.

directories, or digital media. This one-on-one communication is indispensable in the airport environment. Information counters are also commonplace; in fact, all 12 airports visited during the research phase have staffed information counters.

There are multiple reasons why some customers look for an information counter in addition to or instead of other channels of information:

- They speak limited or no English and need access to someone with language skills. Thirty-two percent of foreign language survey respondents could read little or no English.
- They have questions that are not addressed through other channels of information dissemination.
- They require special assistance and need a way to access help. This could include customers with impaired mobility, vision or hearing, or have cognitive issues.
- They are simply more comfortable having a face-to-face conversation with another person than using signs, directories, or digital devices. Information booth staff can more completely describe the complex processes that passengers experience in the airport.

Information counter staff should have full access to airport-wide information via the airport's website and the airport's intranet that serves as a centralized source of pre-scripted information and distributing updates to changes in airport services and operations. This centralized source of information helps ensure consistency in an ever-changing environment of an airport.

Regularly scheduled team meetings to communicate internally with information counter staff also helps ensure continuity.

Resources for information desk staffing should also provide for:

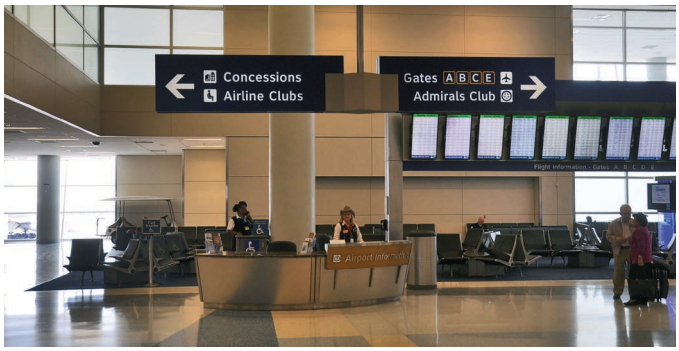
- Language translation services for limited or non-English speaking customers.
- Meeting the needs of customers requiring special assistance.
  - Mobility
  - Vision
  - Hearing
  - Cognitive

The ideal placement for information counters is at key decision points along the customer's journey. The following are some examples of where information counters are placed at the airports included in the research. Proper planning and coordination ensure the best adjacency of information counters relative to decision points, key journey segments, etc.

- Dallas/Fort Worth International Airport Ambassador Information kiosks are positioned at all major decision points within the terminal: after the security checkpoints, after airline recheck, and near the escalators for the APM stations (see Figure 2-12). The Ambassadors are all volunteers.
- Information desks are located at each key decision point at Incheon Airport (see Figure 2-13).
- The information kiosk in the arrivals hall at Munich Airport Terminal 2 is very distinct; passengers or meeters and greeters can find it easily (see Figure 2-14). The counter is staffed by trained, very knowledgeable airport employees. Volunteer hospitality staff is not used. Personal communication is paramount.

Proper training is essential. This typically involves a new staff person first shadowing an experienced staff person and then being supervised for a period of time until they are ready to work on their own. Staff should also rotate to spend time working at all information counter locations so they learn about the whole airport which provides them with a better understanding of the different passenger journey segments and how to best answer their questions.

Another key part of training is to teach all staff simple things like looking the customer in the eye when communicating information because the body language of the customer can indicate back to the airport staff member whether they understood what they heard.



Source: ACRP 03-35 Research Team

Figure 2-12. Post-security information counter at Dallas/Fort Worth International Airport.

Source: ACRP 03-35 Research Team

Figure 2-13. Information counter near the entrance to APM at Incheon Airport.

Source: ACRP 03-35 Research Team

Figure 2-14. Arrivals hall information counter at Munich Airport Terminal 2.

Customer Service Audit: These audits are conducted in addition to the comprehensive customer service training program for concessions employees. JFKIAT (the operators of JFK Terminal 4) also perform customer service audits on a monthly basis to make sure its standards are being met. Their next goal is to be able to offer language training skills to concession employees.

Multilingual Public Address: Multilingual paging for international terminals is another consideration for how to improve verbal communication. For example, the Miami International Airport Paging and Information Center provides multilingual paging throughout the Miami International Airport terminal and concourses for the traveling public, tenants, and users. Additional information is provided in the section on visual paging.

Roving Information Staff: While only observed at two of the airports visited, roving information staff is an emerging trend among airports (see Figure 2-15). Trained uniformed customer service staff equipped with tablets having access to airport-wide information roam the airport searching for customers in need of help. These staff can be positioned anywhere in the airport which allows them to serve customers at key locations that are known to be problem areas at peak periods of travel. These staffers have the ability to spot passengers who appear to be lost or are in need of assistance, especially those not in close proximity to information booths or directories.

Additional thoughts to consider for roving information staff:

- During the busiest times of the year, provide roaming customer service agents to be proactive in assisting customers who appear to need information or directions.
- Signage at most U.S. airports is provided only in English, but the customer service representatives should have multilingual skills or easy access to them.

Verbal Communication Supported by Technology: With a record 53.7 million passengers in 2014, Changi International Airport is Southeast Asia's biggest international airport and voted the best airport in the world in a 2013 Skytrax survey of passengers from over 160 countries. Their focus is to provide a stress-free environment with a personalized and positive experience through the innovative usage of technology, as emphasized in their Service Workforce Empowerment and Experience Transformation (SWEET) program. Changi Customer Service Ambassadors, called experience agents, are armed with iPads with SWEET access. SWEET provides the latest

Source: Denver International Airport

Figure 2-15. Roving airport ambassador at Denver International Airport.

flight information, resource planning, operational reports, and a chat function for real-time discussion among staff. Like roaming flight information and wayfinding displays, this allows agents to assist passengers with questions about flights or locations within the terminal on the spot.

Roving staff can also be used to provide premium meet and greet service. Gatwick First is a premier-class concierge service that accompanies customers through every aspect of their airport journey, arriving or departing, to make it a stress free experience (see Figure 2-16).

Badged Personnel: In addition to formal communication provided by fixed information counters and roving staff, any airport staff with a badge that encounters the public can become an airport ambassador when approached by a customer needing help. These personnel should receive basic training about how to communicate wayfinding information clearly, consistently, and informally.

- What is wayfinding?
- Why is it important?
- What you need to know.
- How you can help.

Law Enforcement: Law enforcement personnel may not report directly to the airport operator, therefore the airport needs to develop and maintain an open dialogue with these agencies about how they can support positive verbal communication to the airport customer.

- Public safety officials
- TSA agents
- U.S. CBP officers

Airlines: Airline personnel that interact with customers include:

- Customer service agents
- Flight crews
- Baggage service office agents

Some airlines provide verbal arrival information to customers over the public address system prior to landing. This information can help speed up the entry process and instill confidence in a customer's decision making upon deplaning. The information relayed to the passengers just before arrival includes:

- Airports with APC that can eliminate the need for filling out the customs declarations form
- Airports with MPC app for smartphones

Source: skybreak.co.uk

Figure 2-16. Gatwick First premium concierge service.

- Connecting gates
- Customs declaration forms

Airline agents at the ticket counter or at the gate are also key points of contact for customers needing direct one-on-one communication.

Other Service Providers: Similar to the groups previously mentioned, other service providers also encounter customers. The airport's process should include these other groups in all training about proper communication with the customer.

- Concessions
- Ground Transportation
- Premium Lounges
- Janitorial

Visual Communication

This section focuses on the various aspects of how information is communicated visually for international passengers. For additional information, a good resource is the *ACRP Report 52: Wayfinding and Signing Guidelines for Airport Terminals and Landside*, which contains comprehensive information on the best practices for static signing in airports.

Based on the survey, approximately 34 percent of the foreign language passengers could read only a little or no English at all. For those surveys filled out in a foreign language, particularly respondents who could only read a little English, 50 percent had a positive (excellent or very good) overall airport satisfaction rating as compared to 74 percent for those who said they could read English.

The survey results also showed that passengers residing outside the U.S. rated the importance of finding their way (83 percent to 80 percent) and the use of universal symbols (62 percent to 58 percent) slightly higher than the U.S. residents surveyed.

Language: Six of the eight U.S. airports visited use only English messaging on their signage. The other two U.S. airports included Spanish in addition to the English messaging. Three of four international airports visited included bilingual or multilingual messaging on their signage. While English is recognized and used worldwide, there is still a need to make a foreign passenger welcome because our airports serve as gateways to the United States.

Symbols with Message: Symbols are the oldest form of visual communication. Long before written languages appeared, pictographs or symbols were used by humans to represent objects and activities and to tell stories. The goal of using symbols in airports is to facilitate the customer's understanding and utilization of the facility.

The established best practice employs a consistent pairing of text and related symbols to provide a powerful communication tool for travelers; once symbols are learned they become a visual shorthand, and a means of communication for those who do not understand the local language. This shorthand offers an added benefit of shortening the time required for a traveler to perceive and process the information. When properly deployed, symbols are an efficient means of communicating key destinations and services to non-English-speaking travelers.

Symbols Only: An exception to using symbols only without the message is when the symbol has a high comprehension rate. Symbols with low comprehension rates, especially those with multiple variations, can cause frustration when a message does not accompany the symbol.

Illumination, Color, and Contrast: The three elements of illumination, color, and contrast are responsible for providing good visibility and legibility. Visibility is about the customer being able to see the sign and legibility is about the customer being able to read the information.

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All four international airports and six out of eight U.S. airports visited use internally illuminated signs. While internally illuminated directional and informational signs provide a higher level of visibility, there is no measured research that provides quantitative proof that customers actually experience an increase in wayfinding performance.

All but one airport visited uses a high contrast color combination, which is important with regard to legibility. Seven of the eight U.S. airports use white messaging on a dark background. The four international airports visited showed no clear preference of message/background color combination.

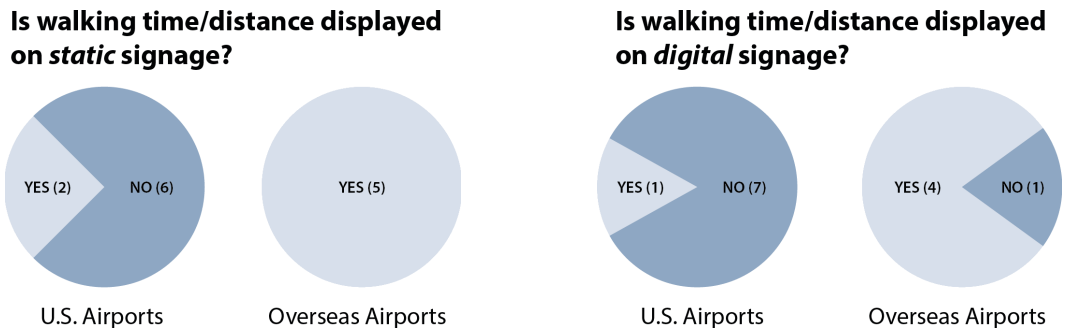
Color-coding: While only one of eight U.S. airports surveyed uses color-coding on signage to help passengers find their way, three of the four international airports visited use some method of color-coding in their terminal wayfinding signage. While the reason for multiple color schemes may not be initially obvious to the international traveler, once educated the remainder of the wayfinding journey becomes intuitive. Because the color-coding is not applied consistently between the airports, the logic must be re-learned at every airport.

The site visits observed how Boston Logan International Airport, Dallas/Fort Worth International Airport, and JFK International Airport Terminal 4 use color-coding to segregate passenger types into different queues at CBP primary processing. The color codes are introduced prior to CBP Primary, so when passengers reach the inspection area, they can find the appropriate queue quickly. This can help reduce congestion in CBP Primary, which in turn can lead to an improved customer experience.

Walk Time/Distance for Wayfinding: Of the U.S. airports surveyed, very few provide information about walking time or distance on directories, FIDS, or other forms of visual communication. Conversely, most of the overseas airports do include this information (see Figure 2-17).

Passengers concerned about missing a flight can use this information to their advantage. For example, a passenger can decide whether they have time to shop before proceeding to a distant departure gate. Whether this information is deployed via static directories or digital screens, this is an excellent opportunity to educate customers and improve their experience. Including walk time/distance for wayfinding information can help manage customer expectations and assist with decision-making.

- Tracking and publishing real-time wait times and walking distances or times would be helpful in managing expectations. Provide information on the best route to use if a customer is in a hurry, such as a tight connection. Customers need to understand the implications of each option.
- The wayfinding signage is very clear and provides information on walking times between points (see Figure 2-18).



Source: ACRP 03-35 Research Team

Figure 2-17. Walking time or distance displayed on signage.

Source: ACRP 03-35 Research Team

Figure 2-18. Walk time displays.

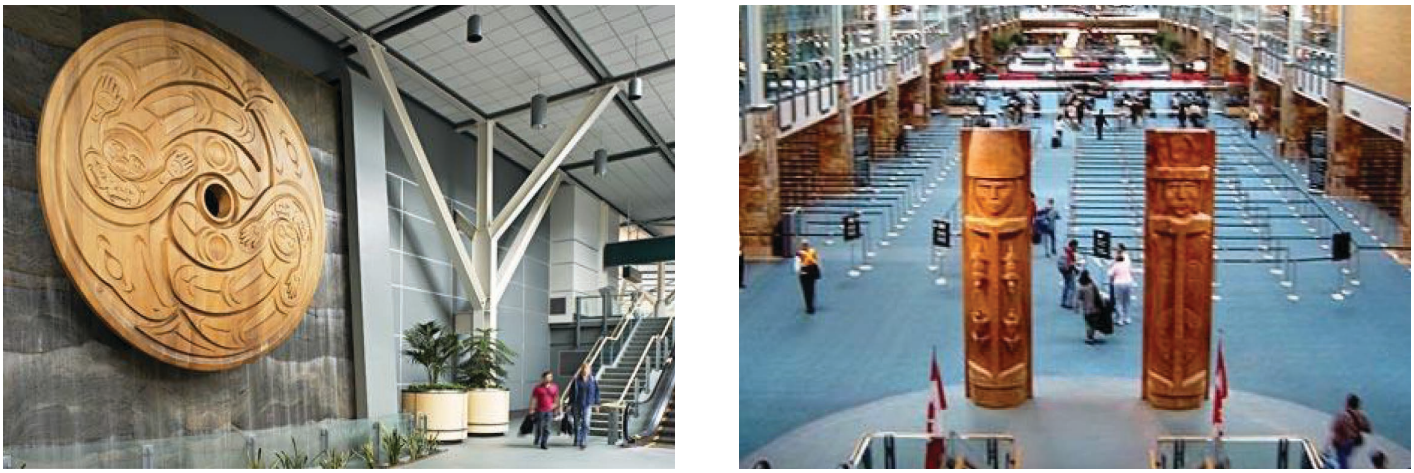
Similar types of information can be useful to unfamiliar customers who have a choice of whether to walk or ride to the departure gate (see Figure 2-19). However, the ability to successfully communicate these options often involves multiple factors and can be a complex issue that requires careful thought and consideration to provide clear and easy to understand information.

It is also important to understand that at many U.S. airports, the FIDS information is supplied by the airlines as compared to overseas airports, where the information is provided or controlled by the airport. This may complicate the ability to include walk time or distance information on FIDS at certain U.S. airports.

Landmarks: Landmarks can be an excellent wayfinding tool to promote the regional culture. For example, the arrivals hall at Vancouver International Airport contains native Indian sculpture (see Figure 2-20). To work well, landmarks must be properly placed and simply described to and recognized by customers. They can deliberately draw the passenger's attention to key areas of the building or the next step in their journey. Landmark design solutions can include

Source: ACRP03-35 Research Team

Figure 2-19. Walk or ride information at Detroit Metropolitan Airport's McNamara Terminal.



Source: Gresham, Smith and Partners

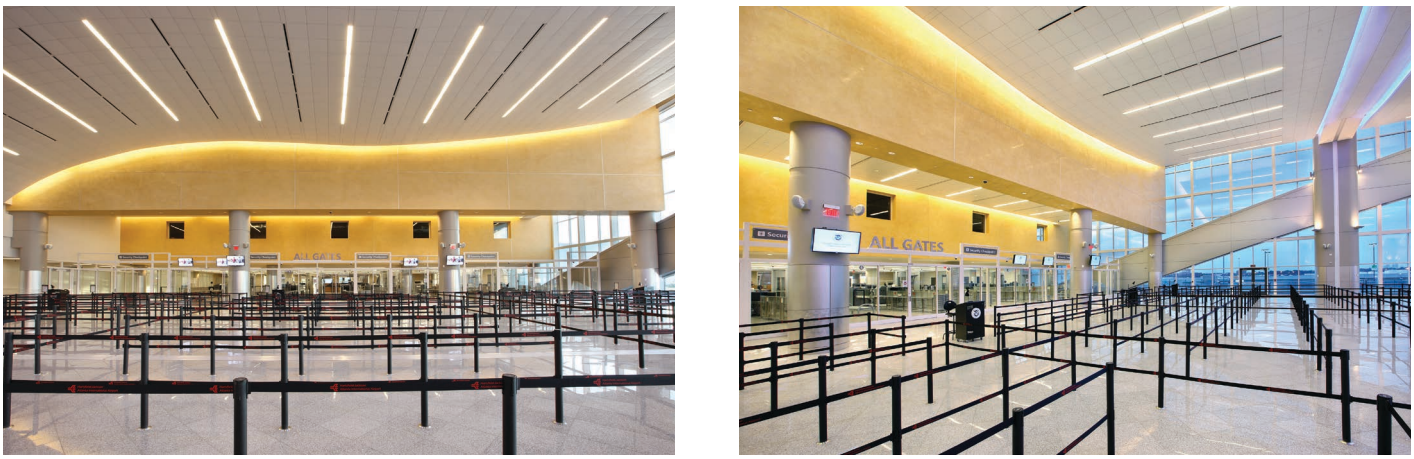
Figure 2-20. Landmarks at Vancouver International Airport.

static and or dynamic media and can be integrated with the airport design to help create a sense of place.

Lighting: Lighting is another design element that can be used to highlight key areas of the terminal building to aid in intuitive wayfinding (see Figure 2-21).

Static Signage: While there are other means and methods to promote good wayfinding, the static signage, as shown in Figure 2-22, is the wayfinding workhorse in an airport environment. Regardless of design preferences, illuminated vs. non-illuminated, color-coded or non-color-coded, the key elements for a well-designed sign program are found in the three Cs of wayfinding: connectivity, continuity, and (most important) consistency. Think of each message as a link in a wayfinding chain. If a message is missing or placed in the wrong location the wayfinding chain is broken. The result is customers that become lost and confused. Therefore, proper planning and programming is essential to the success of any wayfinding system.

A common misconception is that once a new wayfinding system is installed, the job is done. The reality is that airport wayfinding is similar to any other essential building system and must



Source: © Chris Cunningham, Courtesy of Gresham, Smith and Partners

Figure 2-21. Lighting and color accents at ATL International Terminal.

Source: © Jeffrey Totaro, Courtesy of Gresham, Smith and Partners

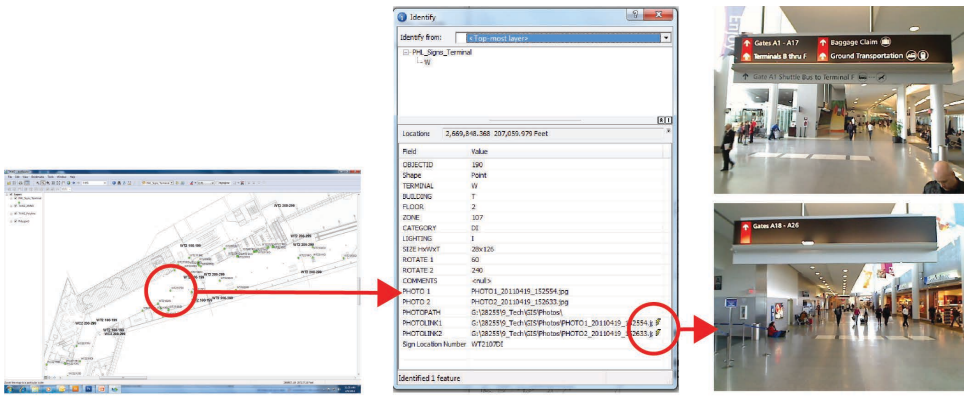
Figure 2-22. Static signage system.

be maintained to function properly. Airports are in a constant state of flux and therefore the wayfinding system needs tools like a sign inventory database (see Figure 2-23) and sign standards guidelines to perpetuate the integrity of the sign system.

While we live in a digital age, not all customers want to or are able to receive information digitally. Therefore, a traditional handout of the physical map of airport is still an effective way to help customers navigate the airport. Figure 2-24 provides an example of a visual map provided to a customer seeking verbal information. The customer can take this visual map with them to help remember what they heard.

Virtual Communication

The virtual or digital dissemination of information from the airport to the customer starts long before the customers begins their journey. Before the digital age, customers relied on travel agents or telephoning the airline directly to book a flight. Today, once the customer determines an upcoming trip is imminent, an Internet-enabled device becomes the portal to book travel and make decisions about every step in the trip. Using the advancements in web, mobile, and content



GIS Data Point Plan | Individual Location Point Table | Linked Survey Photos

Source: Gresham, Smith and Partners

Figure 2-23. Sign inventory database.

DFW

Ambassador Program

DFW Airport Guide Map

Airport Services

Airport Ambassador Program	Terminal B43 Office	972 973 7000
Airport Chaplain's Office	Termninal D21	972 973 2665
American Airlines Custom Service Center locations	A21, C25 & D24	
American Airlines Rebooking Number		1 800 446 7834
Animal Relief Area	B28, D18, E31	
	A8*, C2*, C39*, D18*, D30*, E2*, E38*	
Boutique Air/Corporate Aviation		855-268-8478
DART Rail Service	Terminal A10 Lower Level*	214 979 1111
Emergency Car Service		972 973 3112
Global Entry Enrollment	Office Arrival Level 1** D21/22	
Grand Hyatt DFW	D22 Departure Level	972 973 1234
Ground Transportation	Taxi Dispatch	972 574 2227
Guest Services Center	Terminal B14	972 574 0097
Hyatt Regency DFW		972 453 1234
Lost and Found	Travelers Aid (Terminal E5*)	972 973 4420
	American Airlines C2	972 425 2465
Minute Suites	Terminal D23	972 973 4235
Nursing Room	Terminal A18, B41	
Passenger Paging	Terminal A, B, C, D, E	972 973 3112
Parking		972 973 7275
Valet Parking	www.dfwairport.com/valet	972 574 2407
Police/Fire/Ambulance	Emergency	911
Police/Fire (Operations)	Non-emergency	972 973 3210
USO Center	Terminal B15 Inside Security	972 574 8182
	Terminal D22	
U.S. Customs		972 973 9825

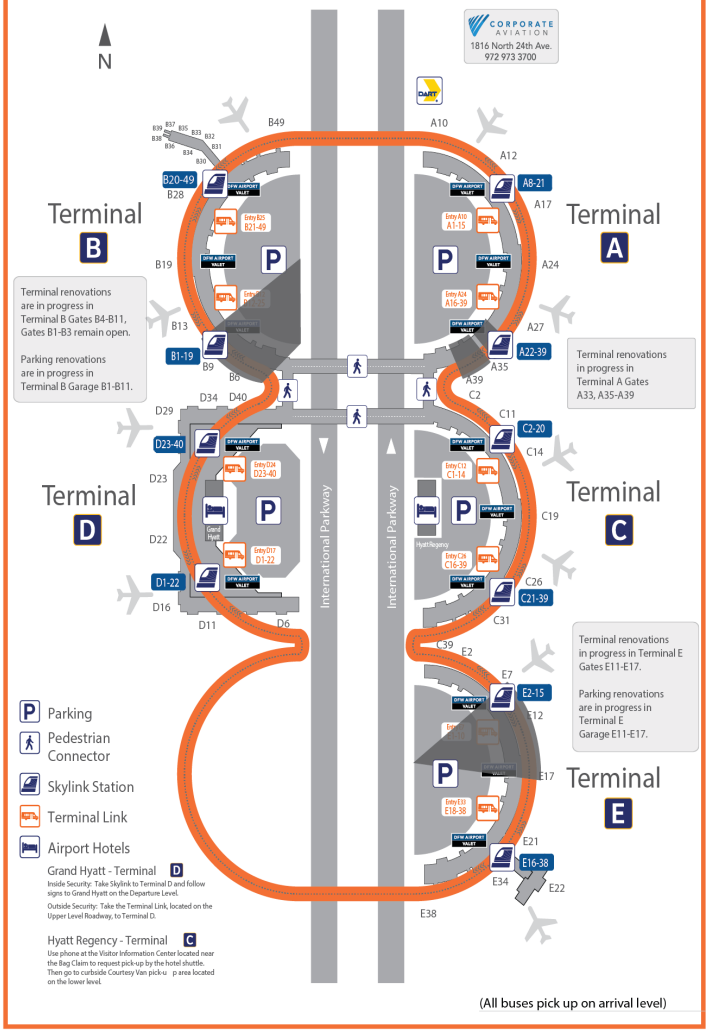
Airline Information

Airline	Terminal	Gates	Bag Claim	Reservation
AeroMexico	D	6-16	Customs	800 237 6639
Air Canada	E	21	E37, 38	888 247 2262
Alaska Airlines	E	24	E31-34	800 252 7522
American Airlines	A	8-39	A15-16, 29	800 433 7300
	C	2-39	C4,12,15,25,26,31	800 433 7300
	D	6-40	D15-16,29-31,Customs	800 433 7300
	E	35-38	E 37-38	800 428 4322
American Eagle	B	1-49	B20,21, 29, 30, Customs	800 433 7300
	D	6-16	D 16, Customs	800 433 7300
Avianca	D	6-16	Customs	800 400 8222
British Airways	D	6-16	Customs	800 247 9297
Cayman Airways	D	6-16	D6-16	800 422 9626
Corporate Aviation	1816 North 24th Avenue,		DFW Airport	972 973 3700
Delta	E	25-30	E31-34	800 221 1212
Emirates	D	6-16	Customs	800 777 3999
Etihad Airways	D	6-16	D6-16	888 838 4423
Frontier Airlines	E	20	E37, 38	800 432 1359
Funjet	D	14	Customs	800 558 3060
Japan Airlines	D	6-16	Customs	800 525 3663
JetBlue	E	10	E4	800 538 2583
KLM	D	6-16	Customs	800 241 4141
Korean Air	D	6-16	Customs	800 438 5000
Lufthansa Airlines	D	6-16	Customs	800 645 3880
QANTAS	D	16	Customs	800 227 4500
Qatar Airways	D	6-16	Customs	800 988 6128
Spirit Airlines	E	18, 31-33	E31-34	801 401 2200
Sun Country Airlines	D	6-16	D 15, Customs	800 359 6786
United Airlines	E	4-9	E 4, 5	800 864 8331
Viva Aerobus	D	6-16	Customs	888 935 9848
Volaris	D	6-16	Customs	866 988 3527
WestJet	E	18	E38	855 547 2451

How To Connect At DFW

Skylink — For transportation between terminals while inside security.

Terminal Link — For transportation between terminals while outside security. Shuttle pick-up at Upper Level Terminal Roadway.



Restrooms

Inside Security

- A A10 ••, A11 ••, A18, A23, A29 ••, A37 ••,
- B B5 ••, B14, B18 ••, B23, B28 ••, B33 ••, B41, B47
- C C2 ••, C7, C8, C19 ••, C21, C27 ••, C35 ••
- D D6L3 ••, D10L3 ••, D-17L3 ••, D20L3 ••, D22L3 ••, D24L3 ••, D27L3 ••, D29L3 ••, D36L3 ••, D40L3 ••
- E E2 ••, E7 ••, E21, E26, E33, E37

Outside Security*

- A A17 ••, A28 ••,
- B B19 ••, B25
- C C4 ••, C7 ••, C8, C19 ••, C21, C27 ••, C35 ••
- D D6L3 ••, D10L3 ••, D17L1 ••,D17L3 ••, D20L3 ••, D22L1 ••,D22L3 ••, D24L3 ••, D27L3 ••, D29L1 ••,D29L3 ••, D36L3 ••, D36L3 ••, D40L3 ••
- E E6, E20 ••, E38

WAREHOUSE # 1-60-0857 •• Family Restrooms REVISED 1-2016

Source: DFW International Airport

Figure 2-24. Visual handout map provided at information desks at Dallas/Fort Worth International Airport (one side of a two-sided handout).

management technology to harness the opportunity to reach passengers throughout every stage of their journey can maximize the customer experience.

Airport Website: The customer's experience typically begins in a web browser. Currently, the majority of travel is purchased and arranged via websites. Regardless of a passenger's age, over 90 percent of users booking travel use a travel service provider website, an online travel agent, or through a traditional travel agent (Peltier 2015). According to the survey, about one-third of passengers surveyed used or planned to use a website that day. According to the FAA's website, in 2014 there were 2.1 million daily passenger enplanements at the 383 primary airports in the United States. This allows for the possibility of over 700,000 daily airport website hits. That level of website traffic signifies the significant opportunity to help travelers have the best experience once they arrive by offering the best online experience.

Passenger Information: The airport website is a portal to preflight information. Many of the questions prior to arrival can be answered using the website features, such as interactive menus. The following information is commonly provided on airport websites:

- Flight information
- Airline and baggage information
- Terminal maps
  - Food
  - Shops
  - Gates
- Security information
  - Screening
  - Prohibited items
  - TSA Pre-Check Program
  - Global Entry Program
- Accessibility (ADA) programs
  - Communications assistance
  - Mobility assistance
  - Pet ports
  - Facilities
- Airport driving directions
- Parking options and locations
  - Waiting lot
  - Economy lot
  - Daily lot
  - Hourly lot
- Ground transportation
  - Rental cars
  - Public transit
  - Taxis
  - Limos and shuttles
- Advisories
  - Airline travel
  - Airport construction
  - Traffic
  - Weather
- Frequently asked questions
- Airport amenities
  - Lost and found
  - ATM

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- Currency exchange
- WiFi
- Kids programs

Terminal Maps: A passenger may be inclined to search online for information about parking, shopping, or dining options in preparing to visit an airport. During the website investigation of the spotlighted airports, it was determined that airport websites use a combination of formats to display information. All airports used, at minimum, a static map to show the dining, shopping, ground transportation, and parking options. The majority of spotlighted airports also used a list format where clicking on the name provided more information about the retail store, dining option, or airline. With the advancement of technology, airports are using innovative ways to enhance the online experience with new tools that provide easy to use and accurate information. The interactive online map technology delivers a personalized experience to the passenger by providing the ability to click on a portion of a map to locate shopping, dining, and amenities. From that point, a user can retrieve additional information about the options within each category.

The use of videos provides a static virtual tour. This is an innovative and effective way to guide the customer through journey segments such as the parking process, from the curbside and the ticketing counters and around the concourse. The research determined that few airports were using this innovation on their websites.

Website Translation: Of the 13 U.S. and foreign airports visited, only half of the U.S. airports offered any other language then English. All five of the foreign airports and one U.S. airport offered at least English and one other language. Of the remaining U.S. airports, three of eight offered over 90 languages besides English. When developing digital media content, additional effort is required to introduce a multilingual option using a variety of different available methods. Prior to embracing one method over another, it is recommended that a feasibility study be conducted to determine the level of effort needed to yield the greatest gain.

One method is to employ a service such as Google Translate. That method enables access to many languages offering a variety of users a high level of service. If the survey results show that level of service is required, Google Translate is a convenient service to quickly enhance the website. A drawback of a one-size-fits-all service is that the translation engine may not always translate to the highest degree of accuracy, unlike a professional translation service. Another issue is that images with text are displayed in the native language of the airport's original website.

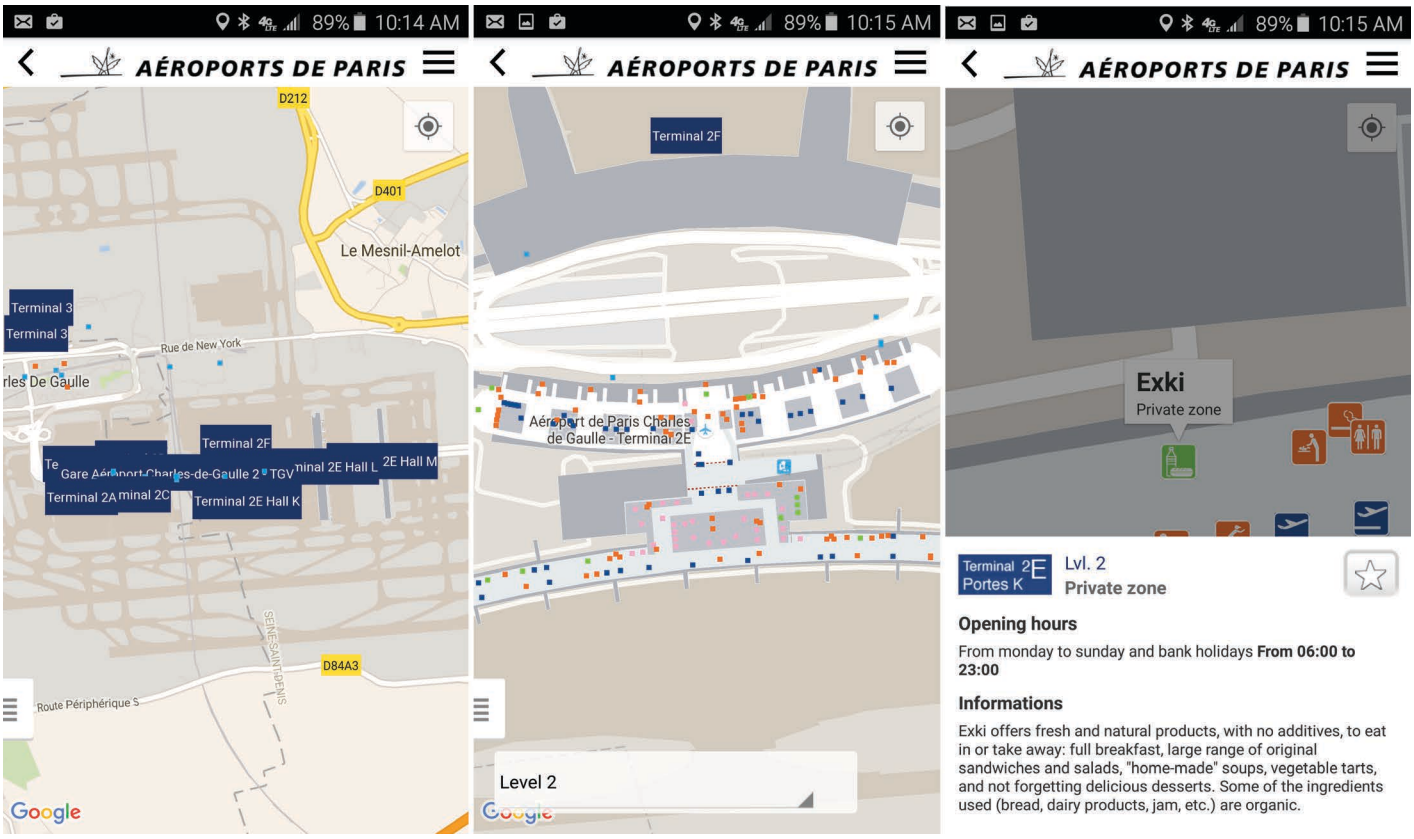
A second method is to design the website multiple times in each of the languages that gets the most traffic. This method ensures the website translates accurately and the images with text appear in the correct language. In many cases, it was noticed that the actual website design differs between each, using more simplistic designs for languages that pull the least traffic. Because the design requires multiple builds, each time a website update must be done each build must be updated independently. With this method, the experience may be more gratifying for the user but cause more work in development.

Mobile Devices: There is a difference between an airline mobile application (app) and an airport app for a mobile device. Though customers have voiced their opinion that too many individual apps are available to address the passengers' mobile travel needs in a flexible manner, airlines and airports have stressed that consolidation across the board is difficult due to the protection of data assets and the nature of industry competition (Garcia 2015). This is not stopping passengers from using either app. Mobile check-in, electronic ticketing (E-tickets), flight updates, and mobile wayfinding can be found in many airport mobile apps and passengers are asking for this information to be more directly available on their devices. Coupled with the advancement in airport WiFi coverage and beacon technology within airports, passengers are using mobile devices more often for travel. Updating the airport information more frequently

and adding more details such as baggage carousel location and processing wait times would only increase their usage (Garcia 2015).

During the same survey, conducted by SITA in 17 countries and representing 76 percent of the world's passengers, it was widely suggested that passengers want to book through mobile apps, continue to see the mobile check-in process grow (including the use of automated baggage drop locations), and add mobile flight updates across the board. From the survey performed by the research team, it was determined that 24 percent of passengers used or planned to use an app specific to that airport that day and 30 percent of passengers used or was planning to use an airline specific application. Couple this service with an advanced airport wayfinding service and it makes sense for a passenger on an international layover to download that airport's app. Figure 2-25 is an example of an airport app that uses indoor wayfinding technology to provide customers with additional information on gate, shopping, and dining locations on their personal mobile device.

Beacons: FlightView conducted a survey finding that 53 percent of U.S. travelers would let airports track their mobile devices as long as they did not give up personally identifiable information if it meant getting real-time updates on security lines, wait times at customs and ticket counters, walking times between gates, and more (FlightView 2015). Many airports have taken the initiative and have started using Bluetooth Low Energy (BLE) beacons to eliminate the need for users to pinpoint their own location on a typical map. If the passenger has a boarding pass stored in the app, the map will automatically default to start navigation at that specific gate location. Alternatively, users can place a pin at their current location and the app will guide them to their desired location, providing estimated walking times along the way, much like the familiar Global Positioning System (GPS) navigation most vehicles now provide.



Source: ACRP 03-35 Research Team

Figure 2-25. Mobile wayfinding app screenshots.

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Beacons are used to gather information from hundreds of points throughout the facility, delivering the customer a wealth of valuable information that could otherwise be missed. The ability to provide informative and relevant information such as wait times at security points gives customers the confidence that ultimately may reduce what could be a stressful situation.

Social Media: As of October 1, 2015, *The eBusiness Guide* listed the top 15 social media websites by unique monthly visits. Facebook, Twitter and LinkedIn take the top three spots, respectively (eBiz 2015). Facebook and Twitter are linked directly on 12 of the 13 airport websites that were visited. YouTube and Instagram were the next most popular social media sites with links. Airports have embraced social media to improve the customer experience by offering direct two-way communication between customer and airport. Customers are using Facebook and Twitter to provide instant feedback on their airport experience while airports are using social media to promote special events, new concessionaires, and services as well as provide updates on the status of ongoing construction projects through posts, pictures, and videos. Consistency, which is a driving factor in digital media, is also important with a social media campaign. Regularly updating, posting or tweeting is how airports have kept customers engaged. Replying to unhappy customers provides an opportunity for customer engagement that could possibly alleviate a complaint to the customer service department. Re-tweeting or re-posting customer praise will encourage more customers to get involved in the social media campaign. The level of satisfaction it gives customers to receive a reply and know their voices are being heard may be surprising.

Travel + Leisure Magazine has created an awards program that recognizes innovation in social media, dubbed the SMITTY awards (Social Media In Travel + Tourism). San Francisco International Airport has won this award in consecutive years, and their last campaign "#SFOHolidays" invited participants to create holiday-themed postcards on Postagram to share on Twitter and Facebook. According to the airport's website, volunteers dressed in Dickensian attire added to the holiday spirit of the campaign (FlySFO.com).

Digital Signage: Digital signage refers to an electronic display of information. Typically viewed via a liquid crystal display (LCD) monitor, direct view light emitting diode (LED) display or video projection, digital signage is used to display informational, advertising, or entertaining content to an audience. Digital signage typically uses a content management system (CMS) that consists of software used to build, schedule, and deploy content though servers, computers (players), and network/video infrastructure. Although all digital signage is technically dynamic in nature (due to the ability to update content on the fly), for the purpose of this guidebook, digital signage has been divided into three distinct categories:

- Static digital signage
- Dynamic digital signage
- Interactive digital signage

Digital signage is intended to enhance the customer experience by providing real time, up-to-date, and reliable information. Providing unreliable information is a disservice to the customer and can affect the airport's credibility, making customers unhappy. While designing a digital signage program requires the knowledge of many aspects of the end users' business segments and is not a one-size-fits-all solution, certain guidelines can be followed to forge a successful program. The following is a list of the universal design principles for a digital signage program:

- Equitable use: The design does not disadvantage or stigmatize any group of users.
- Flexibility in use: The design accommodates a wide range of individual preferences and abilities.
- Simple, intuitive use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
- Perceptible information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

- Tolerance for error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
- Low physical effort: The design can be used efficiently and comfortably, and with a minimum of fatigue.
- Size and space for approach and use: Appropriate size and space is provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

Static Digital Signage: Static digital signage refers to information provided by a digital display (see Figure 2-26) and has the ability to be updated dynamically but does not provide active content updates. Static digital signage pulls information and data from a live database but typically does not use aggregator feeds within the build. Typically, static digital signage is used to display:

- Airport directories
- Provide directions
- Static wayfinding maps
- Temporary signage

Static digital signage is the first step in making the transition from print to digital, allowing the displayed information to be updated as needed. The dynamic nature of an airport makes printed maps costly to constantly change and keep up to date. When moving to a digital environment, the content used for the website and any mobile device can be aggregated through a CMS and displayed digitally, keeping all formats accurate and consistent. As shown in Figure 2-27, displaying information digitally also lends well to multilingual messages. With traditional signage, a lot more real estate is required to display every message in all necessary languages. With digital signage, multilingual content can be developed by programming multiple languages into the sign build. The passenger can then pick their language digitally, eliminating the need for multiple printed signs. Through the research, it was determined that half of the eight U.S. airports visited used static digital directories and one out of five foreign airports did not.

In 2007, Congress fully authorized the Model Ports Program and appropriated $40 million to expand it to the 20 U.S. airports with the highest number of inbound international visitors and hire no fewer than 200 new CBP officers at those model airports (CBP 2015c). Since the program's creation, DHS has initiated several improvements to expedite and enhance passenger processing, including installing digital display monitors in the processing area to educate

Source: Arora Engineers, Inc.

Figure 2-26. Digitally displayed directory.

Source: ACRP 03-35 Research Team

Figure 2-27. Static signage with multiple languages.

passengers about the screening process and establishing a new professionalism program to improve customer service training for its officers.

The Model Ports Program holds a large stake in multilingual signage. Multiple airports have networked displays with a computer-based control system so CBP can control the displays by selecting one of 32 standard messages to be displayed on a localized control panel based on the destination of the outbound flight. This system is also used to support international passengers with multilingual message placement on the displays. By determining what character size is required to clearly display an international message, the back end system then can create the images in an XML language, and project it onto a large video wall through interface equipment that will take a video signal and pixelate it to the matrix size previously determined.

Dynamic Digital Signage: Dynamic digital signage, like static, is displayed digitally allowing updates to occur in real time. Dynamic signage uses live information feeds from multiple aggregators fed through a common database to constantly update the information. Viewers will see the information change in real time, making the content dynamic. The purpose of dynamic signage is to offer the passenger real time, up-to-date information. The most common systems that require dynamic signage include:

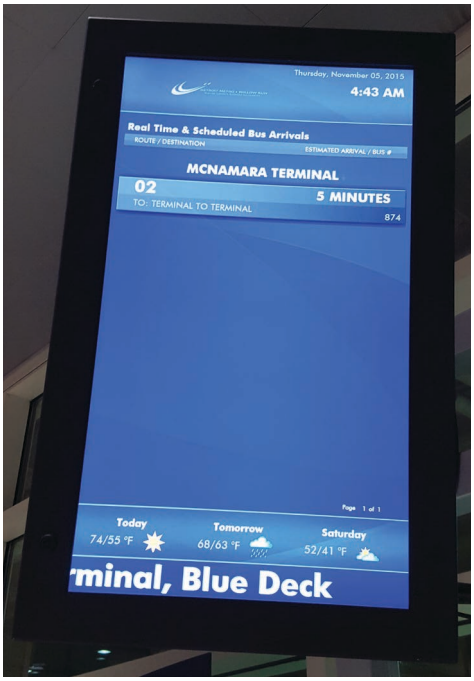
- Baggage information
- Flight information
- Gate information
- General information such as news or weather
- Ground transportation information
- Visual paging
- Wayfinding

Consistency is key when dealing with live data. Flight data is one example of information that comes from a live feed. When data from a flight information aggregator such as the Aircraft

Situation Display to Industry (ASDI) data stream service is not available, receiving data directly from the airline is required. When individual airlines manage their own flight information, the airport has to work directly with each airline to route the data through the airport's back end system to display properly. Similarly, for baggage information, baggage handling systems process this data and can display it or can hand off the feed to a CMS. To keep a consistent look, the airport should be heavily involved in the content development process, formatting and creating a pallet that fits the airports branding. As shown in Figure 2-28, ground transportation information is used to help customers find areas such as airport parking lots or hotel shuttle or regional bus/train stations. Airport shuttles are common in many mid-sized hubs that are spread out but do not offer an automated people mover such as an AirTran. Providing information for shuttle time arrival will help a passenger plan the final stages of their journey. This information can be collected from a number of different systems that use automated vehicle location systems and GPS.

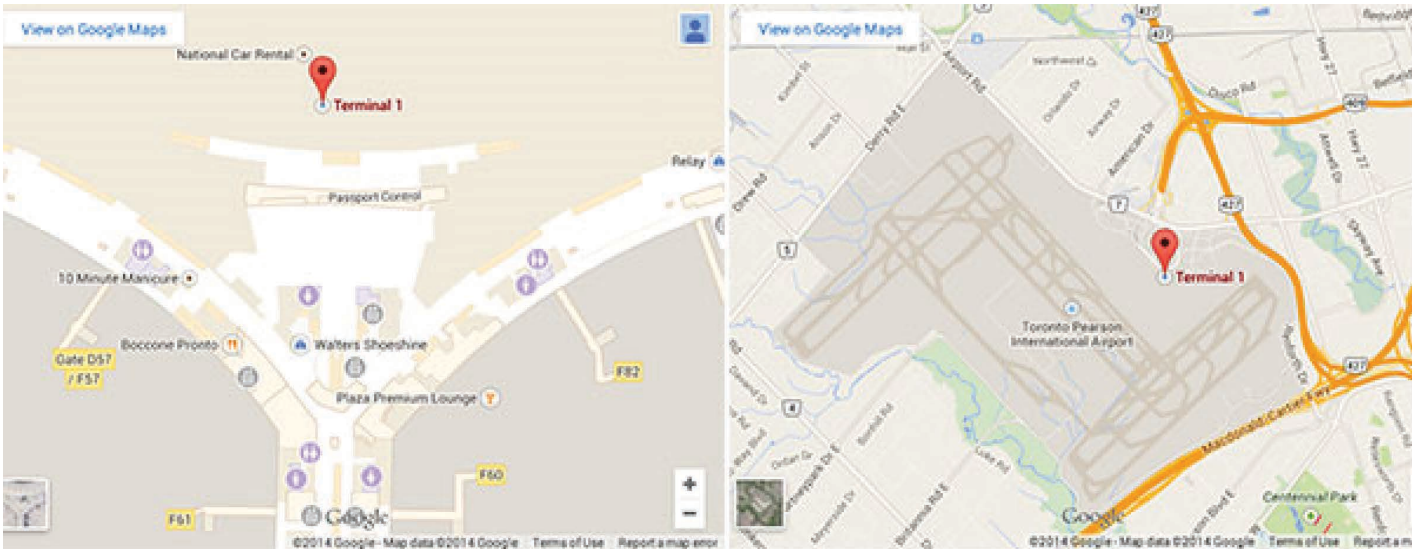
Wayfinding is displayed statically and dynamically. Indoor Geospatial Information System (iGSI) providers such as Google, Apple, Esri, etc., are currently working with many airports to provide street view-like options for indoor maps of the terminal to help with wayfinding at pre- and post-security (see Figure 2-29). This option is available to use across all platforms, providing passengers the ability to find amenities and points of interest in the terminal. With the help of indoor navigation apps, passengers can search for airlines, gates, concessions, restroom facilities, etc., and receive personalized directions to their point of interest.

Advanced algorithms can be introduced to calculate walking times that may be displayed via dynamic digital signage. Based on inbound/outbound flight patterns, time of day and location, or beacons, the back-end software can calculate how long it would take to walk to the passenger's gate, what the best travel method may be, and then diagram how to get there. A FlightView survey determined that 79 percent of customers want updates about security wait times. It was also



Source: ACRP 03-35 Research Team

Figure 2-28. Ground transportation information display.

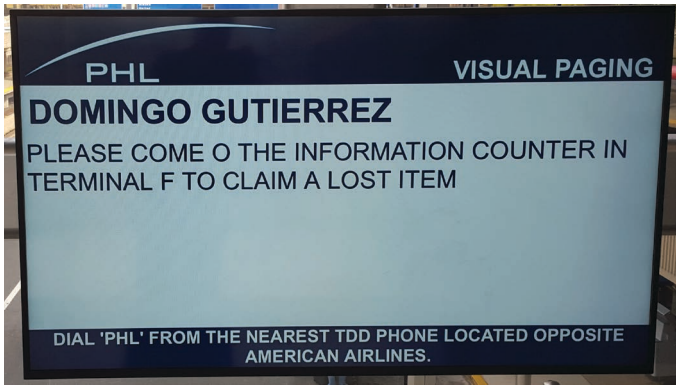


Source: Google Maps

Figure 2-29. Google Street view examples.

determined that keeping the customer happy has a monetary incentive for the airports where highly satisfied customers tend to spend 45 percent more in retail shops (FlightView 2015).

Visual Paging: A visual paging system (VPS) utilizes dynamic digital signage to display customer-specific as well as universal messages meant for passengers (see Figure 2-30). Many times these messages are derives from verbal messages announced from a public address system (PAS). A VPS usually integrates the services of an audio paging/messaging system with a CMS. For the purposes of complete intelligibility, messages that are verbally announced may also be sent to the CMS to be displayed dynamically on digital media. Message intelligibility describes a customer's ability to understand fully the message announced over the PA system. While intelligibility is a difficult metric to measure because of the variance between each customer's ability to audibly comprehend a message, visual paging enhances intelligibility by displaying the message visually. While an international passenger at a foreign airport may be able to somewhat understand that native language, an audible message may be lost on that passenger because of the level of intelligibility the sound system is able to produce. Reading the message enables the customer to take more time to digest what the message is conveying. Dynamic visual paging can display up-to-date messages in multiple languages, truly enhancing the intelligibility of paging messages.



Source: ACRP 03-35 Research Team

Figure 2-30. Visual paging.

Interactive Signage: The main goal of interactive signage is to reduce traveler stress by providing clear, easy to follow instructions while at the same time highlighting shopping and dining opportunities that are available along one's journey to the gate. Interactive signage, as shown in Figure 2-31, allows the passenger to do just that, interact with the digital display. By integrating a touch panel on the LCD display and intelligent content management software, a simple screen turns into a portal that allows users to receive customized information at their fingertips from a public display. Using the same information pool developed for static and dynamic signage maintains the ease of updates and familiar user experience. From the airports visited and surveyed, it is almost a 50/50 split between airports embracing the technology with half domestic airports using digital directories and three of five international airports.

Kiosks: Kiosks are another form of interactive dynamic signage. Kiosks are used by airlines for passenger check-in, by CBP for Global entry fast track check-in, and by airports for help desk services. Kiosks are typically outfitted with a small interactive display with an identification device to scan a boarding pass, passport, credit card or other ID. As shown in Figure 2-32, airline kiosks can be maintained by the airport or each individual airline. A kiosk managed by an airport typically uses Common Use Self Service (CUSS). This refers to a shared kiosk the passenger can use to check-in regardless of the airline. Check-in kiosks can be located in a number of locations throughout an airport, but are most commonly seen in the departures hall. Passengers can use the airline kiosks to:

- Change seats or flights
- Check bags or luggage
- Report lost bags or luggage
- Purchase tickets
- Print ticket receipts
- Update their information, if they are frequent passenger of the airline
- Find information about return flights

Source: Arora Engineers, Inc.

Figure 2-31. Interactive directory with boarding pass scanner.

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Source: ACRP 03-35 Research Team

Figure 2-32. Airline specific check-in kiosks.

Avatars: Beyond CUSS, airports are using other forms of technology, such as kiosks and avatars to assist passengers and enhance the user experience. Providing a limited amount of information based on the customer's selection, customer service kiosks are placed at key areas such as immigration area or at information booths throughout a terminal to provide information to the passenger without having to interact with a customer service agent. The research survey indicated that helpful staff is the second most important feature an airport can offer. The goal of introducing automated processes is not to replace the human interaction but to enhance the customer experience by providing an alternate option.

Robots: Other forms of technology providing airport information to the customer include roving robots, which have been deployed in a handful of domestic and international airports. Robots are designed to roam around and help answer questions, much like an ambassador. Basically a Segway with an iPad, customers can interact with the robot to obtain information. Avatars and holograms are being used to work alongside the human customer service personnel to help more customers with the added advantage of understanding a wider variety of languages. The virtual assistant at the self-service check-in kiosks at Chopin Airport is an attention grabber that encourages passengers to use the self-service check-in kiosk. It makes this service more effective and adds a high-tech dimension to the airport's image. In the United States, JFK International, LaGuardia, and Newark Liberty airports have added virtual assistants to provide basic airport information to arriving passengers, including information about security screening procedures.

Other interactive information dispensers include interactive displays with boarding pass scanners. A boarding pass scanner will automatically deliver key information while having the ability to expand their experience using the touch function. These are particularly useful for airports that may not invest in multilingual signage; it allows passengers to scan their boarding passes and the signage will show the best way to get to the destination by drawing a line from their current location to the gate. If the passengers see a dining option along the way, they can tap that area of the screen to find more information.

CHAPTER 3

International Departing Passengers

The international departing passenger experience at U.S. airports is primarily the same as for domestic departing passengers. However, there are some key differences, particularly in language capabilities, passenger processing, and certain amenities. Cultural differences are another important factor to consider, especially for foreign travelers.

The purpose of this chapter is to provide airport stakeholders with guidelines regarding the basic needs of international departing passengers and innovative approaches to enhancing the customer experience, and the tools to evaluate the international departing passenger experience. Each section identifies the customer needs and expectations and a description of the basic requirements, notable innovations, and performance requirements (where applicable) for each step of the international departing passenger journey. Implementation considerations are provided for each notable innovation to assist airport stakeholders in making an initial determination about the benefits and costs of implementing the innovation at their airport.

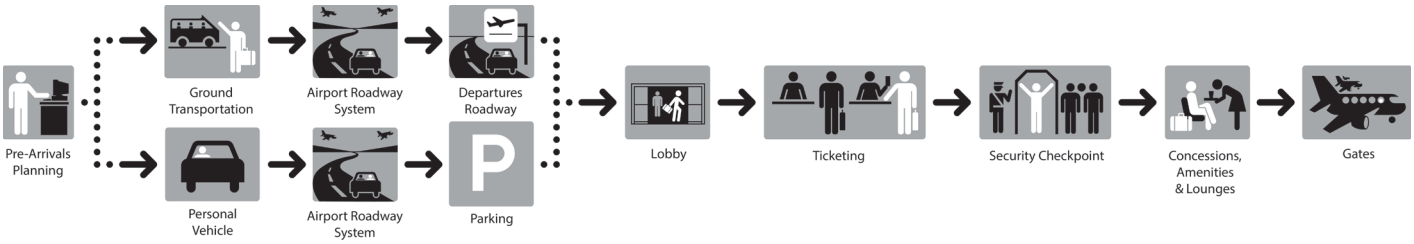
A journey segment evaluation tool is provided at the end of each section highlighting the basic requirements and notable innovations. This evaluation tool is intended to facilitate discussion among airport stakeholders regarding their current operation and identify opportunities to improve the customer experience.

3.1 Overview of the International Departing Passenger Journey Segment

Figure 3-1 illustrates the journey for international departing passengers. It begins with pre-trip planning and includes the departures processes—ticketing/check-in and security screening—and amenities for departing passengers and ends at the gate holdroom. This chapter covers the originating international departing passenger. Chapter 5 provides information about the airport journey for passengers arriving from an international or domestic flight and connecting to an international flight.

As described in Chapter 2, the journey of an international departing passenger includes the following steps:

- Pre-trip planning
- Journey to the airport
- Airport roadway access (including parking)
- Terminal departures roadway
- Pre-security services and amenities
- Ticketing/check-in
- Security screening
- Post-security concessions and amenities
- Boarding



Source: ACRP 03-35 Research Team

Figure 3-1. International departing passenger journey segment.

3.1.1 Customer Needs and Expectations

The challenges experienced by international departing passengers may include travel anxiety or a culture and/or language barrier. In addition, some passengers have anxiety about being in an unfamiliar airport environment and may have a stressful or enjoyable experience depending on the effectiveness of the wayfinding system.

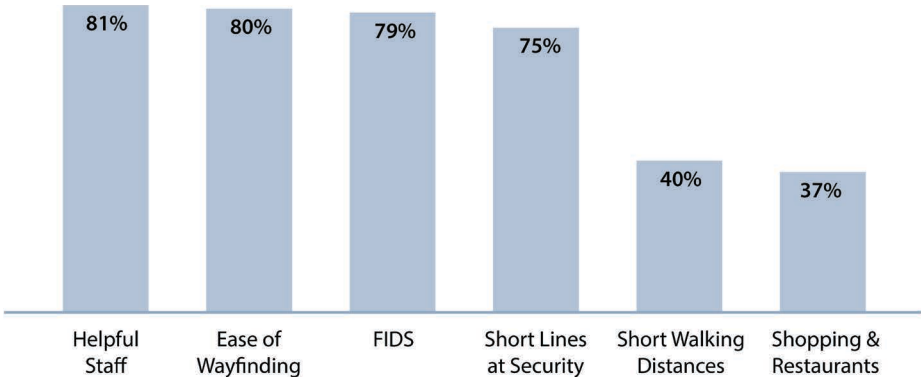
Some of the larger gateway airports span multiple terminal buildings. As part of the pre-departure planning process, passengers need to know basic information such as: (1) when is their flight, (2) on what airline, and (3) what terminal building should they use. Airline code-sharing can further complicate passengers' ability to retrieve and process this information as the carriers can be spread out across the airport. The primary purpose of code-sharing is to enhance multiple airlines' networks, which may come at the expense of making wayfinding more complex. An unpublished survey carried out at a large U.S. gateway airport found that one in three (approximately 30 percent) of departing passengers did not know which terminal was associated with their flight until arriving at the airport. Instead, they only knew the departure time and the airline name. This required them to follow information signage on the roadway or from the ground transportation provider (e.g., taxi, limo, or shuttle bus driver).

In the survey, about half (53 percent) of all departing passengers were infrequent travelers, having only taken one or two flights in the last year. About one-quarter (24 percent) of respondents said they could only read a little or no English at all. About half of departing passengers resided in the United States (56 percent) and the other half lived outside the United States (44 percent).

About one-quarter (n = 236) of all respondents were asked how they got to the airport. Nearly half of these respondents said they traveled to the airport in a personal car (47 percent) and more than one in four (29 percent) traveled to the airport using a taxi, limo, or shuttle vehicle. The remaining departing passengers used public transportation (7 percent) or some other form of transportation (17 percent).

In the survey, departing passengers were asked to rate the relative importance of 15 airport features. The vast majority of respondents rated the following features as very important: ease of wayfinding from public transportation (88 percent), from parking (75 percent), and from taxi, limo or shuttle drop-off (72 percent). Other very important features relevant to departing passengers included: clear roadway signage (82 percent) and parking availability and convenience (77 percent).

As illustrated in Figure 3-2, the most important features to departing passengers inside the terminal were helpful staff (81 percent), ease of wayfinding (80 percent), flight information screens (79 percent), and short lines at security (75 percent). The least important features were short walking distances (40 percent) and shopping and restaurants (37 percent).



Source: ACRP 03-35 Passenger Survey

Figure 3-2. Passenger survey results: Most important features in the terminal.

3.2 Pre-Trip Planning

Pre-trip planning is an essential activity for departing passengers, especially those not familiar with their departure airport. The ability to gather information about their departure experience in advance of their trip helps to reduce the anxiety of being in an unfamiliar place. This may include gathering information about ground transportation options, departures processing options and requirements, and services available at the airport.

3.2.1 Key Activities

Pre-trip planning primarily involves the use of one or more websites or mobile apps to collect information that customers need to plan their airport journey. The airport website or mobile apps are most likely the definitive source of information for the airport facilities, including the following:

- Ground transportation services
- Parking options
- Drop-off locations
- Airline ticketing/check-in location
- Types of check-in methods available
- Security screening procedures and availability of special services such as TSA Pre✓
- Concession, services, and amenities available pre- and post-security

Airline websites and mobile apps are another common source of information for international departing passengers. While there may be some overlap between the information provided, particularly at U.S. airline hub airports, the airlines provide specific information about the air travel portion of the journey, including: check-in options, baggage restrictions, travel document requirements, flight status, and airline specific airport amenities (such as premium lounges).

3.2.2 Customer Needs and Expectations

As part of the pre-trip planning process, international travelers need to know the answers to a number of basic questions, including:

- What airline are they traveling with?
- What is the departure time?

- What terminal building do they need to access to board their flight?
- How will they get to the airport?
- What travel documents will they need?

In addition to these basic questions travelers preparing to depart on an international flight need the following information that may be obvious to the frequent traveler but not evident to those who travel infrequently:

- What time do they need to be at the airport?
- If taking a personal car, how to get to the airport and where to park?
- How much time will it take them to get to the airport?
- What are the carry-on and check baggage restrictions imposed by the airline?
- What items are not permitted through the security checkpoints?

To answer these types of questions, international departing travelers can rely on a number of sources of information. These sources may include their travel agent, their trip itinerary, the airport phone line or website, the airline phone line or website, and other sources of print or digital information.

3.2.3 Customer Service

Person-to-person customer service during the pre-trip planning journey segment is commonly provided by the airlines through their reservations systems. Airports rely heavily on their websites and mobile apps to provide all of the information necessary for customers to plan their airport journey. They do provide social media links, such as Facebook or Twitter, where customers can submit questions and receive responses about services available at the airport, as well as get up-to-date information about special events or services.

3.2.4 Physical Environment

The pre-trip planning does not occur at the airport and therefore there are no physical environment considerations.

3.2.5 Information Dissemination

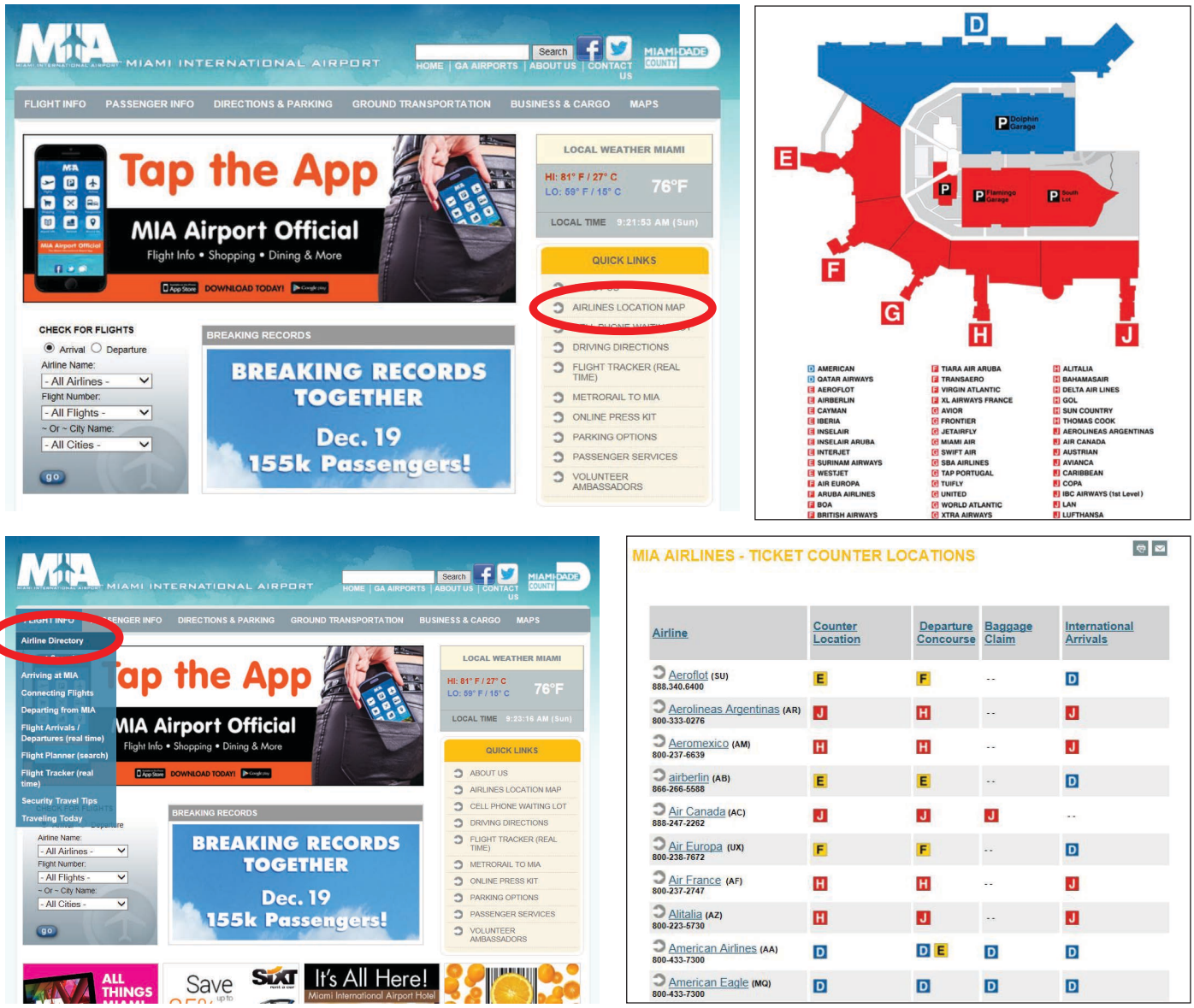
International travelers who are familiar and not familiar with their departing airport can benefit from pre-trip planning efforts. For example, unfamiliar travelers may choose to gather information in advance of their trip to reduce the anxiety of being in an unfamiliar place. This may include gathering information about services available at the airport, airline ticket counter, virtual guides, security screening checkpoint (SSCP) procedures, and translation services. Both familiar and unfamiliar customers alike can benefit from information like parking status, and SSCP status.

Basic Requirements

Airport Websites with Information about Departure Processes at the Airport: The airport website has become an essential form of communicating information to passengers as they plan their trip. The expectation is 100 percent of departing passengers know what airline they will be using; therefore, the primary task is to identify the correct terminal destination. This task is relatively simple for airports with a single terminal; however, seven of the eight U.S. airports surveyed have multiple terminals, or dual curbsides (e.g., Atlanta International Airport's domestic terminal, Denver International Airport, and Tampa International Airport). Consequently, departing passengers must determine which terminal they need to find. The websites of the airports surveyed vary in how a customer can find the answer to which terminal their airline is located.

The example in Figure 3-3 illustrates how customers can locate their airlines. The Miami International Airport's homepage has a user-friendly quick links box located above the scroll with the "AIRLINES LOCATION MAP" link that connects to a map with terminal alpha listings; it is color-coded to indicate the recommended area to park. The airport's homepage also offers customers a link under the FLIGHT INFO pull-down that links to a similar but different listing. Other airport websites, like San Francisco International Airport, have interactive maps that pinpoint the airline location. This type of information should be displayed so it is easy to find from the website homepage.

The other consideration is when an airline operates out of more than one terminal and how to clearly communicate this to the customer. The airport website is the opportunity to educate customers before they leave for the airport to make them aware of this non-intuitive scenario, which is most common when an airline has both domestic and international flights operating



Source: Miami International Airport - http://www.iflymia.com/home.asp

Figure 3-3. Airline location information on Miami International Airport's website.

at the same airport but in different terminals. This issue can be further compounded because domestic flights can operate in the named international terminal and conversely there may be international flights that operate in more than one terminal. Therefore, the virtual communication through the airport website serves a vital role for a customer's pre-trip planning effort.

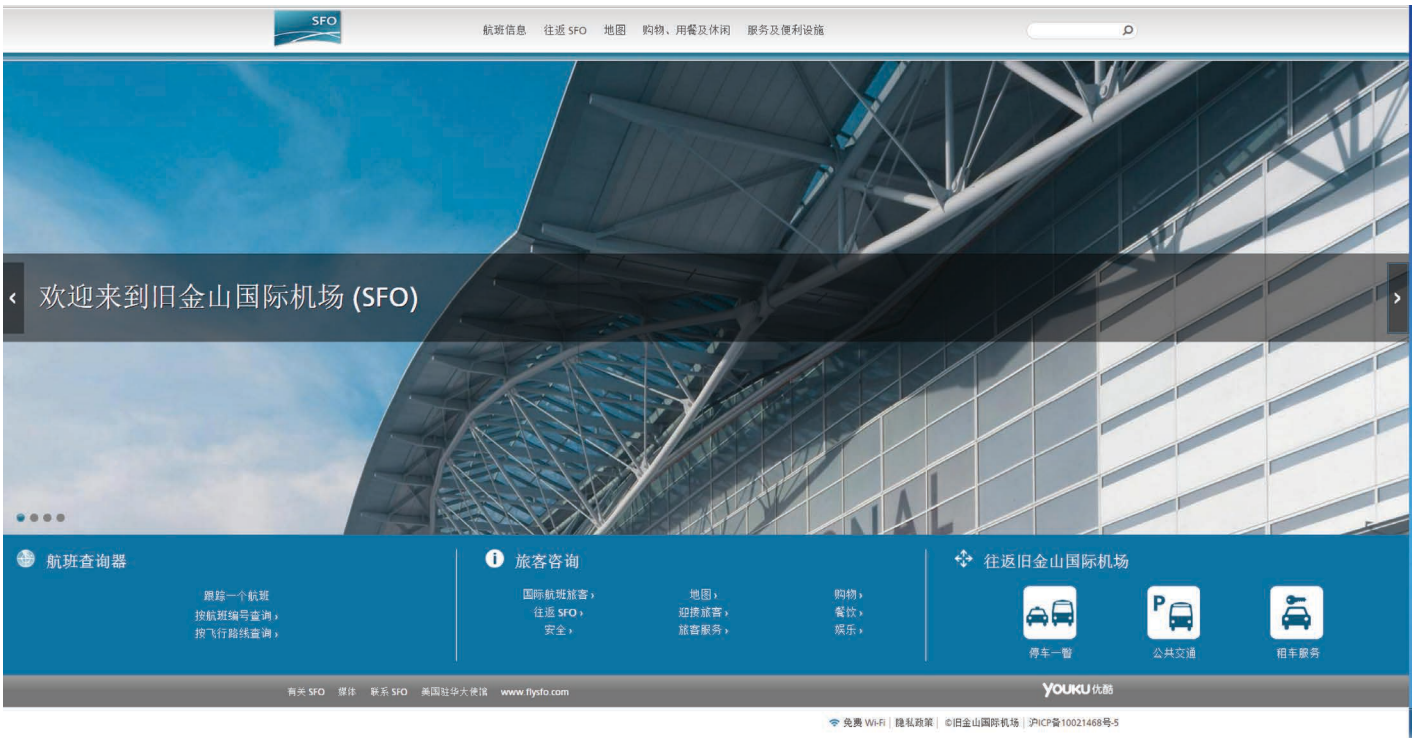
Airport Websites with Parking Information: Another key activity in a customer's pre-trip planning effort is parking. The primary factors that influence a customer's parking choice are convenience and price. Of the eight U.S. airports surveyed, four airport websites provide status of their parking products, which takes on an added importance when the preferred parking product is not available. Customers can use this type of information to make an educated decision, which manages expectations versus a last minute change of plan decision when the customer discovers their preferred parking choice is not available and the negative perception that ensues. Some airport websites, like that of JFK International Airport, go beyond the basic open or full status and provide the percentage of spaces available, as shown in Figure 3-4. The websites of all eight U.S. airports provide both price point and description of the parking products available.

Airport Websites with Other Language Options: An airport website is an opportunity to address the needs of non-English speaking and limited English proficiency (LEP) passengers with multilingual features. The foreign airports surveyed all have some multilingual capabilities. In comparison, U.S. airport websites are inconsistent in the number of translations available, if any. As discussed in Chapter 2, of the U.S. airports that do offer multilingual websites, all but one use Google Translate. San Francisco International Airport offers basic navigation in eight languages, and has a custom-built website in simplified Chinese, as shown in Figure 3-5.

Airport Websites with Helpful Guides: Some airports offer helpful guides on their websites to assist the traveler and familiarize them with the airport. While long lists of wordy instructions on airport websites exist, many are taking advantage of new web technologies available, such as 3D mapping and 360-degree interactive images. Integrating social media and wearables are emerging trends being explored; these trends are not yet fully implemented. With such technology, airports can provide information on their websites to a wider range of customers such as the recommended time to leave for the airport, best parking areas, and check-in and security procedures.

Source: JFK International Airport website - http://www.panynj.gov/airports/airport-parking-jfk.cfm

Figure 3-4. Status information for parking products on JFK International Airport's website.



Source: San Francisco International Airport website – www.flysfo.com

Figure 3-5. Simplified Chinese version of San Francisco International Airport's website.

Regardless of the type of web technology, customers expect to be able to use the airport's website to find these processes in one format or another. Airport websites utilizing the latest web trends convey trust to the customer that the information is accurate and up-to-date and provides the next level of customer service. While the vast majority of U.S. airports have websites that prepare a customer for their upcoming journey, some even utilize interactive maps, but few achieve the level of sophistication exhibited by the Heathrow Airport (see Figure 3-6) and Amsterdam Airport Schiphol's

Source: Heathrow Airport website (www.heathrow.com) and ACRP 03-35 Research Team

Figure 3-6. Example of how information on Heathrow Airport's website is consistent with visual communication at the security checkpoint.

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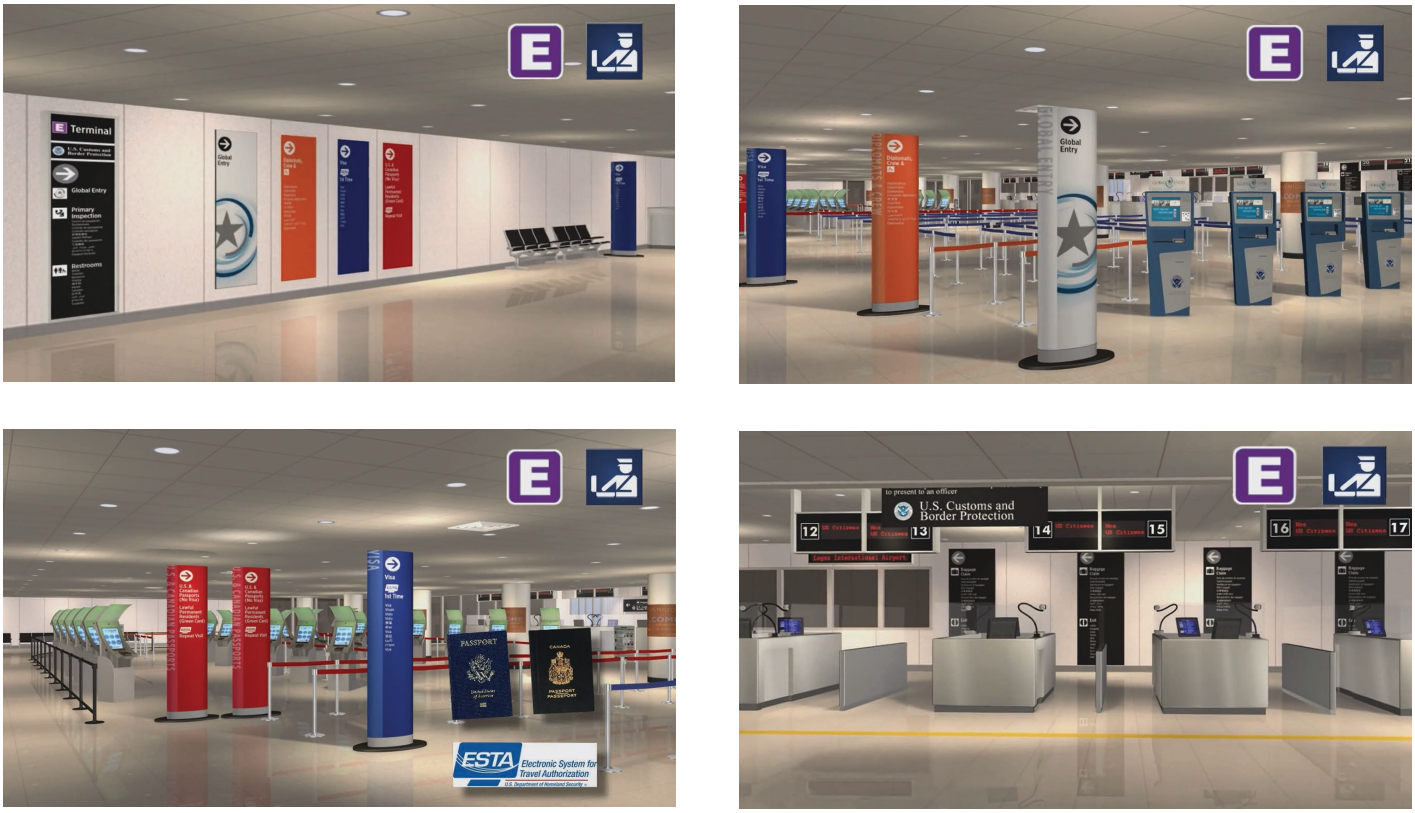
interfaces and videos. Websites provide tools for advance planning that educates customers and provides visual consistency from home to gate.

Animated 3D Mapping: Notable innovations in the United States include Massport's pre-recorded or animated videos of the international arrivals process on its website and the Logan International Airport app (see Figure 3-7). A key point is the videos are visually consistent with the actual information a traveler sees and experiences in the CBP areas at Logan Airport. This type of information can be presented in multiple languages and with subtitles to provide the verbal and visual cues unfamiliar travelers need when learning about a new experience.

360-Degree Interactive Mapping: Looking beyond animated video, mapping giants such as Google and Apple are branching out to certified indoor mapping professionals. There are different levels of indoor mapping but, typically, a professional company will come into an airport terminal and begin taking panoramic photographs every 10-15 feet. When stitched together, this creates a real-time tour allowing customers to click and choose where they would like to focus their attention instead of being guided by a video. Niche companies are emerging that specialize in 360 degree mapping as shown in Figure 3-8, which illustrates what 360 Emirates has coined Dubai 360 and includes Terminal 3 at Dubai International Airport.

By offering 360 degree mapping, 360 Emirates has taken online interactive mapping to the next level enabling customers to familiarize themselves with specific key areas of Dubai, including the airport. Coupled with online interactive maps provided by Dubai International Airport, this allows passengers to explore shopping, dining, and other options prior to arriving at the airport.

Website Videoconference Translation: Highlighted by Future Travel Experience in 2014, Microsoft Skype has created an innovative tool that combines voice instant message technologies



Source: Boston Logan International Airport website – www.massport.com/logan-airport

Figure 3-7. Images from Logan International Airport wayfinder app.

Source: Dubai360 website – http://dubai360.com/#!s=984-terminal-3-concourse-a-duty-free-souvenirs&l=en

Figure 3-8. Dubai360: 360-degree interactive mapping at Dubai International Airport.

with a voice-to-text translation engine to deliver near real-time cross-language communication (Ghee 2014). This tool allows two people who do not speak the same language to have a conversation simply by speaking. This technology makes use of videoconferencing and telepresence technology and is used to enable video-based communication between a customer and an offsite agent. While still in its infancy, many industries have not yet incorporated this technology into their day-to-day operations, but visions of integrating this technology through a web browser could be beneficial.

In theory, customers would be able to voice questions or concerns about their upcoming trip rather than searching online or phoning a call center. This technology could facilitate a Skype call with an airline or airport agent, regardless of language.

Implementation Considerations

Animated 3D Mapping: Animated 3D wayfinding videos are produced by using digital airport programming information to create 3D animation and mapping applications and require a production team with specialized skill sets. The process begins by gathering mapping data points through a number of resources at the facility. Once the data is collected, specialized software interprets the data and a 3D model is created. Through studies, surveys, and observation, wayfinding routes are determined. 3D fly-through images are captured through the software and exported via movie file or built into the website using HTML 5 for mobile applications. Multilingual narration is available as well as closed captioning and subtitles. Table 3-1 provides a summary of the implementation considerations for animated 3D mapping.

Websites with 360-Degree Interactive Mapping: In the interactive video world, Google is the mainstream provider of indoor airport virtual tours, servicing at least 16 international airports, but other vendors are beginning to provide this service as its popularity increases. Benefits from collaborating with Google include access to the indoor view directly via Google maps.

Table 3-1. Implementation considerations for animated 3D mapping and wayfinding.

Airport Websites with Animated 3D Mapping and Wayfinding	
Applicability: Airports with large terminals (or multiple terminals) that want to provide additional wayfinding information via their websites	**Capital Cost Considerations:** Creating the animation requires collecting data of the facility and building 3D models in sophisticated software
Implementation Complexity: The process of gathering the data and creating the final product is complex, but done by a vendor. Once the videos are complete, they are delivered in a common video format that the airport's webmaster can easily work with.	**Operating Cost Considerations:** Updating the data points in the model if the facility is modified or services are moved.
Customer Benefits: Provides 3D animated videos that walk the customer through different airport experiences prior to arrival. Gives the customer confidence with knowledge.	
Stakeholder Benefits: • Increases concessions revenue potential by reducing customer anxiety and increasing their time to shop prior to departure • Reduces operating costs by minimizing the reliance on Customer Service staff to provide wayfinding information	
Entities Involved: • Airport Marketing • Customer Service • Information Technology Departments	**Beneficiaries:** All international and domestic passengers who are unfamiliar with the airport
Brand Relevance: • Customer-friendly airport • High-tech airport	**Representative Airport(s):** • Atlanta International Airport • Boston Logan International Airport

360 Emirates virtual tours provide virtual tours in the U.A.E., coined Dubai360, and as popularity with the technology increases, more vendors are supplying this service. The size of the facility is what dictates the timeframe, cost of implementation, and the level of difficulty. To have full access to every corner of a terminal, a group of photographers must take a 360 degree picture with a specialized camera approximately every 15 feet. Then the images are stitched together using specialized software. There are different levels of service where only points of interest are photographed, and when a customer clicks to move forward it automatically takes them to the next location instead of showing everything in between.

Because this is a web application, it is best suited for the marketing/web development team to work with a vendor directly. Airport property managers may need to be involved when shooting specific tenant locations. Table 3-2 provides a summary of the implementation considerations for 360 degree interactive mapping.

Websites with Videoconference Translation: As of early 2016, the beta release of Translator (similar to Skype) requires a separate application download. As the product matures, it can be expected to be integrated into all Skype applications including Skype for Web. At that time, availability to integrate into websites should be available. The power of this tool has been recognized by many industries and is getting traction in the aviation industry as a tool to improve the customer

Table 3-2. Implementation considerations for 360-degree interactive mapping.

360° Interactive Mapping	
Applicability: Airports with large terminals (or multiple terminals) that want to provide additional wayfinding information via their websites	**Capital Cost Considerations:** • Initial 3D mapping of the facility • Creation of the final stitched product • Implementation to the existing website
Implementation Complexity: The process of gathering the data and creating the final product is complex, but done by a vendor. Once the map is complete, website implementation requires collaboration between the vendor and the airport's webmaster.	**Operating Cost Considerations:** • Updating the map when tenants move or the facility is modified
Customer Benefits: Provides customers with a virtual tour that feels as if one is truly walking through the terminal.	
Stakeholder Benefits: • Increases concessions revenue opportunity by providing customers with the advance information on shopping and dining options along their journey at the airport • Reduces operating costs by minimizing the reliance on Customer Service staff for wayfinding information	
Entities Involved: • Airport Marketing • Customer Service • Properties	**Beneficiaries:** All international and domestic passengers who are unfamiliar with the airport
Brand Relevance: • Customer-friendly airport • High-tech airport	**Representative Airport(s):** • Dubai International Airport

experience. Table 3-3 provides a summary of the implementation considerations for airport websites with videoconference translation.

3.2.6 Pre-Trip Planning Journey Segment Evaluation Tool

Figure 3-9 provides a summary of the basic requirements and notable innovations described above for the pre-trip planning journey segment for international departing passengers. The items are provided in chronological order to show when or where they should occur in the customer experience for this journey segment.

3.3 Arriving at the Terminal Departures Roadway

International departing passengers arrive at the terminal departures roadway via a private vehicle or a variety of for-hire or public transportation services. Once they arrive at the terminal departures roadway, they can continue into the terminal or utilize curbside check-in services, if available.

As discussed previously, the airport website should provide information about all available ground transportation services, parking options, and passenger drop-off locations and services. For passengers unfamiliar with the airport, navigating the airport roadway system can be a daunting

Table 3-3. Implementation considerations for website videoconference translation.

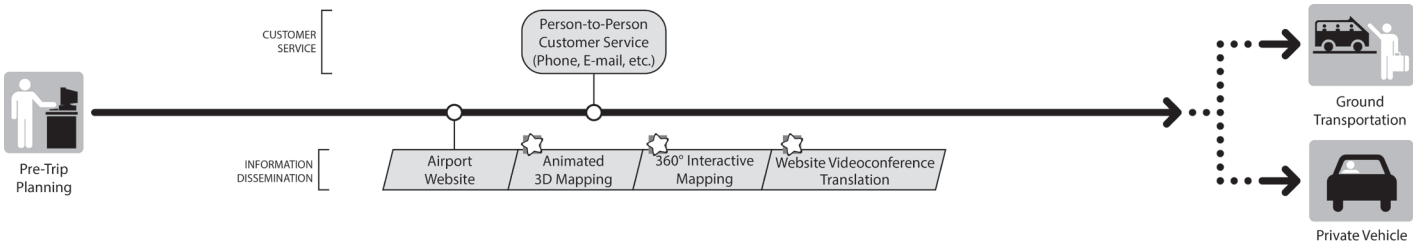
Website Videoconference Translation	
Applicability: Airports with a large number of foreign language speaking passengers	**Capital Cost Considerations:** • Implementation to the existing website • Providing the infrastructure for the operator
Implementation Complexity: Because this is a prepackaged service that uses an offsite engine driven by the Skype backend, the airport website simply becomes an access portal linking customers to operators	**Operating Cost Considerations:** • Typical airport website upkeep • Responding operators
Customer Benefits: • Customers can use the application linked through the airport's website to speak with an international representative in their native tongue via videoconferencing technology • Language translation services are available at any point of the customer's journey	
Stakeholder Benefits: • Reduces operating costs by reducing the need to have Customer Service staff with language capabilities located at designated points • Service is available to all airport stakeholders	
Entities Involved: • Airport Marketing • Customer Service • Properties • Information Technology Department	**Beneficiaries:** Foreign travelers with little or no English language capabilities
Brand Relevance: • International traveler-friendly airport	**Representative Airport(s):** • In beta form as of early 2016

and stressful experience. Airport operators should provide as much advance information as possible using clear informational and wayfinding signage along the airport access roadway and along the terminal departures roadway.

3.3.1 Key Activities

For customers arriving via private vehicles, arriving at the terminal departures roadway includes the following activities:

- Enter the airport access roadway system
- Identify the location (i.e., terminal) of their airline



Source: ACRP 03-35 Research Team

Figure 3-9. Pre-trip planning journey segment evaluation tool.

- Choose between parking or drop-off
- Choose between curbside check-in (if available) at a remote location (if available) or the ticketing/check-in counters
- Identify the location of their airline along the terminal departures roadway or within the terminal

Customers arriving via for-hire or public transportation services have a much more simplified journey and need only to navigate from the drop-off location at their departures terminal or ground transportation center to the location of their airline. The connection from the ground transportation center to the departure terminal may involve another form of transportation, such as a shuttle bus or automated people mover.

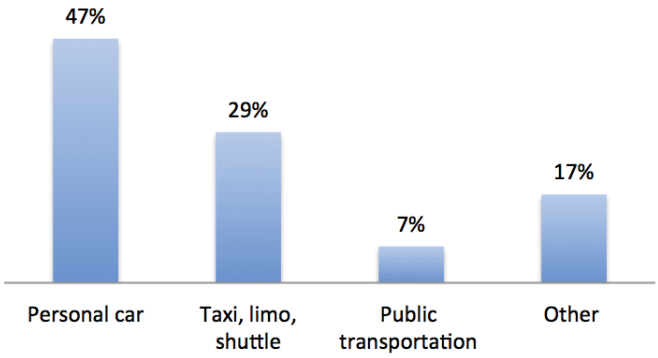
3.3.2 Customer Needs and Expectations

Some of the larger international gateway airports span multiple terminal buildings. At some airports, certain airlines may depart from more than one terminal, making the task of getting to the correct location at the airport particularly challenging. In addition to establishing the date and time of a flight, the next most vital piece of information for travelers is to know which terminal their flight is departing from.

An unpublished survey conducted at a large U.S. gateway airport indicates that nearly one in three (31 percent) departing passengers did not know which terminal was associated with their flight until they got to the airport; instead, they only knew the departure time and the airline name. This required them to obtain this information using signs on the roadway or from the transportation provider (e.g., taxi, limo, or shuttle driver).

Travelers use many different modes of transportation to get to an airport, and each mode requires information about how to access and navigate the terminal departures roadway. For example, private vehicles would need to know where it is acceptable to drop-off passengers along the terminal departures roadway, the parking options for short-term or long-term stays, and how to navigate to the terminal from the parking facility. Travelers arriving by rental car will need to know where to drop off their vehicle and then how to navigate to the terminal building.

About one-quarter (n = 236) of all respondents were asked how they got to the airport. As shown in Figure 3-10, nearly half of these survey respondents said they traveled to the airport in a personal car (47 percent) and more than one in four (29 percent) traveled to the airport using a taxi, limo, or shuttle vehicle. The remaining departing passengers used public transportation (7 percent) or some other form of transportation (17 percent).



Source: ACRP 03-35 Passenger Survey

Figure 3-10. Passenger survey results: Method of getting to the airport.

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3.3.3 Customer Service

A variety of airport stakeholders interact with customers during their journey to the terminal departures roadway. These entities likely include ground transportation drivers, parking attendants, law enforcement officers, and airline skycaps.

Basic Requirements

Ground Transportation Service Providers: The airport customer service training program should include the ground transportation service providers authorized to serve the airport. At a minimum, customer service expectations should be communicated to the service providers and they should be included in any incentive or reward programs that the airport operator maintains for other service providers within the terminal. In addition, customer service standards should be included in the airport's leases, concession agreements, contracts and permits.

On- and Off-Airport Parking: Parking attendants and courtesy shuttle drivers should be included in the airport's customer service training program because they are a critical link in getting many customers from their car to the appropriate departure terminal. They should be able to provide basic information about services available at each terminal, such as airline locations or the availability of TSA Pre✓ and baggage handling assistance.

Traffic Enforcement: Traffic enforcement on the international terminal departures roadway is necessary to maintain orderly operation of private vehicles dropping off passengers. Airport customer service and operations should work with law enforcement officers to establish the best approach for achieving this objective, both from a person-to-person interaction and through operational policies. Having law enforcement officers constantly barking at private vehicle operators to move off the curb is not an acceptable customer service and could be viewed as offensive by many foreign cultures.

Curbside Check-in: Curbside check-in and baggage drop-off is a service typically provided by the airlines. Foreign carriers seldom provide this amenity due to the infrequent number of flights. However, given the large volume of check baggage associated with international travel, especially for leisure travelers, a shared-use curbside check-in (one that serves multiple airlines) could be considered as a highly desirable amenity for many customers.

Because airline skycaps generally work for tips, their approach to customer service is driven by their desire to maximize income. However, they could be included in the airline's or airport's customer service training programs to ensure continuity in the level of service between curbside check-in and check-in located inside the terminal, especially when it comes to providing information about other services that the customer may desire after checking in.

Baggage Carts: Baggage carts should be provided along the terminal building on the departures roadway for departing international passengers with substantial baggage who choose not to utilize curbside check-in. Carts also should be available on the arrivals level roadway for departing passengers who arrive via ground transportation services or courtesy shuttles that only drop-off and pick-up at that location. At U.S. airports, these carts commonly are provided for a charge.

3.3.4 Physical Environment

The physical environment of the terminal departures roadway and ground transportation area should minimize pedestrian-vehicle conflicts and promote a sense of safety and security. It should also provide clear sightlines to facilitate easy identification of airline locations. Because the terminal departures roadway is commonly on the upper-level, protection from the weather is needed.

Basic Requirements

Departures Roadway Configuration: The private vehicle drop-off area for departing passengers should be on the same level as ticketing/check-in so that customers do not have to change building levels. Passengers arriving via commercial vehicles, however, are commonly dropped-off on another building level. The passenger flow for these customers should be straightforward and minimize U-turns and changes in direction; it should be logical and intuitive, not counter-intuitive. Large-capacity, flow-through elevators are especially beneficial for international departing passengers who must change building levels as they likely have substantial baggage.

Pedestrian Safety: Pedestrian safety is the most important consideration for the physical environment of the terminal departures roadway and ground transportation area. Many terminal departures roadways are used exclusively for private vehicles and for-hire vehicles, such as taxis and limos. Commercial vehicles and courtesy shuttles are typically on the arrivals roadway.

Grade-separated pedestrian crossings should be provided from the terminal parking areas. This increases capacity of the terminal departures roadway by reducing pedestrian crossings and improves the customer experience.

Covered Unloading Areas: A canopy should be provided to cover at least one-and-a-half vehicle lanes (approximately 18 to 20 feet) from the edge of the curb to protect well-wishers and customers from inclement weather during drop-off.

Hourly Parking: Hourly parking (two hours or less) should be provided close to the terminal entrance so well-wishers can park while dropping off their party. This parking area is commonly located in the terminal parking garage.

3.3.5 Information Dissemination

Airport roadways present a unique challenge for motorists, especially for infrequent travelers or those making their first trip to the airport. Motorists are faced with several decision points in close proximity to one another as they transition from adjacent freeways to the airport.

Basic Requirements

Airline Terminal Listings: Airline location information is typically not provided at airports with a single terminal and a common departures roadway. It is commonly provided at airports with multiple terminals (e.g., Boston Logan, Dallas/Fort Worth International, JFK International, and Los Angeles International) or a split departures roadway serving a single terminal, such as Atlanta International, Denver International, and Tampa International airports.

For signs that list airlines and terminal assignment, many airports list more than three airlines on a single guide sign. If this practice is adopted, the following guidelines should be considered:

- List the airlines alphabetically and spread out the list as much as possible to avoid information overload. If necessary, use multiple signs.
- Provide adequate letter size for easy and quick legibility of all airlines listed before the sign is passed at the operating speed (assume approximately 1/2 to 1 second reading time per major word or name and legibility of 30 feet per inch of letter height).
- Provide good letter-to-background color contrast for easy reading.
- Provide adequate space (see the following section regarding spacing rules) between successive signs to provide mental processing of the information provided.
- Repeat the signs to the extent possible.

Dynamic Message Signs (DMS): The use of dynamic message signs on the roadway can help benefit the airport, airlines and most importantly the customer. International terminals tend to

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include a wide range of air carriers which in turn determines the capacity requirements for the roadway signage. Airlines also tend to change for a variety of reasons, such as mergers, new start-ups, season service, etc. Whether driven by capacity issues or name changes, DMS can keep pace with these demands and deliver accurate information to the international traveler as changes to DMS only require changes in the electronic airline listing database.

Analysis of existing structures: A key consideration for new digital airline listing display is the structure. New overhead roadway sign structures can easily cost $100,000 or more, so reusing existing structures can yield significant cost savings. An analysis of the existing sign structure should be performed in accordance with AASHTO Standard Specs for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Design criteria included allowances for wind (snow and ice loading in northern locations) in addition to the weight of the new digital LED sign.

Viewing Distances: The maximum distance travelers can identify a message on a DMS is called legibility distance. The Manual of Uniform Traffic Control Devices (MUTCD) does not indicate how bright the LEDs on a DMS should be, but it is strongly recommended that a display brightness of at least 9,200 candela per square meter (d/m^2) is used. All DMS should have intensity adjustment to optimize legibility in all ambient light levels.

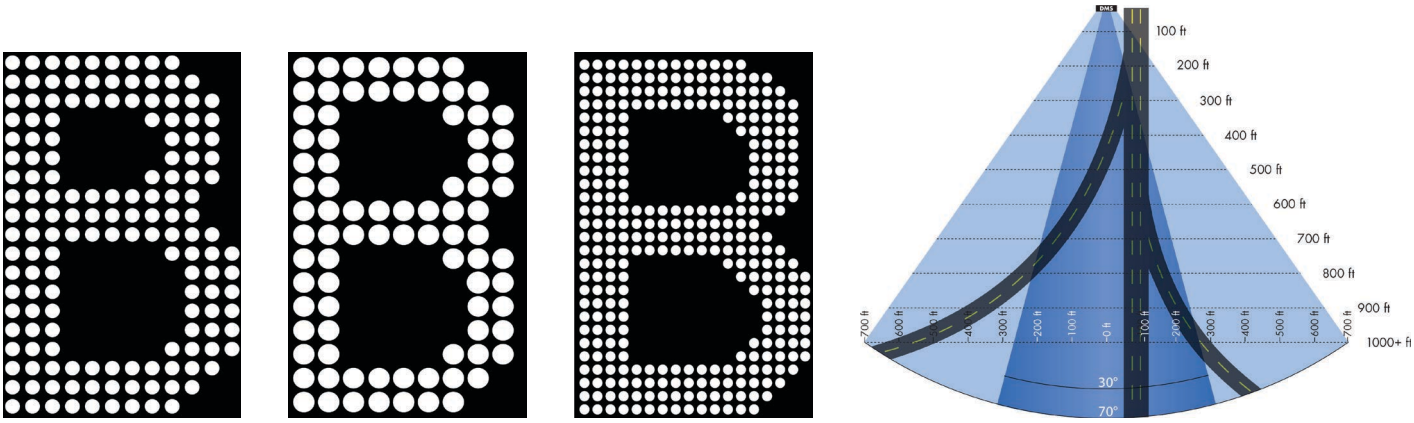
DMS Display—Branding vs. Generic Listings: Monochrome displays are the most economical and can display airline names using simple fonts; however, full-color systems have the ability to display full-color images and even video, meaning airline logos can be displayed, as shown in Figure 3-11.

Standard Character Height: DMS units are available in character sizes such as 12-inch, 9-inch, or 6-inch. Any character, however, can be doubled (or more) in size. For example, 6-inch characters can be doubled in height to produce 12-inch characters; that character would contain more pixels and thus be clearer than a standard 12-inch character, as shown in Figure 3-12.

Terminal Identification Signage: As discussed previously, the expectation is 100 percent of departing passengers know what airline they will be using, therefore the primary task is to identify the correct terminal departures roadway drop-off area. This seemingly simple task can be challenging for airports with multiple terminals. Consequently, departing passengers must determine which terminal they need to find. So, in addition to airline identification signage, each terminal needs to also be clearly identified (e.g., A, B, C, D, etc., or T1, T2, T3, etc.).

Source: Photo courtesy of 115 Degrees West

Figure 3-11. Roadway airline listings at Phoenix Sky Harbor International Airport.



12"/66 mm 12"/34 mm 12"/20 mm

Source: Daktronics website – www.daktronics.com

Figure 3-12. Recommended maximum viewing distances when using nominal 7×5 font.

The example in Figure 3-13 shows how the international terminal identification at Los Angeles International Airport is repeated three times: on the canopy, on the building, and over the entrance. Combined with dynamic airline identification signs, this level of redundancy helps provide customers with confidence and a level of comfort that they are at the correct terminal. This information, along with the drop-off location for each airline, is also reinforced by the terminal map available on the Los Angeles World Airports website, as shown in Figure 3-14.

Digital Airline Identification Signage: When approaching the terminal departures roadway, customers first look for airline identification signage directing them to drop-off location for each airline. As technology advances and common-use infrastructure becomes more prevalent, there is an opportunity to move away from static signage where each airline is assigned a fixed position, to a shared, common-use approach.

Moving to a common-use, shared departures roadway environment requires constant refreshing of airline location identification, which static airline identification signage does not efficiently offer. The departure roadway signage is controlled by airport personnel and can become costly and impractical to constantly update. As illustrated in Figure 3-15, utilizing digital signage for this

Source: ACRP 03-35 Research Team

Figure 3-13. Terminal identification signage at Los Angeles International Airport Tom Bradley International Terminal.

Source: ACRP 03-35 Research Team

Figure 3-14. Dynamic airline identification signs and airline terminal map for Los Angeles International Airport.

purpose allows the airport to update the sign dynamically each time there is a position change. Additional benefits, such as better space allocation and utilization, exist by allowing the available departures roadway positions to adjust to where an airline is operating its ticketing/check-in functions versus a static position based on the signage.

Implementation Considerations

Digital Airline Identification Signage: Signage that identifies the airlines within a terminal provides an essential confirmation to the customer. Costs to be considered with the implementation of digital airline identification signage include:

- Static signage will cost less to implement upfront, but will cost more in the long-term to maintain and update as airlines change. The display capacity can become an issue when there are more airline names to list than the static sign has space available.

Source: ACRP 03-35 Research Team

Figure 3-15. Example of digital airline identification signage at Atlanta International Airport International Terminal.

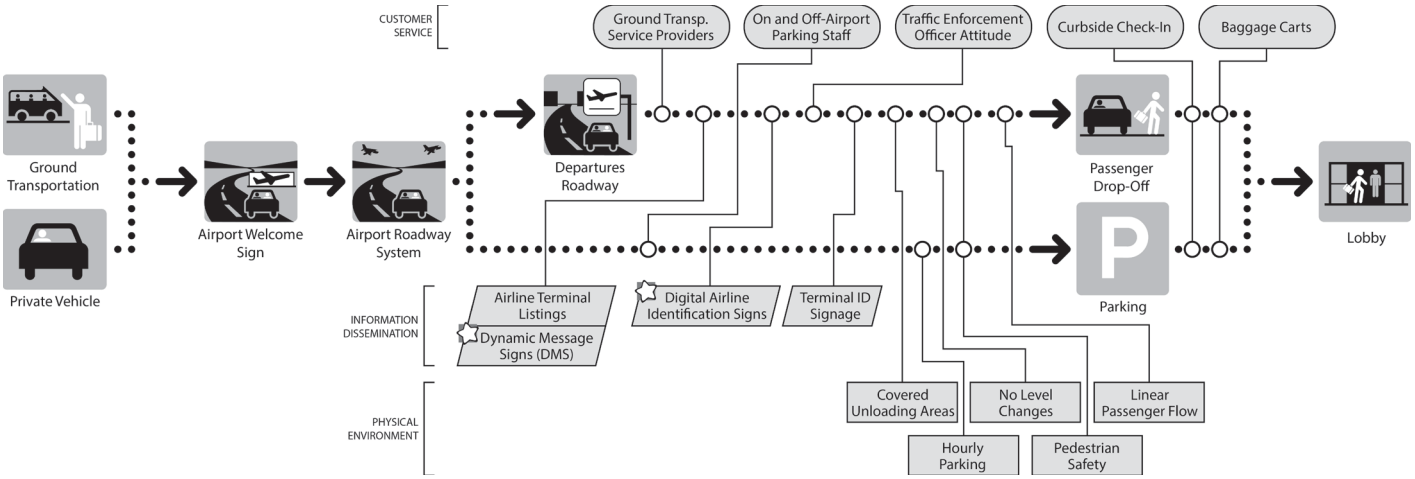
- Dynamic signage will typically cost considerably more to implement up front, but can save money in the long term by making changes to the airline information quickly and efficiently without the need to physically change the signage. Display capacity issues can be addressed by programming the dynamic signs to accommodate additional airlines.

As with the introduction of any digital signage project in an airport, the existing conditions, content, and control factors need to be considered. Specifically, with the implementation of departures roadway airline identification signage, display selection becomes the first major decision. Figure 3-15 illustrates a direct view LED display with airline identification information. LED signs are popular in this scenario over a traditional LCD display because they are typically weatherproof and modular-sized, allowing for a wide variety of bar-shaped displays, similar to what customers are used to seeing in the static form. While LCD manufacturers have begun to develop non-traditional bar-shaped displays, few choices are available. Also, LCD displays typically require an additional weatherproof enclosure to protect them from the elements. One benefit to a traditional LCD display is its true HD resolution. Depending on the content and physical considerations, this decision likely requires detailed planning and cost analysis.

Table 3-4 provides a summary of the implementation considerations for digital airline identification signage.

Table 3-4. Implementation considerations for digital airline identification signage.

Departures Curbside Digital Airline Identification Signage	
Applicability: Airport terminals with frequently changing airlines or common-use departures roadway assignments	**Capital Cost Considerations:** • Engineering design services • Digital display units and IT infrastructure • CMS programming to update displays
Implementation Complexity: Requires planning and detailed engineering design. Integration with the existing FIDS will be required to automatically map data to the correct device.	**Operating Cost Considerations:** • Database and system maintenance • Hardware maintenance
Customer Benefits: • Digital displays provide better visibility, making it easier for customers to identify the location of their airline	
Stakeholder Benefits: • Provides a high degree of flexibility to adjust departures roadway drop-off location assignments based on several factors, such as flight times and curbside demand for specific flights. • Provides for more efficient utilization of ticketing/check-in positions as airlines can be assigned to any positions and the departures roadway signage can be adjusted accordingly.	
Entities Involved: • Airport Operations • Planning • Properties • Information Technology • Customer Service • Airlines	**Beneficiaries:** Departing passengers arriving via private vehicle, airlines and airport operations
Brand Relevance: Highly efficient airport operations	**Representative Airport(s):** • Miami International Airport • Orlando International Airport



Source: ACRP 03-35 Research Team

Figure 3-16. Arriving at the terminal departures roadway journey segment evaluation tool.

3.3.6 Arriving at the Terminal Departures Roadway Segment Evaluation Tool

Figure 3-16 provides a summary of the basic requirements and notable innovations described earlier for the arriving at the terminal departures roadway journey segment for international departing passengers. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

3.4 Terminal Roadway to Check-In

The terminal roadway to ticketing/check-in lobby journey can be an overwhelming experience as customers are provided with myriad information about services, concessions, airline locations, check-in options, and FIDS. While most customers know which airline they are departing on, they may not be as familiar with the arrangement of the facility or the check-in process.

3.4.1 Key Activities

The terminal roadway to ticketing/check-in journey segment includes the following activities:

- Enter the ticketing/check-in lobby from the terminal roadway
- Identify the desired airline location
- Seek additional services, such as currency exchange, business center, or baggage shrink wrapping, prior to check-in
- Proceed to the desired airline check-in location
- Decide between various check-in options
- Complete check-in
- Proceed toward the security checkpoint

3.4.2 Customer Needs and Expectations

From the terminal roadway, passengers will locate the entrance to the terminal (preferably one closest to their airline's check-in counters). To assist passengers in locating the correct terminal entrance point, airline identification signs are provided on the terminal roadway. These airline signs must have sufficient letter heights that can be read by drivers from a distance.

Once inside the terminal, passengers can become overwhelmed with visual information from overhead signs and stanchions located to the left, to the right, and straight ahead as they visually scan the hall for the check-in counter associated with their airline.

While airlines operating international flights typically offer passengers different options for the check-in process (e.g., self-service or agent), passengers must have their identification and travel documents verified by an airline agent. International flights can accommodate hundreds of passengers, which can create long lines at the check-in counters. Waiting in line is typically a frustrating process and a source of passenger dissatisfaction, especially when check-in counters are understaffed.

In the survey, the vast majority of departing passengers were satisfied with the waiting time at the check-in line and the helpfulness of the check-in staff. Only 6 percent expressed dissatisfaction about the length of time spent waiting and only 4 percent indicated that the check-in staff was not helpful. The two airports with the highest present of dissatisfied customers, 11 percent and 9 percent, had very constrained queuing areas and one was in the process of being reconfigured.

3.4.3 Customer Service

Person-to-person customer service in the ticketing/check-in lobby is provided by a wide range of entities, including:

- Airport information counter staff
- Airline agents
- Concessionaires
- Service providers

Another customer service element is the availability of baggage carts to help customers transport their baggage. It is also at this point in the customer's journey that customers are provided with differentiated facilities and services depending on their class of travel or frequent flier status. This is an important part of the airlines' customer service approach and is typically provided by the airlines.

Basic Requirements

Airport Information Counter: The airport information counter should be positioned near the center of the departures hall and be highly visible from each of the entries. It should be staffed by customer service representatives who have been provided with responses to frequently asked questions (FAQs), are very familiar with all of the airport facilities, and have a way to look up additional information, such as a computer or tablet, which the customer may desire.

The information counter may also provide flight information and other relevant information, such as shopping or dining options, that may be of interest to the customer. As shown in Figure 3-17, the customer service center in the Terminal 3 departures hall at Beijing Capital Airport provides a variety of information in addition to serving as a point of interaction between customers and customer service representatives.

Munich Airport has implemented an innovative approach for providing information services at key locations other than the departures hall where departing passengers may need assistance. The InfoGate Counter allows for interaction between customers and customer service personnel via life-size videoconferencing, as shown in Figure 3-18. These are placed in areas with high volumes of customer traffic that departing customers regularly pass through before they reach the departures hall.

Source: ACRP 03-35 Research Team

Figure 3-17. Airport customer service center at Beijing Capital Airport Terminal 3.

Services: International departing passengers may require additional services as compared to domestic passengers due to the length and nature of their trip. The following services should be provided in the departures hall:

- Foreign currency exchange
- Baggage shrink wrapping
- Baggage carts

Source: ACRP 03-35 Research Team

Figure 3-18. InfoGate counter at Munich Airport Terminal 2.

Amenities: International departing passengers typically arrive at the airport earlier than domestic passengers due to the guidance from the airlines to arrive at least two hours prior to departure. Also, depending on where the customers are staying, such as a hotel, and the departure time of their flight, they may arrive at the terminal several hours prior to departure. Some airlines, particularly foreign carriers with only one or two flights a day, do not open their ticket counters until two or three hours prior to departure, which leaves passengers waiting in the departures hall with their luggage. Given this potential for long waiting periods prior to check-in, the following amenities should be considered in the departures hall:

- Food and beverage outlets
- Retail kiosks or shops
- Waiting areas with seating and personal technology charging stations
- Entertainment options, such as museums, art displays, children play areas
- Nursing rooms
- Business centers

Premium Concierge Services: While some airlines provide concierge services for their most valuable customers as well as to customers who pay for the service, there are many for-hire service providers who will provide meet and greet services for customers. Customers traveling in First or Business Class who do not qualify for airline-provided concierge services may be interested in hiring someone to assist them while at the airport. These services may include the following:

- Meet the customer at the terminal curb, assist with their luggage, and escort them to the airline's check-in location
- Expedite the customer through security (via premium passenger lanes)
- Escort the customer to the departure gate

IATA Fast Travel Program: IATA has developed a Fast Travel Program that seeks to improve the customer experience by reducing the time necessary for check-in and reduce costs for the industry. Three components of that program related to check-in are document scanning, bags ready-to-go, and self-service check-in. Document scanning allows customers to scan their travel documents at a self-service kiosk rather than going to a check-in counter to complete the required identification check. Bags ready-to-go enables customers to print baggage tags at a kiosk and deliver their check baggage tagged and ready for acceptance at the check-in counter or bag drop location. Self-service check-in allows passengers to obtain their boarding pass via self-service kiosk, the web, or on their mobile device thereby avoiding long lines at the check-in counters.

Implementation Considerations

Virtual Information Counter: Virtual information counters, such as the InfoGate Counter at Munich Airport, provides an opportunity for airport customer service staff to interact with customers at key locations without having to staff a traditional information counter at each location. The customer service agents are located in a central control room and have access to a wide array of information that the customer may be interested in. This allows a few customer service representatives to provide face-to-face (via videoconferencing) customer service that would otherwise require several customer service representatives, depending on the number of locations. In addition, once the technology infrastructure is in place, the only additional cost of expanding the service to more locations is the cost of the counter itself. Table 3-5 provides a summary of the implementation considerations for virtual information counters.

3.4.4 Physical Environment

The departures hall of most international terminals is a significant architectural statement that reflects the importance of global air travel to the community. They are often large, open

Table 3-5. Implementation considerations for virtual information counters.

Virtual Information Counters	
Applicability: International and domestic airport terminals	**Capital Cost Considerations:** • Kiosks—millwork, computer, monitors • IT infrastructure • Central control room equipment and furnishings
Implementation Complexity: Utilizes proven technology	**Operating Cost Considerations:** • Customer service representatives • Software updates and equipment replacement
Customer Benefits: • Customers are provided with the opportunity for face-to-face interaction with customer service representatives at multiple locations throughout the airport.	
Stakeholder Benefits: • Reduces operating costs by consolidating Customer Service staff in operations centers rather than positioned throughout the terminal	
Entities Involved: • Airport Operator • Information Technology	**Beneficiaries:** • All departing passengers • Airport Customer Service
Brand Relevance: Personalized, convenient customer service	**Representative Airport(s):** • Munich Airport

spaces that can become congested during the busy periods but seem grossly oversized and empty outside of those times. Access to the departures hall may be from various points as customers arrive via private vehicle, ground transportation services (likely located on a different level) or enter from the parking garage. Customers are commonly given many choices of services, amenities, check-in options, and routes to the subsequent step in their journey.

The primary elements of the physical environment in the departures hall that influence the customer experience include the following:

- Natural wayfinding through a clear line of sight
- Logical progression from the terminal entrance through the check-in process
- The ability to choose the type of check-in process
- Sufficient space to allow for unencumbered movement from one step to the next

Basic Requirements

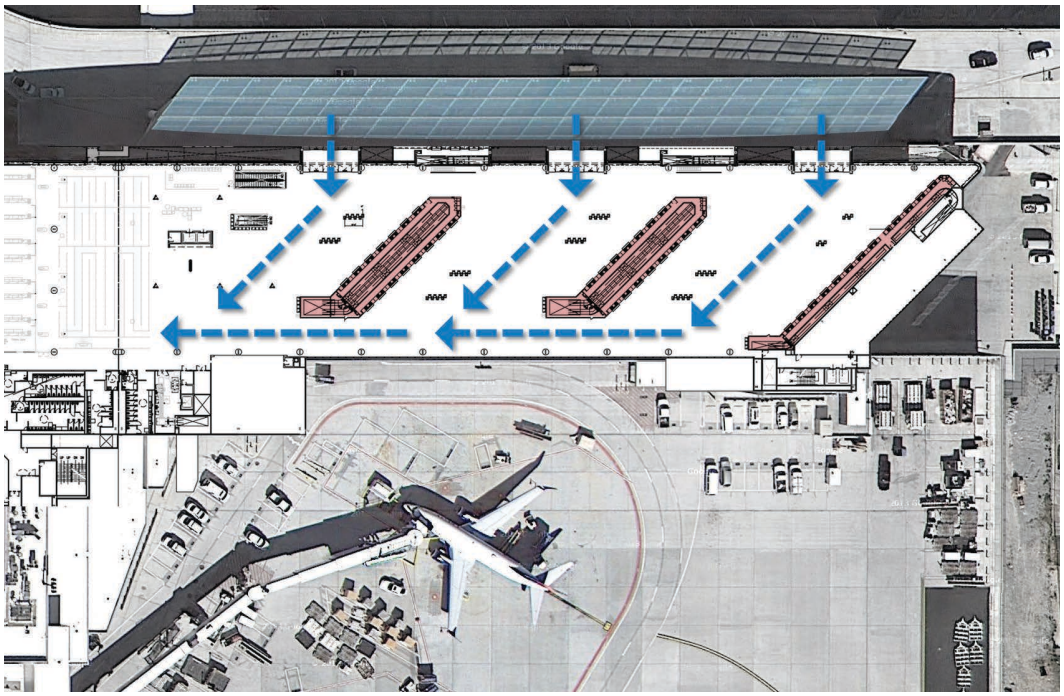
Natural Wayfinding: The architecture and interior design of the departures hall should facilitate natural wayfinding by using visual patterns and physical elements to guide passengers from the various entries to the departures hall through the check-in process and then to the security screening checkpoint. Given the myriad decisions that customers have to make in the departures hall, natural wayfinding is important to reduce anxiety associated with not knowing where to go for the next step in the process.

Figure 3-19 provides an example of how the interior design guides the passenger flow from the front of the departures hall (left side of picture) through the check-in process (center) and then to the security checkpoint. The lighting in the ceiling and the floor patterns are the primary elements of natural wayfinding in this example.

Source: Photograph by Chris Cunning Photo, courtesy of Gresham, Smith and Partners.

Figure 3-19. Example of natural wayfinding elements at Atlanta International Airport International Terminal.

Logical Passenger Flow: In combination with natural wayfinding, the passenger flow from one step in the process to the next should be logical and not require backtracking or circuitous routes. Many international terminals have ticketing/check-in counters arranged in an island layout whereby passengers flow from the entrance of the departures hall, to the check-in counters located in the islands, and then onward to the security checkpoint, progressing through the departures functions in the same direction of travel. As shown in Figure 3-20, some international



Source: ACRP 03-35 Research Team

Figure 3-20. Angled ticketing/check-in counter islands at Hartsfield-Jackson Atlanta International Airport's International Terminal.

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departure terminals utilize angled ticketing/check in counter islands to create a logical passenger flow from the entrance of the departures hall toward the security checkpoint.

Airline Check-in Options: Passengers departing on international flights should be given an opportunity to select the type of check-in process that they are most comfortable with: agent-based full-service or self-service. Premium passengers may choose to utilize the full-service counters designated for their class of travel or status because they like the personal attention or they may choose self-service for more expeditious processing. Many overseas airports, especially those in Europe, provide a variety of self-service check-in options, including self-tagging of check baggage. Figure 3-21 illustrates how the various check-in options—self-service boarding pass (Step 1), baggage drop (Step 2), and full-service (behind the self-service options)—can be arranged in a logical progression.

For most international flights departing the United States, it is necessary for an airline representative to verify the passenger's identity and travel documents prior to the kiosk printing the boarding pass and baggage tag(s). This generally limits the placement of the self-service boarding pass kiosks to the immediate vicinity of the check-in counters or baggage drop locations to reduce the staffing burden on the airlines. Arrangements such as that shown in Figure 3-21 are applicable to U.S. airports and should be considered in the design of new international terminals or significant renovation of existing international terminals.

Self-Tagged Baggage: The self-check revolution has evolved from allowing a customer to check into a flight by printing a boarding pass at home or at a kiosk, to offering customers the option to do the same with a permanent checked baggage tag. This has been a popular concept at foreign airports, first implemented by Air New Zealand in 2008, and allows a passenger checking baggage to print a baggage tag at home or at a self-service kiosk, secure it to their bag and bring it to a designated drop-off area at the airport without the help of an airline agent. According to Nicas and Shukla, in 2015 more than a third of global airlines ask fliers to tag their own bags, compared to 13 percent in 2009, and it is estimated that by 2018 more than three-quarters intend to offer the service. TSA has recently made it easier in the United States to offer this service and major airline groups are beginning to take advantage across the country.

The next phase in the self-baggage tagging revolution incorporates permanent baggage tags, as shown in Figure 3-22. These baggage tags attach to a customer's luggage and digitally display

Source: Heathrow Airports Limited. Accessed at mediacentre.heathrow.com, copyright protected.

Figure 3-21. Airline check-in options at Heathrow Airport Terminal 2.

Source: DS Tags website – www.dstags.com

Figure 3-22. Example of a permanent baggage tag.

flight information using e-paper (like an e-reader). The information is updated using a customer's smartphone via near field communications (NFC) or radio frequency identification (RFID) technology and is powered by an ultra-low power supply that could allow the device to operate up to five years, even with frequent use.

The tag displays the destination information and a traditional bar code that any airport in the world can scan as is currently done with printed tags. If the customer has a mid-trip change, the tag can be updated to reflect the new course.

Unencumbered Passenger Flow: The size and configuration of the departures hall should facilitate unencumbered passenger flow during the peak periods. While this is commonly identified as the level of service (typically a specified area per person), the intent is to provide clear circulation routes so that passengers who have completed a step in the process can proceed to the next stop without having to fight through a crowd of people moving in different directions. This situation most commonly occurs when the queue for the ticketing/check-in counters spills into the circulation path to the security checkpoint. Planners must accurately determine the queuing requirements based on realistic conditions so that the designers can create distinct areas for the queuing and circulation that minimize or eliminate cross-flows. Sensitivity analysis should be conducted during the planning phase to determine the queuing requirements of various performance and level of service scenarios to examine the potential conflict of queuing and circulation.

Implementation Considerations

Self-Tagged Baggage: Self-tagging kiosks are beginning to emerge in the United States (based on new TSA regulations) providing airports that currently offer CUSS kiosks an opportunity to provide this service to their customers. Airlines must still staff bag drop areas because security regulations require airline agents to check the identification and verify the travel documents of international passengers, which according to the TSA, is not likely to change. Table 3-6 provides a summary of the implementation considerations for self-tagged baggage.

3.4.5 Information Dissemination

The best wayfinding is based on spaces designed with intuitive, open, and direct line of sight to the destination. However, not every international departure terminal benefits from this design feature. Factors such as the ground transportation operation located on a different roadway than the ticketing/check-in level will necessitate the need for clear signage located at key decision points to help unfamiliar international travelers find their airline in large departure halls.

Table 3-6. Implementation considerations for self-tagging and permanently tagged baggage.

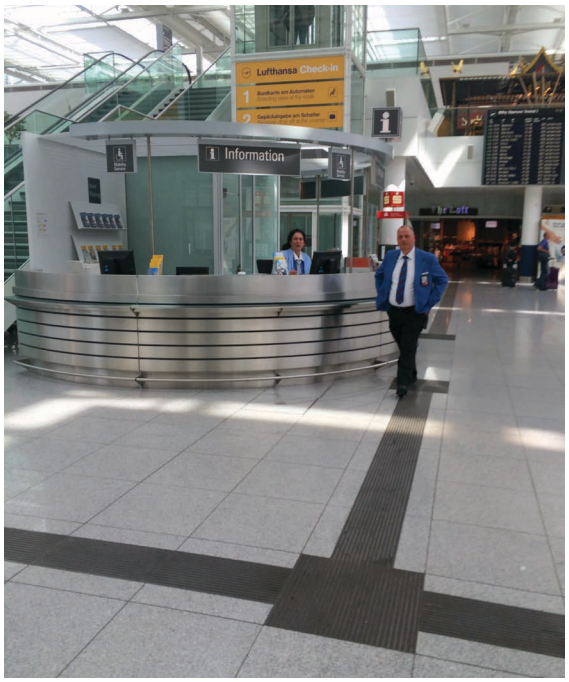
Self-Tagging and Permanently Tagged Baggage	
Applicability: Airports with common-use self-service kiosks	**Capital Cost Considerations:** • Kiosks with baggage tag printing capabilities • Common-use software with baggage tag printing • Baggage drop positions with weight scales and baggage tag readers
Implementation Complexity: May require replacement of existing self-service kiosks and modification to ticket counters to install bag drop positions	**Operating Cost Considerations:** • Self-service kiosk maintenance
Customer Benefits: • Customers have more choices for check-in and baggage drop. • Additional self-service check-in options reduce the wait times at check-in.	
Stakeholder Benefits: • Minimizes the increase in operating costs by increasing processing capacity through technology rather than staff	
Entities Involved: • Airport Customer Service • Information Technology • Airlines	**Beneficiaries:** • All departing passengers checking baggage
Brand Relevance: Convenient passenger processing	**Representative Airport(s):** • Auckland Airport • Amsterdam Schiphol International

Passengers with disabilities finding their way from the departures roadway to the ticketing/check-in areas can benefit from several enhancements and strategies. Tactile routes (that use markedly three-dimensional texture designed to be perceived under the feet) lead to key points of interest, such as information desks, that are equipped to provide assistance to passengers with low vision and no vision, as shown in Figure 3-22. Other examples include assistance or a means to request assistance that is available outside the terminal, e.g., curbside check-in, accessible kiosk/call point, or telephone identified by an easily visible and tactile sign.

For large departure halls, digital signage provides an efficient way of providing wayfinding information relevant to only the air carriers operating in a given time frame. A static sign would have to show all potential airlines and direction. Simplifying the amount of information reduces confusion (see Figure 3-23).

Basic Requirements

Flight Information Display Systems (FIDS): Between the departures roadway and check-in, FIDS are the standard for giving passengers the most current information about flight status, departure time, and gate. The industry standard format for FIDS in the United States is alphabetical (by destination), though occasionally an airport will use a chronological display (by departure time). Many foreign airports sort the listings chronologically. Information displays may also show codeshare flights but not all airports are doing this. Figure 3-24 provides examples for both formats for FIDS. While it is acceptable to display content alphabetically or chronologically, the first column listed on the FIDS should display the data that sorts the flight information.



Source: ACRP 03-35 Research Team

Figure 3-23. Left photo: Accessible tactile route leading to key points like information center and ticket agent. Key touch points for verbal communication at Munich Airport. Right photo: Check-in location signage by airline including accessible check-in counters at Munich Airport.

Source: ACRP 03-35 Research Team

Figure 3-24. FIDS sorted alphabetically by destination at Miami International Airport and FIDS sorted chronologically at Amsterdam Airport Schiphol.

Location of the FIDS for international travelers is another consideration. Mapping international customer circulation paths that account for both horizontal and vertical flow within the terminal will help to identify the best overall FIDS location. This can be adjacent to entry points, elevators/escalators that are prior to the check-in area or consolidated after the check-in area but prior to the security checkpoint.

FIDS with Alternate Content: FIDS are a key touch point in the passenger journey that creates a natural opportunity to communicate additional alternate content as a means to enhance customer experience. As shown in Figure 3-25, the FIDS at Heathrow Airport confirm flight status and provide check-in zone information; this connects passengers with the large overhead zone designation signage to guide them to the correct ticket counter area. Extra displays are used to educate departing passengers on check-in information relevant to boarding passes, bag drop, and special assistance. This type of information can be especially helpful for international travelers unfamiliar with U.S. airport check-in procedures. Other screens provide security information and marketing that promotes the Heathrow Airport brand.

Directories: For facilities with limited pre-security amenity choices, directories in the departures hall area supply the necessary information that helps customers decide if they want to eat or shop before or after they go through security. Static directories can be a simple but direct, low-cost option versus the higher cost interactive touch-screen directory option, which is discussed in Section 3.5.5. Figure 3-26 shows examples of static and interactive directories.

Implementation Considerations

FIDS with Alternate Content: Providing passengers with alternate content on an existing digital display used to show other content typically can be accomplished through the CMS by building a template structure for the content, linking the correct data aggregators to the template and scheduling the content within the CMS. The key is to keep the content current and accurate. By using data aggregators and constantly updated data streams, this is easily accomplished. If using static images for events, ensure there is an expiration date for the information and schedule a backup of the content that is not time sensitive. Displaying outdated content is the fastest way to

Source: ACRP 03-35 Research Team

Figure 3-25. FIDS at Heathrow Airport Terminal 4 departures hall use alternate content (on first and fourth displays) to enhance the customer experience.

Source: ACRP 03-35 Research Team

Figure 3-26. Directories in the departures hall (Left photo: JFK International Airport, Right photo: Atlanta International Airport).

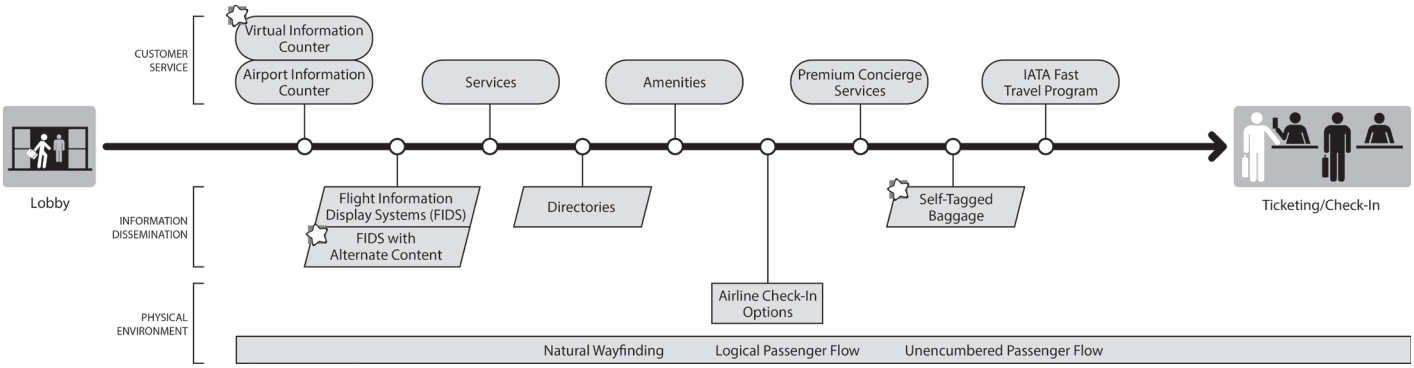
lose customer trust in all digital content. Table 3-7 provides a summary of the implementation considerations for FIDS with alternate content.

3.4.6 Terminal Roadway to Check-In Journey Segment Evaluation Tool

Figure 3-27 provides a summary of the basic requirements and notable innovations described earlier for the terminal roadway to check-in journey segment for international departing

Table 3-7. Implementation considerations for alternate content at existing digital display locations.

Alternate Content at Existing Digital Display Locations	
Applicability: Existing digital display locations	**Capital Cost Considerations:** • Content development and CMS programming
Implementation Complexity: With a mature CMS driving FIDS, implementation is as simple as creating content and scheduling it to play when desired.	**Operating Cost Considerations:** • Content development and CMS programming
Customer Benefits: • Provides customers with additional content in locations where information is useful and applicable but may not be required or able to stand on its own	
Stakeholder Benefits: • **N/A**	
Entities Involved: • Airport Marketing/PR • Information Technology • Content team	**Beneficiaries:** • All passengers traveling along this journey segment
Brand Relevance: Alternate content for digital displays	**Representative Airport(s):** • Heathrow Airport • Boston Logan International Airport



Source: ACRP 03-35 Research Team

Figure 3-27. Terminal roadway to check-in journey segment evaluation tool.

passengers. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

3.5 Check-In to Security Checkpoint

Upon completing the check-in process, passengers typically proceed directly to the security checkpoint for security screening. This segment of their airport journey should be straightforward and provide an opportunity for customers to say goodbye to well-wishers and prepare for the security screening process. The security screening process itself can be a stressful experience for passengers, especially those who travel infrequently, have not traveled in the United States since September 11, 2001, or who have very little English language capabilities.

3.5.1 Key Activities

The key activities included in the check-in to security checkpoint journey segment include the following:

- Utilize post check-in amenities, such as restrooms or nursing rooms
- Say goodbye to well-wishers
- Enter the queue for the security checkpoint
- Undergo security screening

3.5.2 Customer Needs and Expectations

After passengers have completed the check-in process, they require directional information to their gate. Along the path to their gate, passengers are required to pass through a security checkpoint. Since an international flight typically includes hundreds of passengers, the length of the queue at security checkpoints is likely to be long during the busy periods.

In the survey, three-quarters of departing passengers indicated that short lines at security were very important to them. About one in eight departing passengers expressed some dissatisfaction with each of the following aspects of the security checkpoint screening process: long wait time at security (14 percent), lack of clear explanation of the screening procedure (14 percent), and unhelpful security staff (13 percent).

Research by McIntosh et al. (1998) validates that the security clearance process is one of the more stressful portions of a passenger's journey. Additional research by Thompson et al. (1996) has also shown that perceived wait time has a greater influence on passenger satisfaction than actual wait time. Therefore, providing information, projecting quality, and managing wait time perceptions and expectations may be more effective than reducing actual wait time.

3.5.3 Customer Service

Person-to-person customer service during this journey segment primarily involves interaction with the staff managing the security checkpoint queue and the TSA officers conducting the security screening. The security checkpoint queue is commonly divided by class of service (first/business or economy), frequent flier status, and TSA Pre✓. The queue manager is responsible for helping customers get into the appropriate line based on their qualification.

Basic Requirements

Customer Service Staff and Officer Attitudes: The queue manager is typically the first point of contact at the security checkpoint. They should provide customers with the reassurance that they are in the proper line and should be able to answer any questions about the screening process that the customers might have. The tone of their voice and attitude should be pleasant and reassuring to minimize the anxiety many customers have about the security screening process.

TSA officers have the dual responsibility of ensuring that passengers are not bringing any items that are prohibited into the secure area while at the same time representing the U.S. government. Their attitude must be polite and professional while maintaining orderly operations. Barking orders or using a raised voice to convey instructions should be strongly discouraged as this not only heightens the customers' anxiety levels but may also be offensive to many foreign cultures.

Observations and stakeholder discussions conducted at the overseas airport for the research identified that the attitude of the staff at the security checkpoint has a major influence on the customer experience. This was especially apparent at Seoul Incheon Airport, an airport renowned for its excellent customer experience, where staff at the security checkpoint used normal voices and had a professional approach to providing instructions and interacting with customers, even in situations where customers were being inconvenienced due to prohibited items or inadmissible carry-on baggage.

Wait Times at the Security Checkpoint: One of the key measures of customer service in the check-in to security checkpoint journey segment is wait times at the security checkpoint. IATA recommends standards for both wait time and the waiting space (IATA 2014). The IATA standards for economy class wait time are less than 5 minutes for Over Design, 5-10 minutes for Optimum, and greater than 10 minutes for Suboptimum. The wait time standards for business/first class are zero minutes for Over Design, 0-3 minutes for Optimum, and greater than 3 minutes for Suboptimum. The IATA standards for waiting space are greater than 13 square feet per passenger for Over Design, 10.8 to 13 square feet for Optimum, and less than 10.8 square feet for Suboptimum. The TSA has informally established wait time targets of 10 minutes for all passengers, which falls in the top end of the IATA Optimum range for economy class passengers. Airport stakeholders and local TSA leadership should work collaboratively to identify staffing requirements, processes, and physical solutions to achieve average wait times of 10 minutes or less for regular customers (excludes Pre✓ or frequent fliers using designated lanes) during the busy periods.

3.5.4 Physical Environment

The physical environment for the check-in to security checkpoint journey segment is an important component of the customer experience. The route to the security checkpoint should be clear of obstacles and the space where the security checkpoint is located should facilitate passenger processing and provide a sense of calmness.

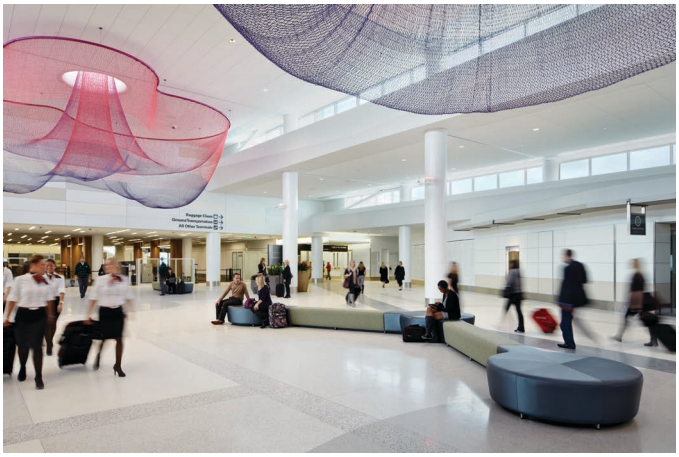
Basic Requirements

Restrooms: Restrooms should be located along the route from check-in to the security checkpoint or at least be within close proximity so that customers can utilize the facilities in advance of security screening, particularly as the queues may become long during peak periods.

Security Checkpoint Area Interior Design: The interior design of security checkpoint area creates the context for the security screening process, which commonly involves queuing, verbal and written instructions from TSA officers, the removal of liquids, computers and clothing/shoes, screening, and then collecting the items and recomposing. All of these activities can be quite stressful. Several airports in the United States have created hotel-inspired security checkpoint environments by including furniture, wall art, lighting, music, recorded instruction messages, and custom video content, developed in conjunction with major hotel brands to provide higher levels of comfort and customer service.

San Francisco International Airport has incorporated large recompose areas into their terminal design guidelines. As shown in Figure 3-28, these areas are located immediately after the security checkpoint and provide customers with a designated space to place their items into their carry-on baggage and put their clothing/shoes back on. This is especially beneficial for international travelers who may be traveling with large groups or several family members and need more space to recompose themselves. Stylish seating and forms of art are used to designate the space and create a calming and relaxing environment after the security screening process. It also allows customer an opportunity to gather their thoughts and plan the rest of their airport journey.

Smart Security: Amsterdam Airport Schiphol introduced a new approach to security checkpoint design, as shown in Figure 3-29, by creating an environment that makes the security



Source: San Francisco International Airport Media Collective. Accessed at sfomedia.widencollective.com

Figure 3-28. Post-security recompose area at San Francisco International Airport.

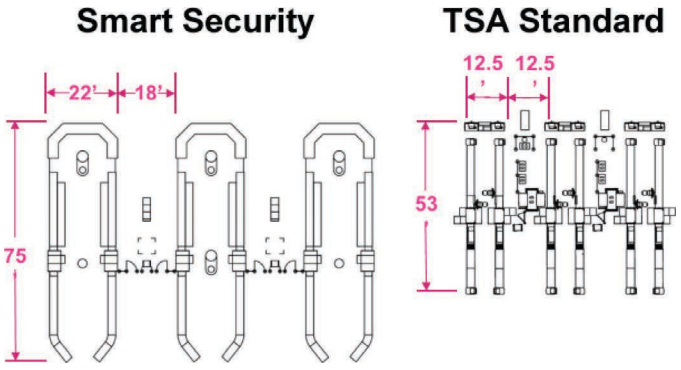
Source: Amsterdam Airport Schiphol. Accessed at http://www.schiphol.nl/B2B/RouteDevelopment/NewsPublications1/RouteDevelopmentNews/AmsterdamAirportSchipholNewSecurityControlEnhancesComfort.htm

Figure 3-29. Security checkpoint design at Amsterdam Airport Schiphol.

process as pleasant and efficient as possible. The materials used in the floor and ceiling reflect nature and create a sense of calmness. Even the screening equipment is designed to be more visually appealing.

The checkpoint equipment arrangement is based on the smart security initiative, a joint program between IATA and ACI, which seeks to strengthen security, increase operational efficiency, and improve the passenger experience. According to ARUP (2016), the area required for this arrangement is approximately 100 percent larger (excluding the queuing and recompose areas) than that for TSA standard security checkpoints in the United States, but the processing rate is anticipated to be approximately 150 percent greater. Figure 3-30 provides a side-by-side comparison of the smart security configuration and the TSA standard security checkpoint configuration.

One of the key elements of the smart security configuration is the use of parallel divestment stations or tray loading solutions on the divestiture end of the x-ray rather than the standard single-file line used in TSA checkpoints. The parallel divestment stations approach utilizes designated



Source: ARUP

Figure 3-30. Smart Security and TSA standard security checkpoint comparison.

spots for customers to divest their belongings without feeling rushed because they are holding up the line. In conjunction with the automatic bin return system, this ensures that the throughput capacity of the x-ray is fully utilized. Customers who need longer to divest their belongings also feel less stressed because they are not holding up the people behind them. More information about smart security can be found at: http://www.iata.org/whatwedo/security/Documents/SMART%20SECURITY_ALL.pdf.

Implementation Considerations

Smart Security: The smart security initiative involves the same equipment as the standard TSA security checkpoint—carry-on baggage x-ray and advanced imaging technology portal—but has a different layout and operational process (Table 3-8). The layout requires more width and length per lane than a TSA security checkpoint resulting in an increase in total area of approximately 100 percent. The most significant operational process change is the use of matrix loading on the divestiture end of the screening process versus the TSA standard single-file line. The result however is a 150 percent increase in the processing rate. This could reduce the number of lanes or reduce the waiting time for customers. Fewer lanes could possibly reduce the TSA staffing

Table 3-8. Implementation considerations for Smart Security.

Smart Security	
Applicability: International and domestic airport terminals	**Capital Cost Considerations:** • Renovation of existing security checkpoints • Bin return system required for matrix loading • Larger area required for future checkpoints • IT infrastructure modifications
Implementation Complexity: Not yet approved by TSA but has been implemented at several foreign airports	**Operating Cost Considerations:** • Maintenance of additional automation equipment
Customer Benefits: • Reduced anxiety due to enhanced interior design of the checkpoint area and operational process • Lower wait times due to higher processing rate	
Stakeholder Benefits: • Reduces reliance on increased TSA staffing to accommodate increases in passenger volumes • Increases concession revenue potential by reducing customer wait times • Reduces airline operating costs associated with accommodating passengers who experience long delays at the security checkpoint	
Entities Involved: • Airport Customer Service • Airport Planning and Design • Transportation Security Administration (TSA)	**Beneficiaries:** • All departing passengers • Transportation Security Administration (TSA) • Concession and amenity providers
Brand Relevance: • Efficient passenger processing • Customer-centric experience	**Representative Airport(s):** • Amsterdam Schiphol Airport • Heathrow Airport • Gatwick Airport • Manchester Airport • Geneva Airport • Melbourne Airport

requirements while lower wait times would give customers more time post-security to shop or dine before their flight.

While the TSA Checkpoint Design Guide (Revision 5.1 issued May 7, 2014) does not currently reflect the smart security initiative, airport planners and designers should consider the implications of converting the TSA checkpoint into a smart security configuration at some point in the future. This would likely require providing additional length between the queue and the recompose areas and ensuring that the functions on each side of the checkpoint could be converted to additional screening area at a future date with minimal cost impact.

3.5.5 Information Dissemination

Airports receive lower customer satisfaction scores at the security checkpoint than many other segment of the customer journey. According to the survey, 64 to 65 percent of passengers rated their satisfaction on wait times, explanation of procedures, and helpfulness of SSCP staff as "very good" or "excellent." As discussed previously, an airport can use touch points like their website and alternate content on digital signage to help educate unfamiliar international travelers prior to reaching the security checkpoint about what they can and cannot take through security as well as all other pertinent procedures.

Airports wanting to improve the security checkpoint customer experience also can apply research-based design principles that reflect how psychology is a significant element in the security checkpoint queuing experience (de Neufville and Odoni 2003).

- **Physical environment:** A comfortable environment, such as seating availability and temperature, is a central influence on perceptions about delays; passengers will be more tolerant of the situation and have reduced negative reactions.
- **Information:** Customers' perceptions of wait times are typically longer than the actual wait times; therefore, passengers will be more patient when they are provided real-time information. This information can be communicated visually on display monitors, and virtually on airport mobile apps or dynamic directories. This information becomes even more relevant at a terminal with multiple security checkpoints when some checkpoints are closed and customers must detour to another checkpoint. When customers feel they are in control of their time, passenger satisfaction increases.
- **Fairness:** Queues management based on a first-come, first-served basis (i.e., single-line queue) promotes a sense of fairness. Unfair waits (i.e., individual queues for each processor) are perceived to be longer than equitable waits.

Basic Requirements

Security Screening Information: Providing customers with clear, concise, and easy to understand directions on the screening process helps improve both customer satisfaction and processing times. As outlined in the TSA *Security Checkpoint Design Guide*, displaying images of what to place in the X-ray bins ensures the passenger throughput capacity remains high. Dynamic signage that displays wait times helps manage customers' expectations. Providing comfortable seating for reorganizing baggage reduces frustration and in turn stress. Figure 3-31 shows examples of these design principles.

The security checkpoint should be identified with clear signage. Most airports offer dedicated lines based on type of passenger (e.g., frequent flier, first class, and economy) as illustrated in Figure 3-32. Clearly identifying which lanes should be used by employees and passengers with disabilities should also be included.

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Source: Dallas/Fort Worth International Airport website – www.dfwairport.com

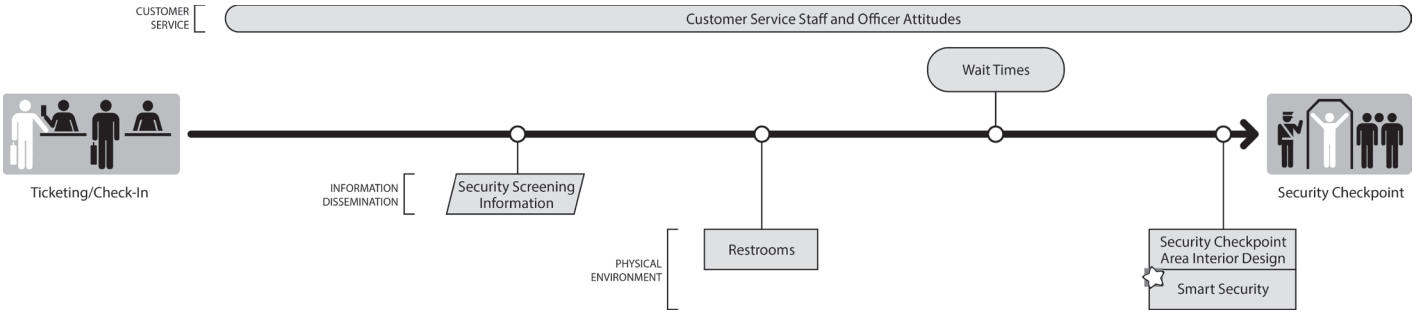
Figure 3-31. Security screening information presented at a security checkpoint at Dallas/Fort Worth International Airport.

3.5.6 Check-in to Security Checkpoint Journey Segment Evaluation Tool

Figure 3-33 provides a summary of the basic requirements and notable innovations described earlier for the check-in to security checkpoint journey segment for international departing passengers. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

Source: ACRP 03-35 Research Team

Figure 3-32. Signage at the security checkpoint indicating different lines (Munich Airport).



Source: ACRP 03-35 Research Team

Figure 3-33. Check-in to security checkpoint journey segment evaluation tool.

3.6 Security Checkpoint to Gate

Once through the security checkpoint, departing passengers have many choices for how they spend the remainder of their time before boarding their flight. For international departing passengers, this may be a substantial amount of time if they arrived at the airport two or three hours before their flight as commonly recommended by airports and airlines. Many airports recognize this situation and have provided a variety of amenities and services to enhance the customer experience.

3.6.1 Key Activities

The key activities included in the security checkpoint to gate journey segment include the following:

- Patronize food and beverage outlets, retail shops, and duty free stores
- Seek other services such as currency exchange, spa treatments, rest areas, and business centers
- Utilize premium lounges (particularly frequent fliers and business or first class passengers)
- Proceed to the departure gate

3.6.2 Customer Needs and Expectations

After passing through the security checkpoint departing passengers continue to the departure gate holdroom. The wayfinding task at this point is generally straightforward as passengers are generally looking for a gate number and the path is usually linear with few decision points.

According to the survey, less than half (40 percent) of all departing passengers said that short walking distance was important. About one in eight departing passengers (12 percent) expressed dissatisfaction regarding the long walking distance from the security checkpoint to the gate.

Passengers waiting in the departure holdroom may need to wait an hour or longer for their flight, depending on how early they arrived at the airport and potential unforeseen delays in departure. Based on the survey, 71 percent of departing passengers said that free WiFi was very important and an additional 25 percent said it was somewhat important. By way of comparison, about half as many departing passengers (37 percent) said that access to shopping and restaurants was very important.

3.6.3 Customer Service

Customer service during the security checkpoint to gate journey segment is delivered by several entities, including: airport customer service representatives, service providers (including janitorial staff), and the airlines. It is important for these stakeholders to be closely aligned in their approach

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to customer service to create a holistic environment that enhances the customer's experience. The range of amenities available is another important consideration as international departing passengers may have a substantial amount of time before their flight departs and they likely do not want to spend it sitting in the departure gate holdroom.

Basic Requirements

Airport Information Counters: It is common to provide airport information counters at key intersections in the post-security area. These locations may include:

- After the security checkpoint
- Near vertical circulation cores to automated people movers that connect to other terminals
- Within view of corridors that connect to other terminals

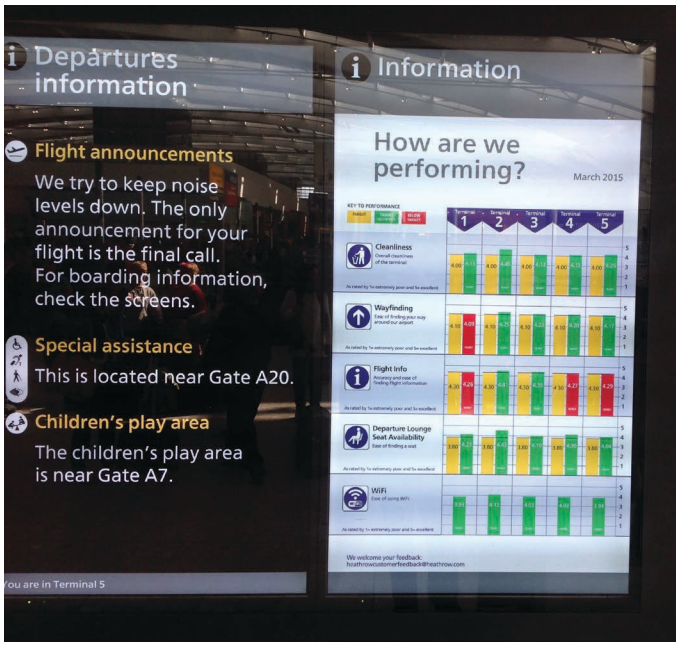
Customer Satisfaction Feedback Kiosks: Many foreign airports provide customers with the opportunity to express their satisfaction, or lack thereof, after each major process. Not only does this provide the airport stakeholders with useful information on the customer's perception, but it also gives customers the impression that the airport and other stakeholders care about their experience. While customer satisfaction kiosks, such as those shown in Figure 3-34, can be placed in a variety of locations, installing them right after the security screening process allows customers to immediately express their satisfaction with one of the most stressful processes of their airport journey. They may also be located near the entrance/exit to the restrooms as cleanliness/operability of the restrooms is another key factor in customer satisfaction. Singapore's Changi Airport is well-known for having customer feedback kiosks at almost every location within the terminal where customer satisfaction measurement is important.

Customer Service Performance Information: Customer service performance information, as shown in Figure 3-35, is also provided at many foreign airports. This information gives customers a sense of how well the airport is meeting its customer service performance objectives. The criteria shown on the displays may include the following:

- Security checkpoint wait times
- Security checkpoint customer satisfaction
- Cleanliness of the airport terminal facilities

Source: ACRP 03-35 Research Team

Figure 3-34. Customer satisfaction feedback kiosks at Munich Airport.



Source: ACRP 03-35 Research Team

Figure 3-35. Customer service performance information at Heathrow Airport.

- Ease of wayfinding
- Accuracy and availability of flight information
- Departure gate holdroom seating availability
- Ease of using the airport's WiFi

Free WiFi: As indicated in the survey, free WiFi is especially important in the post-security area, as customers may need to conduct business or contact family members before a long trip, particularly for foreign visitors who do not have international data plans. All of the airports visited for this Study provided free WiFi for at least a limited amount of time and most provided unlimited free WiFi.

Amenities/Services: Airports worldwide provide a wide variety of amenities and services for international departing passengers. The following is a list of the amenities and services that U.S. airport stakeholder should consider for international departing passengers:

- Foreign currency exchange
- Food and beverage options that reflect the local region as well as cater to the unique cultures of the regions served by the airlines
- Duty free retail shops and boutique luxury goods outlets
- Local cultural awareness and art exhibits
- Multi-religion worship facilities
- Quiet areas with comfortable seating and personal device charging stations
- Regularly scheduled live entertainment
- Nursing rooms
- Childrens' play areas
- Indoor parks
- Outdoor spaces such as observation decks
- Pay-for-use entertainment, such as movies or TV shows
- Massage and spa outlets

- Smoking areas
- Short-stay sleeping pods or private suites where customers can sleep, work or relax
- Exercise and meditation facilities
- Unique amenities such as casinos, libraries, and museums
- Pay-for-access lounges
- Small carts for carry-on baggage and purchased items

Smoking Areas: Smoking areas were provided in the secure concourse in all of the foreign airports visited for this research. While smoking indoors in the United States has been nearly eliminated in recent years, it is still common in many parts of the world. Requiring customers who smoke to leave the secure area and re-enter through the security checkpoint is an inconvenience. Airports serving regions of the world where smoking is still very much a part of the culture should consider providing indoor smoking areas as an amenity. These areas should be tastefully designed and inviting for customers.

3.6.4 Physical Environment

The physical environment of the post-security departures area should facilitate easy identification of the departure gates and the location of amenities and services. Maintaining reasonable walk distances is important although customers have many options to distract them as they proceed from the security checkpoint to the departure gate holdrooms. The departure gate holdrooms themselves are also an important part of the customer experience.

Basic Requirements

Clear Line of Sight: International departing passengers are provided with a variety of shopping, dining, and other amenities between the security checkpoint and their departure gate. The architecture and interior design should provide for clear lines of sight to promote natural wayfinding and present the different choices in a visually organized manner that allows customers to easily navigate through the departures concourse. Airport terminals with amenities such as premium lounges, food and beverage outlets, or other services on a level above the departures concourse should be designed in such a way that a clear visual link can be established between one level to the next, as shown in Figure 3-36.

Walking Distances: Walking distances are often a key consideration in the design of international terminals as they can be quite large due to the size of aircraft commonly used for long-haul flights. While the site for the new facility will significantly influence the walking distances, the design should seek to minimize them as much as possible. Where walking distances longer than 1,000 feet are required, mechanical assistance, such as moving walkways and motorized carts,

Source: ACRP 03-35 Research Team

Figure 3-36. Example of a clear visual link between one level to the next at Changi Airport Terminal 3.

should be provided. The moving walkways should be located as close to the key intersection, such as a security checkpoint, as possible to benefit the greatest number of customers, including those whose gate is less than 1,000 feet from the intersection. According to *ACRP Report 37*, for distances between the security checkpoint and the furthest gate of over 2,000 feet, automated people mover systems should be strongly considered, specifically if the furthest gates are in a remote concourse.

Restrooms: International departing passengers preparing for long trips on airplanes with cramped lavatories may desire a place to refresh themselves or change clothes so they are more comfortable on their trip. Restrooms in the post-security departures area should provide spa-like environments—size, interior design, sound, smell, and function—to help reduce the stress of intercontinental air travel. Customers should be able to enter and exit the restrooms without waiting for someone to pass and should be able to move around freely inside the restrooms even during busy periods. The interior design should evoke a calming environment but should also be functional and easy to maintain. *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design*, provides detailed guidance on this topic

Restrooms should be located adjacent to every other gate (counting only one side of a double-loaded concourse) so that customers have to walk past no more than one gate beyond the gate they are departing from. Based on a range of the wingspan of long-haul wide-body aircraft (212 feet, 5 inches for an A350-800 to 261 feet, 10 inches for an A380-800) plus the typical wingtip separation of 25 feet this would place the restrooms about 250 to 300 feet apart. The restrooms should be sized according to the number and capacity of the aircraft served by the restroom.

Departure Gate Holdrooms: Departure gate holdrooms have become much more than seating areas where customers wait for their flight to start boarding. At a minimum, holdrooms should provide a variety of seating types (including accessible seating), personal electronic device charging outlets, and some form of entertainment such as monitors with news broadcasts. As shown in Figure 3-37, several airports have blended the holdrooms with food and beverage outlets to create a more integrated environment where customers can order food while they wait at the gate. This approach also addresses the "gate glue" tendency of customers to seek out their departure gate before visiting the concession outlets only to remain in the holdroom because the concessions are not within close proximity.

International flights on wide-body aircraft can have large numbers of customers in wheelchairs: over 40 for some of the largest aircraft such as an Airbus A380 which seats over 500 passengers. These customers are usually brought to the holdroom by the wheelchair providers far in advance of the flight departure time and are left there until boarding begins. A variety of accessible seating options should be provided and designated using the internationally recognized wheelchair symbol. Holdrooms with food ordering services integrated with the seating area also should include accessible seating for passengers in wheelchairs or elderly passengers.

Airport terminal designers and customer service staff should consider how to best integrate seating for these customers into the holdroom layout as well as provide equal level of amenities (i.e., access to charging outlets or food and beverage ordering devices). It is recommended practice to locate holdrooms in pairs or groups of four to increase the viability of concessions. The designated location for the customers in wheelchairs should also take into consideration the boarding process so that seating for these customers is within close proximity to the gate podium but out of the way of where other passengers will be queuing. Figure 3-38 provides an example of designated accessible seating located in close proximity to the boarding door.

The sizing for gate holdrooms has traditionally been based on applying splits for seated and standing passengers to the projected passengers (load factor times aircraft seating capacity) for the largest aircraft that can be parked at the gate. Additional space is provided for the gate counter and boarding queue area. It is generally recommended that holdrooms be configured in pairs

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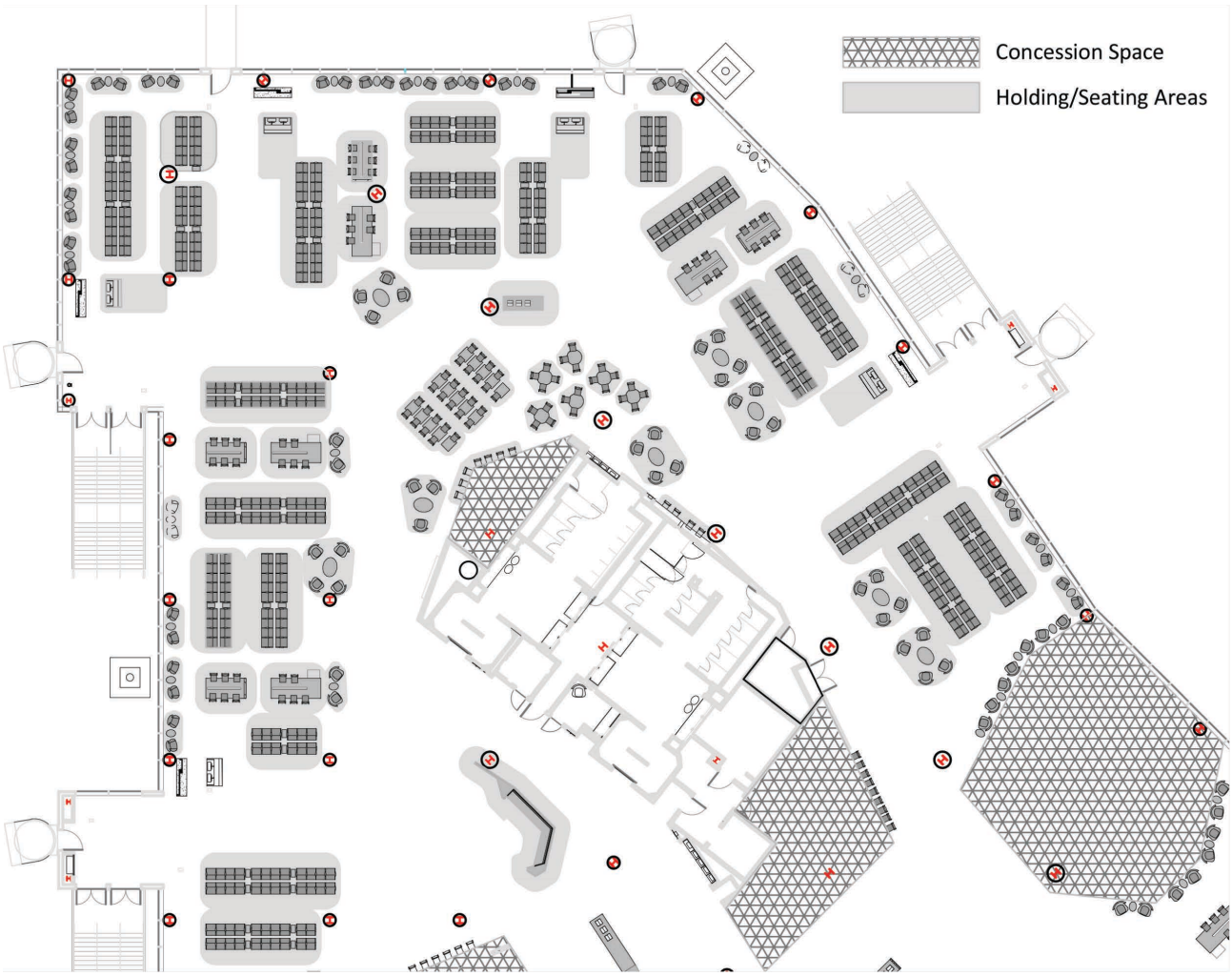
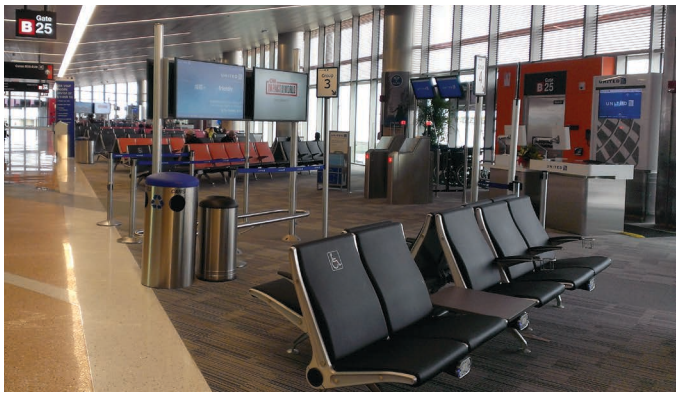


Source: ACRP Report 109

Figure 3-37. Departure holdrooms with integrated concessions at San Francisco International Airport Terminal 2.



Source: ACRP 03-35 Research Team

Figure 3-38. Departure holdrooms with designated accessible seating at Boston Logan International Airport.

so that there is overflow space when one gate is in the boarding process and the holdroom is at maximum occupancy. The amount of seating area also may be adjusted based on the concession seating provided adjacent to the holdrooms. IATA provides a globally recognized method for determining the size of departure gate holdrooms. However, airport terminal planners and designers should understand the local conditions and work with airport stakeholders to determine the best approach for sizing holdrooms based on the operational objectives at that specific airport. Some of the most important factors to consider include the following:

- Boarding process: typically unique to each airline; may involve boarding more than one cabin at the same time via two or three passenger loading bridges.
- Peak load factors: historically, average load factors have been used in the holdroom calculation but international departing flights regularly have very high load factors (90 percent or higher) that would exceed the capacity of the holdroom.
- Proximity of concession seating: concession seating adjacent to or integrated with the holdroom will affect the timing when passengers show up at the gate and therefore impacts the holdroom size.

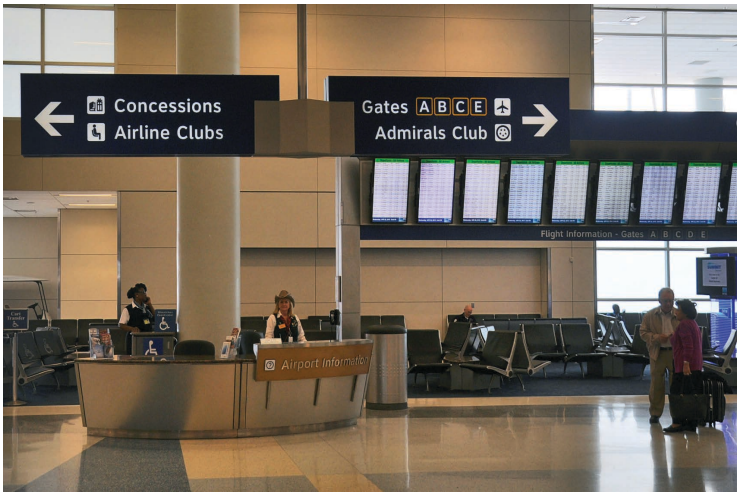
3.6.5 Information Dissemination

The step following the security checkpoint is an important touch point in this journey segment; as passengers get re-organized and proceed to their departure gate, information should be provided in multiple forms:

- Visually through clear directional signage to the gates
- Verbally at information counters
- Virtually through FIDS and dynamic directories

Basic Requirements

Clear Line of Sight: Customers should have a direct line of sight to the signage, information counter, and FIDS or directories. As shown in Figure 3-39, the signage, information counter, and directory placement is ideal: all are within the field of view as passengers exit the security checkpoint. Some customers only need to know which way is their gate (i.e., directional signage). Others will want to check their flight status (i.e., FIDS) or determine where to find a service or concession (i.e., directory). Then others may have questions and need a live person to talk with (i.e., information



Source: ACRP 03-35 Research Team

Figure 3-39. Information placement (post-security checkpoint) at Dallas/Fort Worth International Airport.

counters). The ability to co-locate each of these forms of communication in relevant proximity to each other and in direct line of sight helps ensure all passengers' needs are met.

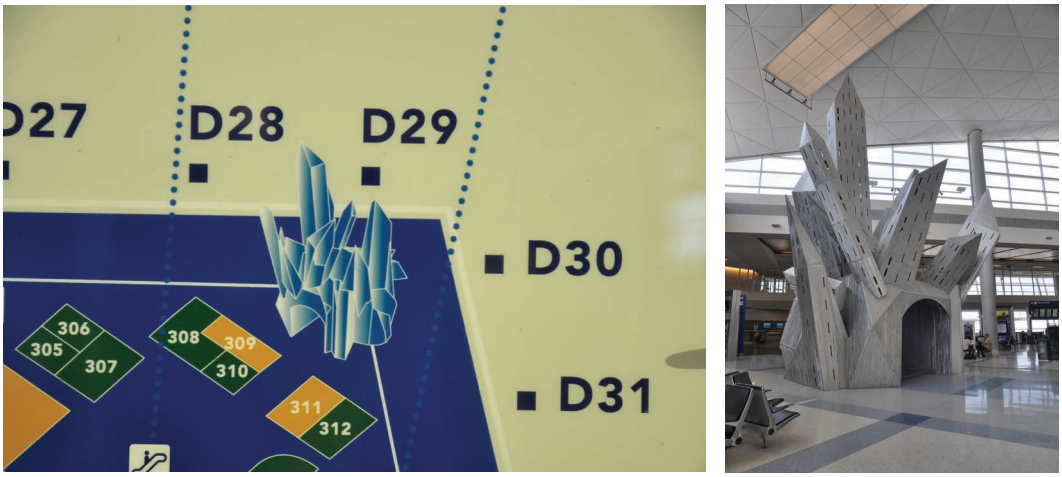
Specific consideration regarding the multilingual needs of international passengers should also be considered. All of the airports surveyed have information staff with multilingual capability.

Directories: Directory maps are useful tools for unfamiliar travelers. Static directories have long been the industry norm, but digital directories offer even more features and benefits. The most important benefit is accuracy. Large airports can have hundreds of static directories that may take weeks to update every time something changes. Digital directories can be controlled and managed from a centralized location that allows instant updates saving time, money, and resources. Digital directories with interactive capability offer a personalized experience and are an excellent means of bridging the language barrier associated with international travelers by offering multilingual features. Other considerations can include information like artwork that serves as a natural landmark wayfinding tool, as shown in Figure 3-40.

Directory Map Scale: Another key element essential to good directory map design is scale. Unfortunately, airport directory maps do not always convey a sense of scale. An important feature of directory maps is the ability to provide walk time or distance information. While none of the directories at U.S. airports surveyed display walk time or distance information, most foreign airports do. Including this type of information can help manage passenger expectations, especially at large airports and/or airports with multiple terminals. Figure 3-41 provides an example of how the universal measure of time is used to communicate scale on both directories as well as FIDS. Time is a universal measure and directories should avoid using feet or meters to convey distance as passengers typically are not able to relate to distance as well as they can to time.

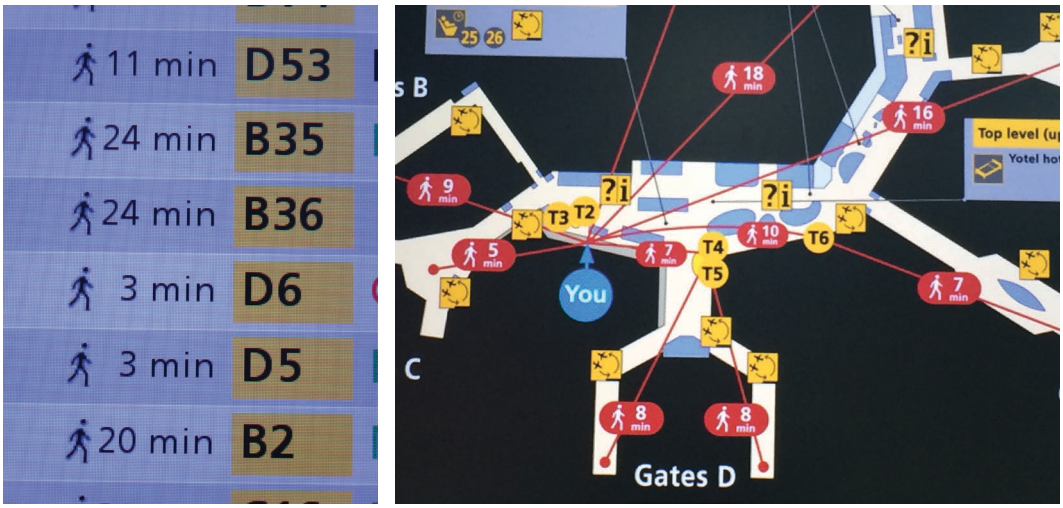
Wayfinding Apps: As discussed previously, personal mobile devices have become a tangible means of communicating with the customer. In the gate area airport apps, like the one for Dallas/Fort Worth International Airport shown in Figure 3-42, help passengers search and find amenities, shops, and food within close walking distance of their location. Key elements of wayfinding apps include the following:

- The maps on the app are visually consistent with airport directory maps.
- The content in the gate area is based on the universal scale of time.
- The functionality is tailored to meet the needs at a specific airport versus a one-size-fits-all approach.



Source: ACRP 03-35 Research Team

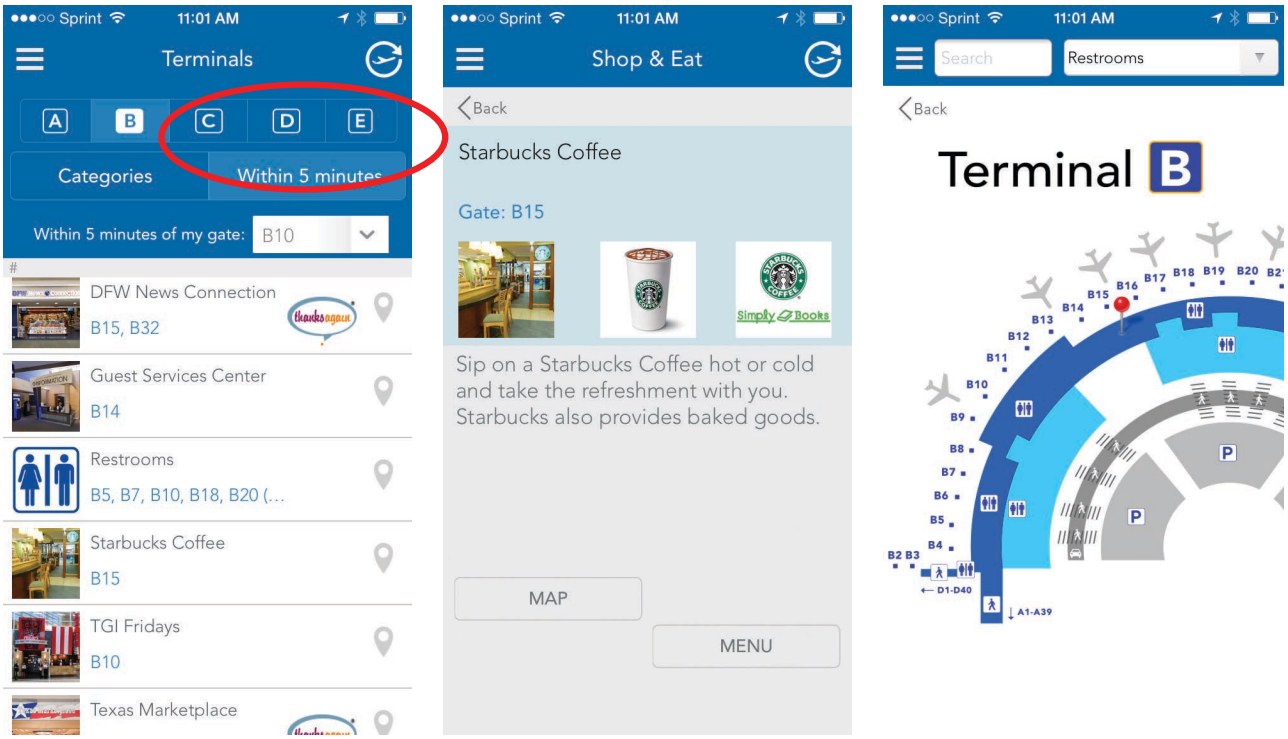
Figure 3-40. Digital directory at Dallas/Fort Worth International Airport that highlights artwork to serve as a wayfinding landmark.



Source: ACRP 03-35 Research Team

Figure 3-41. FIDS and maps at Amsterdam Airport Schiphol that highlight walk times to a specific gate and gate areas.

Mobile App with Speech Translator: A notable innovation associated with mobile apps is how Tokyo Narita Airport provides passengers with a speech translator app that can translate 10 different languages, as shown in Figure 3-43. For international passengers with LEP, virtual communication tools like the Narita Airport app help bridge the communication gap. Translations can be provided via speech as if talking on the phone, by using the smart phone's mic or by inputting text manually.



Source: Dallas/Fort Worth International Airport website – www.dfwairport.com

Figure 3-42. Dallas/Fort Worth International Airport's wayfinding app provides information based on the customer's needs.

Source: Narita Airport mobile app

Figure 3-43. Narita Airport app with speech translation capabilities.

Interactive Digital Wayfinding Signage: Digital wayfinding signage may be used during many segments of the airport journey; attention should be paid to the content to ensure it is appropriate to the location. As mentioned earlier on the terminal roadway to check-in journey segment, customers need to be able to determine the location of amenities and services and the options available to them. Traditionally displayed as a static map, interactive digital airport wayfinding, as shown in Figure 3-44, has become the new standard for world-class airport customer service. Wayfinding is in a unique category of digital signage because it can be displayed and used in all the digital formats as explained in Chapter 2.

Source: Photograph by Rixon Photography, courtesy of Gresham, Smith and Partners

Figure 3-44. Example of digital wayfinding signage at Tampa International Airport.

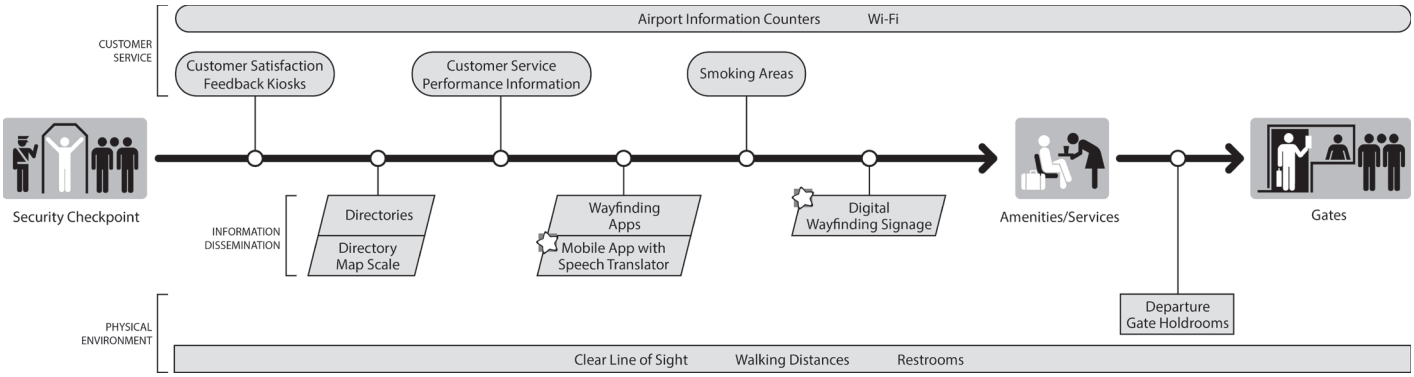
Implementation Considerations

Digital Wayfinding Signage: Many implementation considerations depend on the existing level of digital signage at the airport and the type of signage being considered. A facility that only uses digital signage for typical information display systems (e.g., flight gate, baggage counter, and ramp) will most likely require a program overhaul to incorporate advanced wayfinding functions. The platforms that were used to display information digitally in the early 2000s most likely will not support all the functionality a full-scale digital wayfinding deployment requires. To introduce an advanced CMS into a live environment, an airport has to consider network infrastructure implications, including physical, logistical, and other engineering practices that may be affected. Choosing hardware and software platforms and developing a content strategy are also major components.

Finally, developing a digital signage program takes time and careful planning. Aspects that go beyond the initial installation include a responsibility hierarchy, hardware and software maintenance plan and constant development updates and programming. Appendix B provides additional details about how to implement a full-scale digital signage program. Table 3-9 provides a summary of the implementation considerations for digital wayfinding signage.

Table 3-9. Implementation considerations for digital wayfinding signage.

Digital Wayfinding Signage in the Terminal	
Applicability: Locations within the terminal where customers have many choices of amenities and services	**Capital Cost Considerations:** • Program definition • Content development and programming • Hardware and software • Engineering services • Installation costs
Implementation Complexity: Defining a digital signage program requires careful planning and input from many stakeholders.	**Operating Cost Considerations:** • Hardware and software maintenance • Content and programming updates
Customer Benefits: • Provides up-to-date, relevant information about the amenities and services that are available and where they are located. • Information can be organized in a variety of ways to make searching easier.	
Stakeholder Benefits: • Reduces capital and operating costs associated with changing directories to reflect current conditions • Increases concession revenue potential by providing easy-to-access information about services and amenities	
Entities Involved: • Airport Customer Service • Concessions • Marketing • Development and Engineering • Information Technology	**Beneficiaries:** All passengers that required guidance or directions in the terminal
Brand Relevance: • High-tech airport • Customer-friendly airport	**Representative Airport(s):** • Boston Logan International • Detroit Metropolitan Wayne County Airport • San Francisco International



Source: ACRP 03-35 Research Team

Figure 3-45. Security checkpoint to gate journey segment evaluation tool.

3.6.6 Security Checkpoint to Gate Journey Segment Evaluation Tool

Figure 3-45 provides a summary of the basic requirements and notable innovations described earlier for the security checkpoint to gate journey segment for international departing passengers. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

CHAPTER 4

International Arriving Passengers

Improving the passenger experience for international arriving passengers has become a major focus of many U.S. airports. U.S. airports compete with foreign airports to create a world-class customer experience, and with other U.S. airports for connecting passenger traffic, as the gateway to metropolitan areas, regions, or leisure destinations.

The purpose of this chapter is to provide airport stakeholders with a set of tools to evaluate their international arrivals experience and identify innovative approaches to enhance that experience for passengers. Each section identifies the passenger needs and expectations and a description of the basic requirements, notable innovations, performance requirements (where applicable), and implementation considerations for each step of the international arrivals journey. A journey segment evaluation tool is provided at the end of each section, highlighting the basic requirements and notable innovations. This evaluation tool is intended to facilitate discussion among airport stakeholders about their current operation and identify opportunities to improve the customer experience.

4.1 Overview of International Arriving Passenger Journey Segment

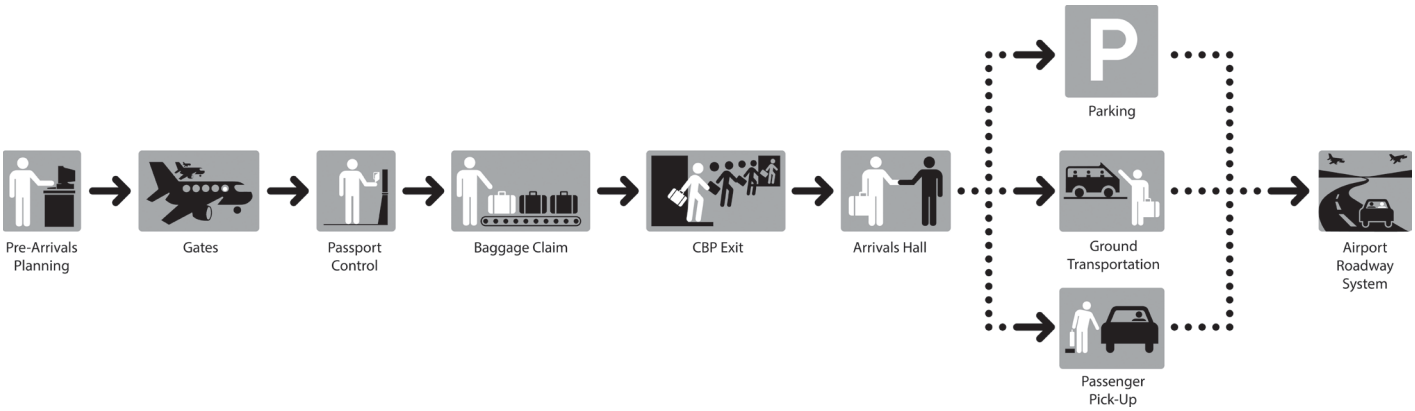
Figure 4-1 illustrates the journey of an international arriving passenger. It begins with pre-trip planning and includes the U.S. CBP processes. This chapter covers the international arriving passenger whose final destination is the community served by the airport at which they arrive in the United States. Arriving passengers continuing on to their final destination via a connecting flight are covered in Chapter 6.

As described in Chapter 2, the journey of an international arriving passenger includes the following steps:

- Pre-arrival planning
- Arrival gate to CBP passport control
- Baggage claim to CBP exit control
- Arrivals hall
- Terminal arrivals roadway/ground transportation
- Airport egress roadway

4.1.1 Customer Needs and Expectations

As described in Chapter 2, challenges experienced by international arriving passengers may include general travel anxiety, jet lag, travel fatigue, culture shock, and language barrier. Regarding anxiety among passengers arriving on an international flight, research suggests this is most likely to occur at border protection and at baggage claim.



Source: ACRP 03-35 Research Team

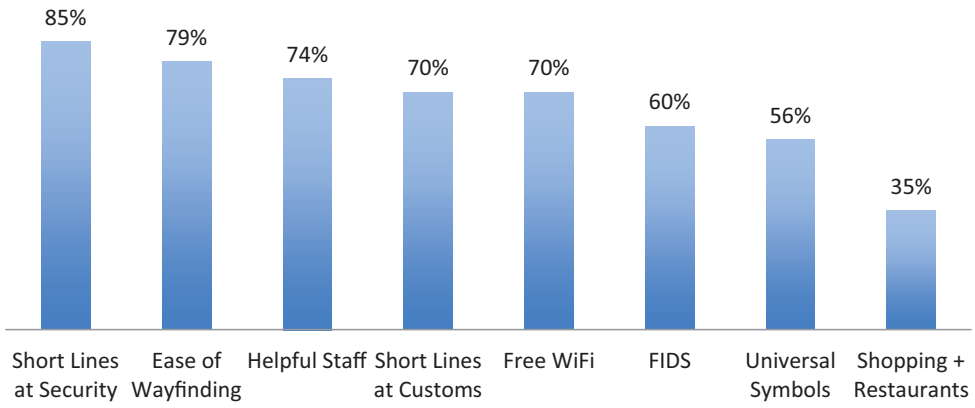
Figure 4-1. International arriving passenger journey segment.

In the survey, arriving passengers were asked to rate the relative importance of 15 airport features. As illustrated in Figure 4-2, the most important airport features identified were short lines at security (85 percent), ease of wayfinding (79 percent), helpful staff (74 percent), short lines at customs (70 percent), and free WiFi (70 percent). The least important features to arriving passengers were shopping and restaurants (35 percent), universal symbols on signs (56 percent), and flight information screens (60 percent).

In the survey, arriving passengers were much more likely to rate short walking distance as being very important (62 percent) as compared to departing or connecting passengers (39 percent to 43 percent). This is likely due to the effects of jet lag and travel fatigue, especially by those arriving on an overseas flight.

On the path from the gate to border protection, international travelers require information about the necessary documents and procedures for processing. In addition, arriving passengers need to be guided to the appropriate queue for processing. There are many different traveler categories and it can be overwhelming if all options are presented at the same time. As described in Section 2.2, people can easily be overwhelmed when faced with more than two choices at a time.

In the survey, arriving passengers were asked to rate their satisfaction with walking distance, wait times, and ease of wayfinding. Nearly one in five passengers said that the walking distance from the arrival gate to customs was fair or poor (18 percent) and that the wait time at customs was fair or



Source: ACRP 03-35 Research Team

Figure 4-2. International arriving passengers: most important airport features.

poor (19 percent). By comparison, 7 percent said that the ease of finding their way from the plane to the arrivals hall was fair or poor. For the most part, the airports where surveys were carried out did not provide information to passengers about walking distances or real-time estimates of wait times.

Although a great deal of research has been carried out on wait times at U.S. ports of entry (e.g., Roberts et al. 2014; Ryan et al. 2007) and on ways of measuring wait times at U.S. ports of entry (e.g., Sabean and Jones 2008), little has been done to evaluate the satisfaction of those seeking entry into the United States. Research in emergency departments at hospitals have found that satisfaction levels were higher when patients were given an expected wait time to see a physician (Mowen et al. 1993), but other research has demonstrated that perceived wait time has a greater influence on passenger satisfaction than actual wait time (Thompson et al. 1996). Providing information, projecting quality, and managing wait time perceptions and expectations may be more effective than reducing actual wait time.

Along the route from passport control to baggage claim, passengers require information to identify the baggage claim carousel associated with their flight and then find their way to the correct carousel. It may be challenging for passengers to locate the correct baggage claim carousel at larger airports with many baggage carousels in a wide space with views obstructed by structural columns.

4.2 Pre-Trip Planning

International travelers not familiar with their arrival airport may choose to gather information about their arrival in advance of their trip to reduce the anxiety of being in an unfamiliar place. This may include gathering information about services available at the airport, the border protection process, and ground transportation options.

4.2.1 Key Activities

Pre-arrivals planning primarily involves the use of one or more websites or mobile apps to collect the information that customers need to plan their airport journey. These websites could include the following:

- Arrival airport website or mobile app
- Airline website or mobile app
- U.S. CBP website

4.2.2 Customer Service

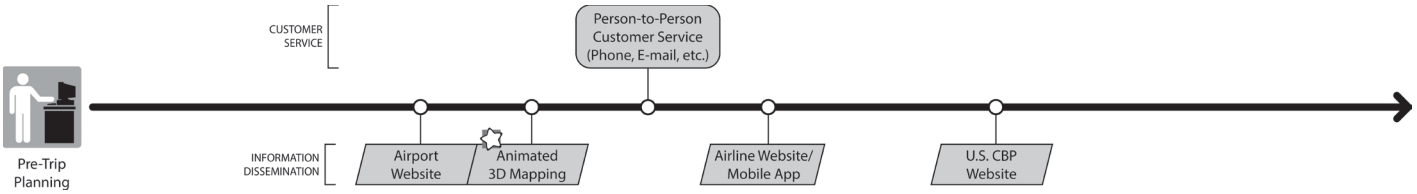
Person-to-person customer service during the pre-arrivals planning journey segment is very limited. Customers may choose to contact the airport or airline directly to receive additional information about their airport journey. They may also contact the appropriate U.S. or foreign government agencies to confirm that they have they appropriate travel documentation.

4.2.3 Physical Environment

The pre-arrivals planning does not occur at the arrival airport and therefore there are no physical environment considerations.

4.2.4 Information Dissemination

As highlighted in Chapter 3, airports are using their website to prepare customers for their upcoming journey with newer, advanced tools available in web design with a further focus on mobile device integration. As the travel date nears for an upcoming voyage and the anxiety that



Source: ACRP 03-35 Research Team

Figure 4-3. Pre-trip planning journey segment evaluation tool.

may come with it emerges, the customer (more now than ever) is accustomed to turn to their computer for the information needed to set them at ease, especially when arriving at an unfamiliar airport. Customers can use the website tools to determine the location of a connecting gate and the best way to connect, especially in a larger airport that may require changing terminals. Using the airport website in advance of their journey can provide a traveler with the location of baggage claim or ground transportation in an unfamiliar airport. This is another way for a customer to prepare for a smooth exit.

4.2.5 Pre-Trip Planning Journey Segment Evaluation Tool

Figure 4-3 provides a summary of the basic requirements and notable innovations described earlier for the pre-trip planning journey segment. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

4.3 Arrival Gate to Passport Control

The arrival gate to passport control journey begins when passengers deplane at the arrival gate and ends when they reach the passport control hall.

4.3.1 Key Activities

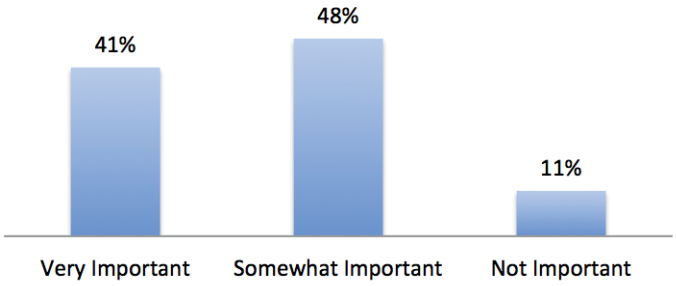
The arrival gate to passport control includes the following activities:

- Deplane aircraft
- Receive wheelchair assistance (if necessary)
- Receive connecting flight information and quick connect identification (if applicable)
- Enter the arrivals corridor
- Travel to the passport control hall
- Queuing and passport control

4.3.2 Customer Needs and Expectations

Walking Distances: Short walking distances are very important to international arriving passengers as this group is likely to experience jet lag and travel fatigue, in particular passengers on long-haul flights who may have spent up to 16 hours on a flight spanning multiple time zones. Travel fatigue causes passengers to feel disoriented and decreases their ability to carry out the physical and mental tasks essential to navigate from the gate to passport control.

In the survey, all passengers were asked to rate how important short walking distances were at any airport using a three-point scale (very important, somewhat important, or not important). Overall, 41 percent of passengers said that short walking distances were very important, 48 percent said that short walking distances were somewhat important, and 11 percent said short walking distances were not important (see Figure 4-4). However, as shown in Figure 4-5, arriving



Source: ACRP 03-35 Research Team

Figure 4-4. Overall passenger ratings for importance of short walking distances.

passengers were much more likely to say that short walking distances were very important (62 percent) as compared to departing passengers (39 percent) or connecting passengers (39 percent to 43 percent).

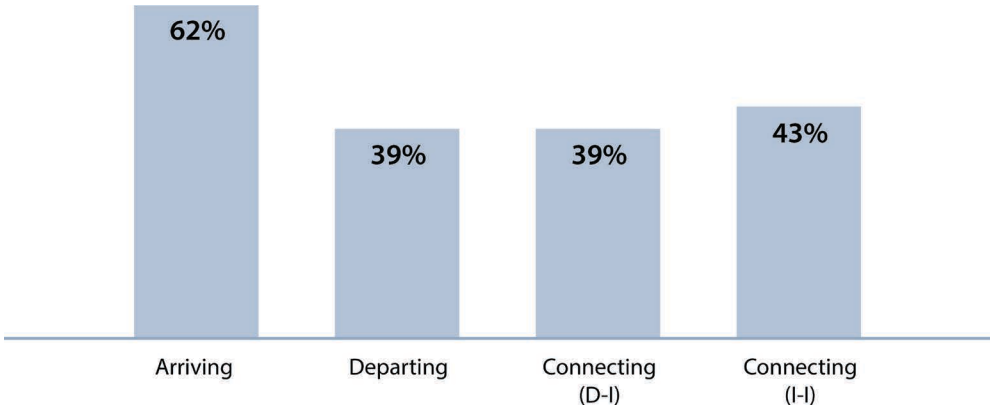
Wait times: When arriving at passport control passengers can expect they will have to wait in line, but long lines can lead to feelings of frustrating and dissatisfaction. *ACRP Report 55* conducted research on passenger level of service and found a strong correlation between time in queue and passenger perception ratings.

In the survey, all passengers were asked to rate how important short lines at border control were at any airport using a three-point scale (very important, somewhat important, or not important). Overall, 72 percent of passengers said that short lines at border control were very important, 26 percent said short lines were somewhat important, and two percent said short lines were not important.

There was little difference between the perceptions of arriving passengers as compared to departing and connecting passengers with respect to the importance of short lines at border control (range between 67 percent to 74 percent).

4.3.3 Customer Service

Person-to-person customer service during the arrivals gate to passport control journey segment consists of receiving information from the airline about connecting flight status, interacting with



Source: ACRP 03-35 Research Team

Figure 4-5. Passenger ratings for importance of short walking distances, by journey segment.

wheelchair service providers, and receiving directional information at key points along the way and interaction with CBP officers during primary inspection.

Customer services also are provided in the form of passport control processing options, including trusted traveler programs and fast connect lanes.

Basic Requirements

Greeting Customers: The initial person-to-person interaction should occur as customers exit the passenger loading bridge and enter the terminal facility. Customers who have short connection times due to flight delays or other flight schedule issues should be given proper identification to allow for expedited processing at passport control. They should also receive information about the time and departure gate location of the connecting flight so that they have a better understanding of how to reach their departure gate.

Wheelchair Services: Wheelchair service providers should be positioned just outside the passenger loading bridge or immediately inside the terminal to provide customer assistance at the earliest point possible. Because customers requiring wheelchair assistance may be elderly or have very little English language capabilities, the wheelchair service providers should utilize print or digital signs with the customer name in English and their native language.

Free WiFi: The availability of free WiFi is important to many customers, especially foreign visitors who do not have U.S.-based mobile phones, to let family and friends know that they have arrived safely.

Customer Service Staff: Additional customer service may be necessary along the arrivals corridor, particularly if there are numerous building level changes or intersections where passengers have to make a decision about which way to go. While providing customer service staff for this purpose is often referred to as herding sheep, practical experience indicates that large groups of passengers, such as those deplaning from a large aircraft, tend to follow those in front of them and ignore informational signage.

Customer service staff is also required in the passport control hall to guide passengers to the appropriate queue. The recent introduction of APC kiosks, MPC, and the evolving eligibility for these services drives the need for customer service staff to be available to guide customers to the appropriate queue and to help first-time customers understand how to use the kiosks. Frequent traveler services, such as Global Entry, require minimal customer service staff support because those customers travel regularly and are familiar with the process. The customer service staff assigned to the passport control hall should have a wide variety of foreign language capabilities to answer questions about the entry documentation, baggage retrieval, ground transportation, or connecting flights.

A notable customer service innovation at Boston Logan International Airport identified through the research was the delivery of water and snacks to customers who had to wait in long queues at passport control. While queue times at passport control have been reduced greatly with the deployment of APC kiosks, the variable nature of international flights may create large surges of passengers that overload the capacity of the passport control processor, resulting in wait times that could easily exceed one hour. Providing customers with some form of amenity could substantially improve their experience.

At JFK International Airport, the Port Authority of New York and New Jersey (PANYNJ) provides a language hotline for customers whose native language is not spoken by the customer service agents in the terminal.

Two of the U.S. airports that were visited, Los Angeles International (Tom Bradley International Terminal) and Miami International (South Terminal), provide information counters at the entrance to the passport control hall. These booths are staffed by customer service agents and are primarily intended to provide customers with information to complete their entry documents, such as the address for their final destination and language assistance. At Los Angeles International, the information counter is staffed by airport customer service staff, while the information counter at Miami International is staffed by representatives of the airlines for the arriving international flights.

Expedited Processing Lanes: Another facet of customer service in the passport control hall is expedited processing lanes. Most U.S. airports visited provided special lanes for passengers with short connection times. The CBP port director typically established the rules for using these lanes. However, unlike at the security checkpoints, CBP does not allow for passenger segmentation based on frequent flier status or class of service. Frequent travelers are encouraged to apply for one of the trusted traveler programs, such as Global Entry, which in effect is an expedited processing program. Designated queues and head-of-line privileges for passengers in wheelchairs should be considered because flights utilizing large aircraft can easily have 30 or more customers in wheelchairs.

Another customer service notable innovation is to provide dedicated one-stop processing areas for customers who do not have checked baggage to claim. This concept has been implemented at Dallas/Fort Worth International (Figure 4-6), Houston's George Bush Intercontinental, and Chicago O'Hare International (Figure 4-7) airports. These processing lanes also can be used for crewmembers who typically do not have checked baggage.

Wait Times at Passport Control: One of the key measures of customer service in the arrival gate to passport control journey segment is wait times at passport controls. IATA recommends standards for wait time and the waiting space (IATA 2014). The IATA standards for wait time are less than 10 minutes for Over Design, 10 minutes for Optimum, and greater than 10 minutes for Suboptimum. The IATA standards for waiting space are greater than 13 square feet for Over Design, 10.8 to 13 square feet for Optimum, and less than 10.8 square feet for Suboptimum. According to information collected during the airport site visits, the target immigration wait

Source: ACRP 03-35 Research Team

Figure 4-6. CBP one-stop processing (Carry E-Z) at Dallas/Fort Worth International Airport.

Source: ACRP 03-35 Research Team

Figure 4-7. CBP one-stop processing (1 Stop) at Chicago O'Hare International Airport.

time at Seoul Incheon International Airport, widely recognized as one of the world's best airports, is 40 minutes for 95 percent of arriving passengers. The average immigration wait time at Seoul Incheon is 11 minutes.

With the widespread rollout of APC, MPC, and trusted traveler programs and increasing eligibility to use those services, U.S. airports should strive to achieve an average passport control wait time that is less than 20 minutes during the peak periods with a maximum wait time of 40 minutes.

While CBP does not publish total processing time standards, U.S. airport operators and airline stakeholders should work collaboratively with local and national CBP representatives to establish airport-specific international arriving passenger processing metrics that would inform staffing levels and operational protocols aimed at minimizing the maximum wait times.

The immigration queuing area at Heathrow Airport's Terminal 2 included a seating area for elderly customers and families adjacent to the main queue. This amenity allows one person to remain in the queue while the others wait in the seating area. While this type of amenity was not observed at any of the U.S. airports that were visited, it is worthy of discussion with the CBP port director to determine if it would be an appropriate customer service enhancement.

Passport Control: Another factor that influences the customer experience is the staffing of the passport control booth, or lack thereof. The appearance of a large number of unstaffed booths during busy periods when the queues are large and the wait times are long creates an impression that no-one cares about the customer experience. While the number of passport control booths that must be provided is established by CBP's Airport Technical Design Standard (ATDS) and is based on projected peak hour passenger volumes, close coordination with the CBP port director should be undertaken to identify the number of booths that will be required. At some airports, such as Dallas/Fort Worth International, surplus booths were removed and APC kiosks installed in their place. In new terminal planning and design efforts, an incremental approach to inspection booth installation should be utilized to better coordinate with realistic officer staffing levels.

Customer interaction with CBP officers during primary inspection is a key point of customer service. In some countries, uniformed and armed law enforcement officers may ask one or more questions during the immigration and customs inspection processes; customers may be

intimidated by the very appearance of the CBP officers or by the fact that they are being questioned about their travel.

The attitude of CBP officers during the primary inspection has a significant influence on the customer experience. Officers are trained to be professional and courteous while determining a passenger's admissibility into the United States. Customer feedback about the passport control process should be reviewed frequently and possible improvements should be discussed with the CBP port director and other key stakeholders.

Implementation Considerations

Basic amenities at passport control: Providing basic amenities requires very little pre-planning and can be delivered using existing customer service staff. All customers waiting in the queue will benefit and the initiative is relevant for all international terminals because long queues can develop at any time regardless of the size of the terminal. Airport customer service would likely be responsible but the airlines serving the terminal may also be involved to authorize the expenditure or to deliver the amenities. Table 4-1 summarizes the implementation considerations of providing water and snacks or other basic amenities for customers waiting in long queues at passport control.

Language Hotline: The primary component of the language hotline is the staff who operate the hotline. While the staff may be dedicated to the hotline, it is also possible to utilize an operator who can put customers in touch with someone within the airport environment who has the necessary language skills. The operator would just need a database of airport, airline, or other entity staff who speak foreign languages. Table 4-2 provides a summary of the implementation considerations for providing a language hotline.

Table 4-1. Implementation considerations for providing basic amenities at passport control.

Basic Amenities for Customers Waiting in Long Queues at Passport Control	
Applicability: All terminals with international arrivals	**Capital Cost Considerations:** N/A
Implementation Complexity: Requires pre-purchase of amenities to distribute to customers	**Operating Cost Considerations:** Purchase of amenities
Customer Benefits: • Customers perceive that airport staff are aware of the long queues and appreciate the small gesture of hospitality while they wait • Customers are more likely to utilize airports and airlines where they felt like their needs were being addressed and undesirable conditions were mitigated to the best of everyone's ability	
Stakeholder Benefits: • Customer service agents and CBP officers can spend more time processing passengers versus dealing with complaints	
Entities Involved: • Terminal Owner/Operator Customer Service Staff	**Beneficiaries:** All international arriving passengers waiting in long queues
Brand Relevance: • Customer-centric airport	**Representative Airport(s):** • Boston Logan International Airport

Table 4-2. Implementation considerations for a language hotline.

Language Hotline	
Applicability: Airports with large numbers of passengers with limited English capabilities	**Capital Cost Considerations:** N/A
Implementation Complexity: Utilizes existing telephone or mobile communication infrastructure	**Operating Cost Considerations:** • Utilizes existing staff or dedicated hotline staff • Service could be outsourced to a vendor
Customer Benefits: • Customers can obtain information in their native language during any part of their journey	
Stakeholder Benefits: • Hotline operators or staff can convey customer questions or needs to the customer service agents • Airport operators can provide a wider range of language capabilities at any location as compared to only the languages spoken by staff assigned to a particular location • All airport stakeholders can utilize the language hotline, providing language assistance for customers at any stage of their airport journey • Reduces operational costs associated with providing and maintaining staff with sufficient language capabilities to address customers' needs	
Entities Involved: • Terminal Owner/Operator Customer Service and Operations • Airlines • Government agencies • Service providers	**Beneficiaries:** • International arriving passengers with very little or no English capabilities
Brand Relevance: • Foreign passenger friendly airport • World-class customer experience	**Representative Airport(s):** • Port Authority of New York and New Jersey

Information Counter in the Passport Control Hall: The information counter consists of the customer service staff, the counter itself, and the information technology components necessary to provide the desired information, such as a computer with Internet connection. It may require additional customer service staff but should otherwise be relatively easy to implement. It would be beneficial to have such a service in any international arrivals terminal because there are always customers who need additional information for their entry documents or have questions about the arrivals process. The information counter gives these customers a designated location to go to for this assistance. Table 4-3 provides a summary of the implementation considerations for providing an information counter in the passport control hall.

CBP One-Stop Processing: One-stop CBP processing requires changes to existing processes and facility modifications that will increase the implementation cost and timeframe. Several airport departments, the CBP port director, and likely the primary air carriers will be involved in determining if one-stop CBP processing would provide a benefit worth the cost of implementation. Beyond the cost of the facility modifications and new information technology infrastructure, one-stop CBP processing may require the re-assignment of CBP officers from the passport control area. This could have a detrimental effect on passenger wait times. Assuming that a significant daily volume of passengers eligible for one-stop CBP processing would be required to justify the service, this innovation is primarily applicable to large international terminals with

Table 4-3. Implementation considerations for an information counter in the passport control hall.

Information Counter in the Passport Control Hall	
Applicability: All international arrivals terminals	**Capital Cost Considerations:** • Millwork for the information counter • Computers and monitors • IT connections
Implementation Complexity: Requires planning and design of information counter, IT infrastructure connections, and staff	**Operating Cost Considerations:** • Customer service staff for the information counter or could be staffed by the airlines
Customer Benefits: • Customers can obtain information necessary to complete their entry documents • Customers can obtain information about the arrivals process in their native language	
Stakeholder Benefits: • CBP officers can focus on inspection rather than answering questions or rejecting passengers with incomplete forms	
Entities Involved: • Terminal Owner/Operator Customer Service • Airlines	**Beneficiaries:** • Any international arriving passenger that needs assistance
Brand Relevance: • Customer service focused airport	**Representative Airport(s):** • Los Angeles International Airport • Miami International Airport

multiple carriers or hub carrier terminals. Table 4-4 provides a summary of the implementation considerations for providing one-stop CBP processing.

4.3.4 Physical Environment

The journey from the arrival gate to the passport control hall is a key opportunity to make a great first impression on the customer. The physical environment plays a major role in creating the customer experience. Along this journey segment, the physical environment considerations consist of the architecture and interior design, restrooms, moving walkways or automated people movers, and building level changes.

Basic Requirements

Architecture and Interior Design: The architecture and interior design of the international arrivals corridor is an important element of creating the first impression of the airport. The arrivals corridor should allow for natural light and provide views of the exterior (airfield or surrounding area) or the interior of the terminal. If natural light or interior views are not possible within the international arrivals corridor due to its location inside the terminal or underground, artwork should be used to provide a visual distraction to customers as they travel through the corridor. Figures 4-8 and 4-9 provide examples of artwork utilized in international arrivals corridors.

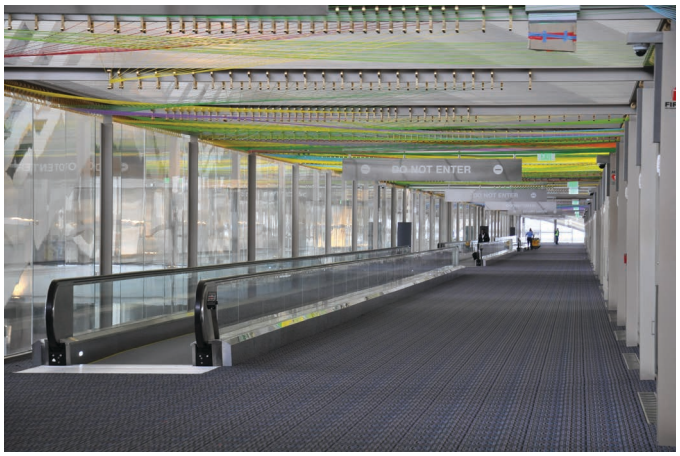
The physical environment of the passport control hall is another important factor in the customer experience. Because most customers may spend quite some time in queue for processing, the architecture and interior design should provide natural light and elements of visual interest

Table 4-4. Implementation considerations for CBP one-stop processing.

CBP One-Stop Processing	
Applicability: Major gateway or hub carrier terminals with high volumes of passengers without checked baggage	**Capital Cost Considerations:** • Building modifications • Additional APC and Global Entry kiosks • Additional CBP inspection booths • IT infrastructure
Implementation Complexity: Requires coordination with CBP, planning and design and likely modifications to existing facilities	**Operating Cost Considerations:** • Customer service staff to manage the queue
Customer Benefits: • Customers without checked bags to claim avoid the longer queues commonly associated with Passport Control and bypass the baggage claim and CBP Exit Control areas • Reduced wait times at CBP Exit Control for customers with checked baggage	
Stakeholder Benefits: • Airline crew members can utilize the one-stop processing as they typically don't have checked baggage • Negative: Likely reduces CBP Officer staffing at U.S. Citizen and Foreign Visitor booths	
Entities Involved: • Terminal Owner/Operator Customer Service • Airport Information Technology • Airport Planning and Engineering • CBP Port Director • Airlines	**Beneficiaries:** • International arriving passengers with no checked bags to claim
Brand Relevance: • Global connecting hub	**Representative Airport(s):** • Dallas/Fort Worth International • Chicago O'Hare International • George Bush Houston Intercontinental

Source: ACRP 03-35 Research Team

Figure 4-8. Miami International Airport North Terminal arrivals corridor artwork.

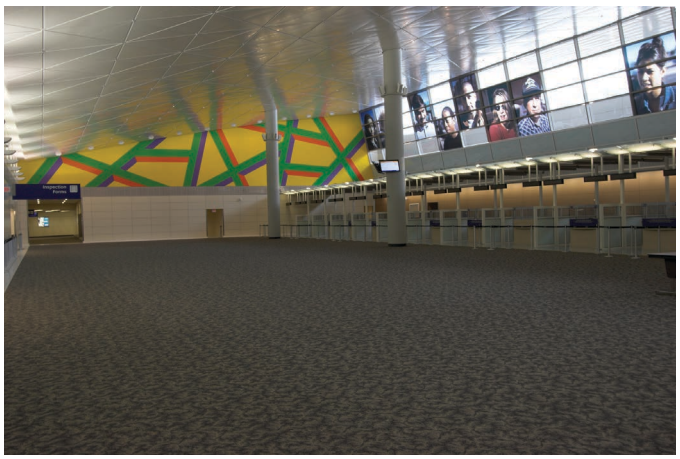


Source: ACRP 03-35 Research Team

Figure 4-9. Los Angeles International Airport Tom Bradley International Terminal arrivals corridor artwork.

to distract passengers while they wait. The passport control hall at Dallas/Fort Worth International Airport's Terminal D (see Figure 4-10) is a good example of how architecture, interior design, and artwork are used to create a unique environment that establishes a sense of place and is welcoming.

Walking Distances. Walking distances often are considered in the design of international arrivals facilities and the walking distance from arrival gate to passport control is a key metric. While the site for the new facility will likely dictate the walking distances, the design should try to minimize it as much as possible. Where walking distances longer than 1,000 feet are required, mechanical assistance such as moving walkways and motorized carts should be provided. The moving walkways should be located as close to the key intersection, such as a security checkpoint, as possible to benefit the greatest number of customers (particularly the elderly), including those whose gate is less than 1,000 feet from the intersection. According to *ACRP Report 37*, for distances of over 2,000 feet between the furthest gate and the passport control hall, automated people mover systems should be strongly considered, specifically if the furthest gates are in a remote concourse.



Source: DFW International Airport. Accessed at http://dfwairport.mediaroom.com/image-gallery.

Figure 4-10. Dallas/Fort Worth International Airport Terminal D passport control hall.

114 Guidelines for Improving Airport Services for International Customers

Restrooms: Restrooms are an important component of the arrival gate to passport control journey. *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design* provides guidance on the design of restrooms in airport terminals. Because many customers have just completed long intercontinental flights, the restrooms in the arrivals corridor should include a full complement of amenities, including family restrooms and nursing rooms. The design should reflect a calming, spa-like environment to ease the stress of long-haul air travel and give customers a chance to refresh before proceeding to the border protection process. Restrooms should be located in the international arrivals corridor and at the entry to the passport control hall.

Restrooms should be located adjacent to every other gate (counting only one side of a double-loaded concourse) so that customers have to walk past no more than one gate beyond the gate where they arrived.

Based on a range of the wingspan of long-haul wide-body aircraft (212 feet, 5 inches for an A350-800 to 261 feet, 10 inches for an A380-800) plus the typical wingtip separation of 25 feet, this would place the restrooms about 250 to 300 feet apart. At Incheon International Airport, restrooms are located adjacent to every gate in the arrivals corridor. The restrooms should be sized according to the number and capacity of the aircraft served by the restroom.

Moving Walkways: Moving walkways are a common element of the international arrivals corridor at airports worldwide. In addition, as more elderly and passengers with disabilities travel, the use of motorized carts will also become more popular. At some airports, automated people mover systems, such as at Miami International Airport's North Terminal, are used to take customers from the arrival gate to the passport control area. The international arrivals corridor should include moving walkways, motorized carts, and potentially automated people movers to the greatest extent reasonable.

When moving walkways are provided, passengers should not have to pass more than one gate (counting only one side of a double-loaded concourse) beyond the gate where they arrived to access the moving walkway. Also, duplicate moving walkways (or other contingency plans, such as electric carts) should be considered for longer distances (between 1,000 and 2,000 feet) as periodic planned and unplanned maintenance is required.

CBP Facility Configuration: International arrivals facilities in the United States almost inevitably require building level changes to separate international arriving passengers from departing passengers. Some airports, such as San Francisco International, JFK Terminal 4, Chicago O'Hare International, Hartsfield-Jackson Atlanta International's International Terminal, and Miami International's South Terminal have a single-level international arrivals facility. That is, the arrivals corridor, passport control, baggage claim, CBP exit control, and arrivals hall are all located on the same building level. Single-level international arrivals facilities are the most efficient from a CBP staffing standpoint and improve the customer experience because the wayfinding and passenger flow is simplified. Airports in the process of planning and designing new international arrivals facilities should strongly consider single-level configurations.

Level changes immediately after deplaning are very common at airports across the world and can be accommodated as part of the fixed walkway to the loading bridge or immediately inside the terminal building, where two gates can utilize a single vertical core (i.e., escalator and elevator). For Airbus A380 and Boeing 747 aircraft, a double-level fixed walkway may be required to serve both decks in the aircraft.

Within the international arrivals facility, particularly between functions such as passport control and baggage claim, an additional level change may be necessary. The layout of the facility should provide an intuitive or natural passenger flow to minimize the need for signage to guide

passengers to the next step. A change in the building level located after baggage claim is undesirable because many customers will use baggage carts to transport checked baggage. Large capacity elevators, such as those described in *ACRP Report 10: Innovations for Airport Terminal Facilities*, should be considered if a building level change is required after customers have claimed their checked baggage.

A notable innovation for the physical environment in the arrivals gate to passport control journey segment is the reconfiguration of the CBP process to allow customers to claim their checked baggage first (bags first) and then complete the passport control and CBP exit control procedures at one location. This process has been implemented at Austin-Bergstrom International Airport and is the basis of the design for the new Terminal 1 international arrivals facility at Fort Lauderdale-Hollywood International Airport.

This concept is also being considered at larger airports, such as Seattle-Tacoma International, where new international arrivals facilities are being designed. Combining passport control, secondary inspection, and exit control functions allows CBP to more efficiently deploy officer resources to increase processing capacity without increasing the number of officers. While overall wait times are likely to be reduced substantially, customers benefit by only having to stop at one location for examination.

Implementation Considerations

Bags First CBP Processing: The implementation of a bags first international arrivals facility should be considered during the planning and design phase of a new international terminal. Austin-Bergstrom International was able to retrofit the existing international arrivals facility to achieve a bags first process but that may not be the case at most airports. Table 4-5 provides a summary of the implementation considerations for providing bags first CBP processing.

Multiple stakeholders should be involved in the decision process because it will require the coordination of the airport, airlines, and CBP to effectively operate such a process. One of the primary concerns is the baggage delivery time since customers will reach the baggage claim area quickly because they will not have to go through passport control first. Both airports are addressing this concern by placing APC kiosks in advance of the baggage claim area so that passenger can begin the primary inspection process while they wait for their baggage to arrive at the carousel.

4.3.5 Information Dissemination

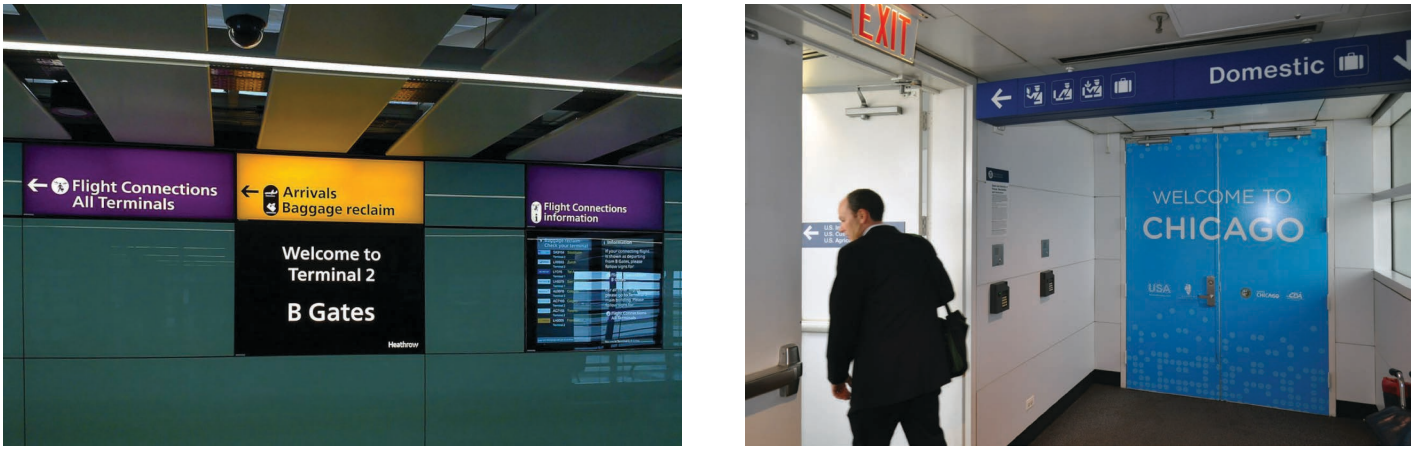
Information provided from the arrival gate to passport control has a definitive impact on the customer experience. Basic steps like greeting passengers with a welcome graphic or simple directional sign are very helpful. When the first signs visible to the passenger include the identification of the arrival terminal, passengers begin the process of knowing where they are, which helps them find their way to other areas of the airport. Other types of information can help bridge the multilingual needs of passengers to educate them about what to expect at passport control (e.g., which line is the correct queue for them).

Basic Requirements

Welcome Signage: The first piece of information an arriving customer needs for successful wayfinding is their starting point. A welcome sign is the first impression of the airport and is an excellent way to greet an arriving customer and present information about where they are in the airport (see Figure 4-11).

Table 4-5. Implementation considerations for bags first CBP processing.

CBP "Bags First" Processing	
Applicability: Well-suited for smaller international arrivals terminals with only a few arriving flights in the peak period; applicability to larger terminals to be determined	**Capital Cost Considerations:** • Incorporated into design of new facilities • Likely to reduce overall area required for CBP processing
Implementation Complexity: Can be incorporated into the design of new terminal facilities only. Requires detailed planning and coordination with CBP and airline stakeholders	**Operating Cost Considerations:** • Combined Passport Control and Exit Control reduces customer service staffing requirements • Smaller overall area reduces operation and maintenance expenses
Customer Benefits: • Customers claim checked baggage first and then proceed to a one-step CBP inspection point. • Improved CBP staffing efficiency can reduce customer wait times	
Stakeholder Benefits: • Combining Passport Control, Secondary Inspection, and Exit Control in one location improves CBP officer staffing efficiency • Reduces operating costs by consolidating the number of locations where Customer Service staff are required	
Entities Involved: • Terminal Owner/Operator Customer Service • Airport Planning and Engineering • CBP Port Director • Airlines	**Beneficiaries:** • All international arriving passengers
Brand Relevance: • Efficient passenger processing • Convenient gateway	**Representative Airport(s):** • Austin-Bergstrom International • Fort Lauderdale-Hollywood International



Source: ACRP 03-35 Research Team

***Figure 4-11. Welcome signage at Heathrow Airport* (left) *and Chicago O'Hare International Airport* (right).**

Source: Photo courtesy of Arielle Berger

Figure 4-12. Digital welcome sign with multiple languages, bag claim device number, date, time, and local weather at Incheon International Airport.

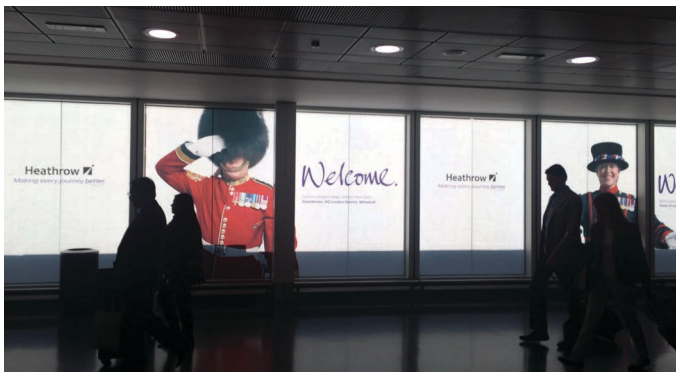
For airports with more than one terminal, listing the terminal name is useful, especially for connecting passengers. Signage for terminals with more than one concourse should include the concourse name to orient the customer.

If the sign is digital, a welcome message can be displayed in the primary language of the arriving passengers and be changed for every incoming flight. Technology can also be leveraged to post the bag claim device. Displaying the current time and date is helpful because many passengers seem to be unaware of the current time and or date at their new location (see Figure 4-12).

As shown in Figure 4-12, static or digital signage can include the name of the city in addition to the airport name.

Welcome Signs that Celebrate: The journey segment between the gate and passport control provides an opportunity to promote the airport brand and celebrate a city's image. Figure 4-13 illustrates how the airport name, brand, image, and "Welcome" are all incorporated to celebrate the arrival experience.

Directional Signage: While the journey segment from gate to CBP is typically a linear one without many choices, directional signage should be included here for reassurance for unfamiliar customers. After exiting a loading bridge or gate area, there should be a sign directing customers to the passport control hall. Other destinations may be included, such as restrooms.



Source: ACRP 03-35 Research Team

Figure 4-13. Welcome sign in the arrivals corridor at Heathrow Airport Terminal 5.

Directional signs should be placed at all decision points, which may include the gate area, where customers can turn left or right after exiting the loading bridge. Signs should be repeated on long corridors where the destination is not yet in sight, even if no alternate routes can be taken. This helps to reassure customers they are following the correct path.

In addition to basic wayfinding, the journey segment between the gate and passport control provides an opportunity to educate the customer about what to expect and to entertain the customer. The level of design and physical amount of detailed information provided is subject to the distance from gate to CBP Primary. The longer the walking distance the more time there is to educate and entertain.

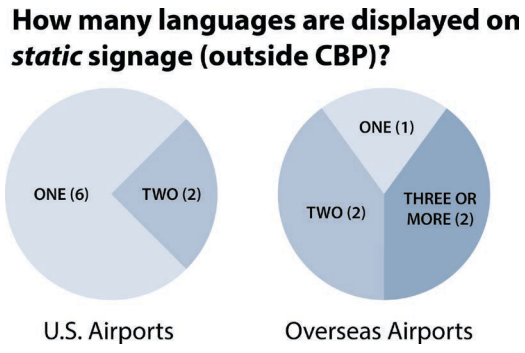
Input from airport stakeholders interviewed reinforced the need for signage in the international arrivals facility to be bold to help herd and navigate passengers through the space and the passport control process. Having the information presented in a variety of languages can be helpful because it can be challenging to provide staff with the necessary multilingual skills. As shown in Figure 4-14, the number of languages displayed on static signage varies between the airports visited.

For additional information on the planning and design of directional signage for airports, refer to *ACRP Report 52*.

Depending on the walking distance from the gate to passport control, there may be opportunities to educate and enhance the customer experience along the way. The most important of these two opportunities is how to educate the customer about what to expect (e.g., documents required, queue options, etc.) when they arrive at passport control (see Figure 4-15). Understanding what to expect reduces anxiety and improves customer satisfaction.

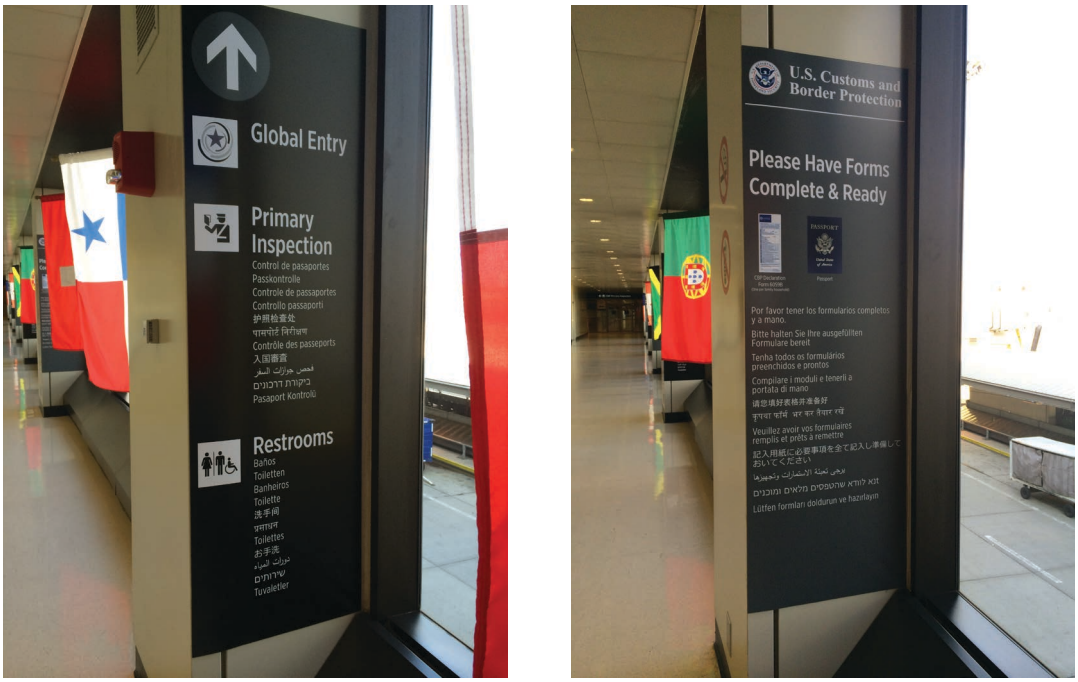
Color-Coded Signage in the Passport Control Hall: A color-coded signage system along the arrivals corridor helps educate customers by associating entry status with a particular color and the information is provided in seven different languages. The queuing area in the passport control hall is arranged by the entry status, which corresponds to the color-coded signage (see Figure 4-16).

According to input from airport stakeholders, the color-coded signage along with support from the passenger service representatives (PSRs) has been very helpful in accommodating the tremendous growth in passenger volumes. There is a lot less passenger confusion, which also reduces the amount of assistance required, which lessens the burden on manpower to staff the passport control area. The color-coded signage program at BOS evolved with the



Source: ACRP 03-35 Research Team

Figure 4-14. Number of languages displayed on static signage.

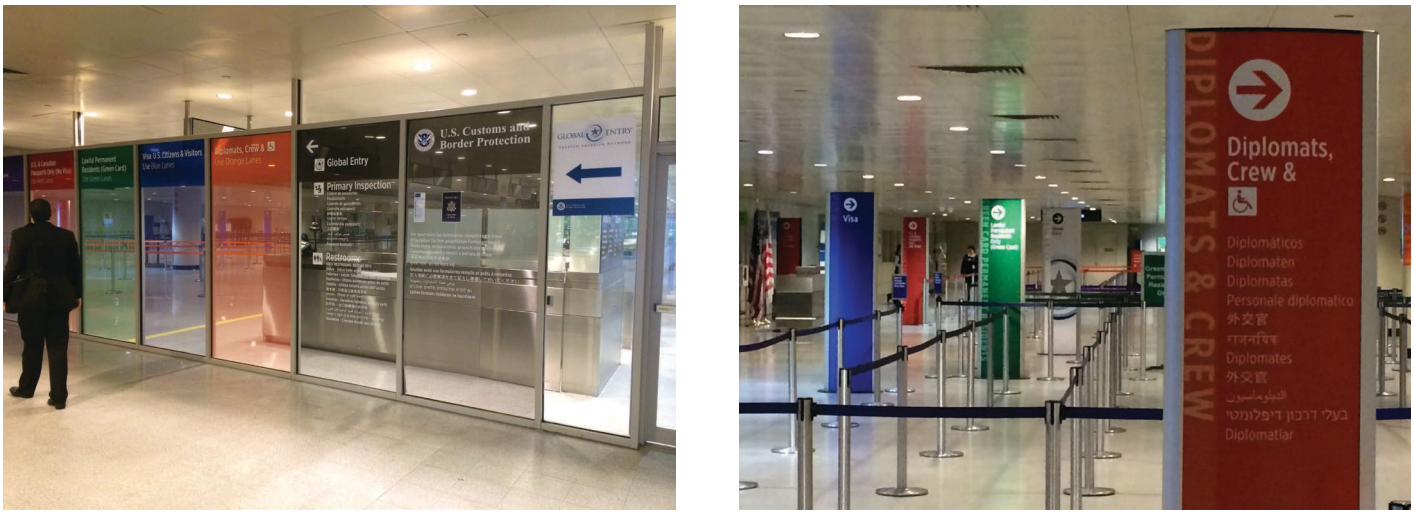


Source: ACRP 03-35 Research Team

Figure 4-15. Multilingual signage in the arrivals corridor at Boston Logan International Airport.

passenger responses so it was crucial that it was flexible and could be easily modified based on their feedback.

The further segregation of passengers in the passport control hall (U.S. citizens, Electronic System for Travel Authorization (ESTA), foreign visitors, lawful permanent residents, accessibility needs etc.) has made the queuing process more complex. The implementation of the



Source: ACRP 03-35 Research Team

Figure 4-16. Color-coded signage leading to passport control at Boston Logan International Airport.

color-coded signage orients passengers with their specific processing requirements and the matching signage color is clearly displayed in the passport control hall to help guide passengers into the appropriate queue.

Passport Control Hall Signage: When planning a signage program for a CBP area, airport planners and/or wayfinding consultants must reference the CBP ATDS. All CBP signage must be approved in advance by CBP during the design stage. The goal of the standards is to "make a significant contribution to operational efficiency by minimizing confusion among travelers and permitting traffic to move expeditiously through the CBP passenger processing facility."

The general requirements for signage in passport control are dictated in the ATDS. The document also covers general requirements for secondary processing, the sterile corridor and entrances leading to passport control, and international baggage claim. Additional detailed guidance is available from CBP headquarters. Required artwork (including the seal of the Department of Homeland Security) should be obtained from the local CBP.

Chapter 4 in the ATDS gives an overview of four categories of signage: wayfinding, identification, notification, and statutory/regulatory.

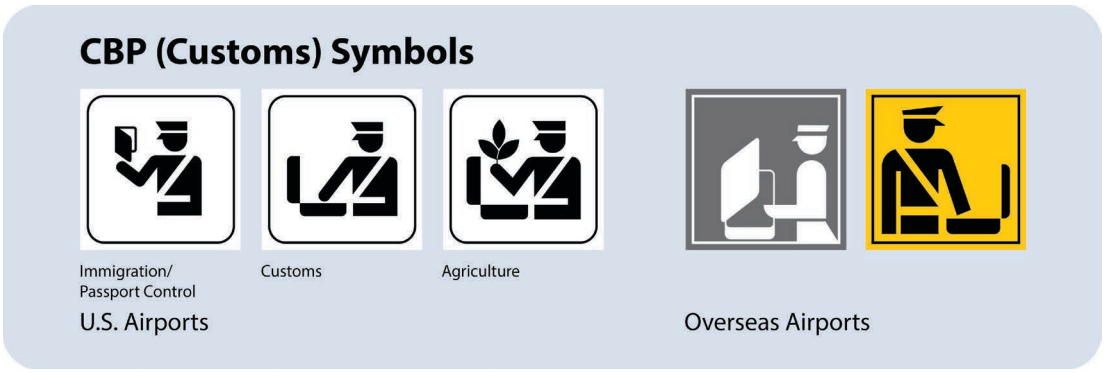
Wayfinding signs: These signs should provide directions to specific areas within the CBP passenger processing facility. The ATDS states the use of CBP approved terminology is required to maintain consistency. However, at the U.S. airports surveyed there are a variety of terms that appear on signage in the United States. This includes U.S. Customs and Border Protection (CBP), passport control, Federal Inspection Service and CBP Primary Inspection. The overseas airports surveyed use terminology such as customs, Arrivals, or Arrivals Immigration. The differences between U.S. and overseas airports and lack of consistency between airports within the United States can be a source of confusion for passengers.

Likewise, there are varying approaches to using symbols for CBP processes on wayfinding signage. Some U.S. airports use only the three U.S. symbols shown in Figure 4-17, while others use symbols and text.

The term passport control when paired with the immigration passport control symbol at U.S. airports communicates a consistent message to the unfamiliar traveler so they know what to

Source: ACRP 03-35 Research Team

Figure 4-17. Examples of signs with CBP symbols only and CBP symbol with text.



Source: ACRP 03-35 Research Team

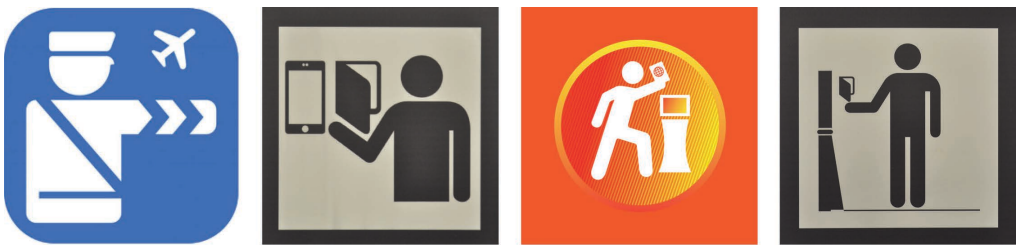
Figure 4-18. Comparison of CBP symbols.

expect at the first major stop in this journey segment. Figure 4-18 shows a comparison of symbols used at U.S. and overseas airports.

Stakeholders at the airports visited understand the challenges of finding ways to successfully communicate information to non-English speaking passengers. For example, recruiting personnel with bi-lingual and/or multilingual skills provides verbal communication. Implementing signage with bi-lingual messaging paired with the appropriate symbol also helps communicate information visually. Digital dynamic signage can communicate information virtually by tailoring pre-programmed messages as a versatile, efficient, and cost-effective method to meet the communication needs of passengers speaking a number of different languages.

Expedited Entry Programs: If the path to Expedited Entry program kiosks is unclear, signage may be required to guide customers. Proper symbology for these signs should be considered carefully. Life in the 21st century presents an ongoing challenge to keep pace with advances in technology which airports are not immune from and nor are their passengers. While the recent deployment of APC and MPC improves the customer experience at passport control, there has not been a symbol set developed and tested for comprehension to reflect this technology.

In an attempt to fill this void, the blue symbol in Figure 4-19 (the logo on the MPC website) has been picked-up by airports offering MPC processing as the default symbol. However, the symbol does not clearly indicate the actions taken when using MPC. The second symbol in



Source: ACRP 03-35 Research Team

Figure 4-19. Symbols for MPC and APC.

Source: ACRP 03-35 Research Team

Figure 4-20. Examples of CBP queue signage for accessibility.

Figure 4-19 is a proactive effort by Atlanta International Airport to create a sensible symbol to fill the void created by this new technology by including the phone/tablet in the symbol. The third and fourth symbols in Figure 4-19 show a similar issue for APC. This research illustrates how new processes and technology can create a gap in how to best communicate this information using a visual medium.

Wayfinding signs in the passport control area guide customers into the proper queues. Several of the U.S. airports surveyed improved upon the standard groupings of passenger types by having dedicated accessibility queues (see Figures 4-20 and 4-21). Typical sign messages include, but are not limited to:

- Visitors
- Permanent residents
- U.S. citizens
- Crew
- Diplomats
- ESTA travelers

Source: ACRP 03-35 Research Team

Figure 4-21. Examples of CBP queue signage.

Source: ACRP 03-35 Research Team

Figure 4-22. Official CBP branding at Los Angeles International Airport Tom Bradley International Terminal.

Identification Signs: Identification signs should provide information at a desired location, including operational areas and specific rooms. Among the many requirements for identification signs, the ATDS dictates that CBP branding with the department seal be located at the CBP entrance, and a "Welcome to the United States" sign be located at the entrance to the passport control hall. These guidelines can be met while also tailoring the signage to the material and color standards for the airport's sign program (see Figures 4-22 and 4-23).

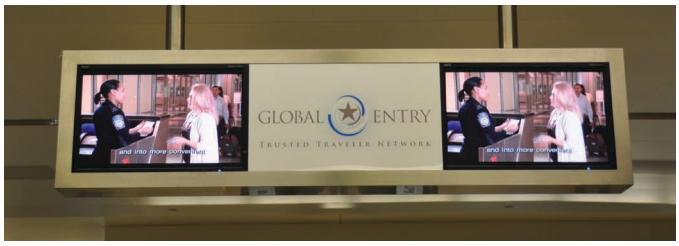
Global Entry: Global Entry is a program available to U.S. citizens, lawful permanent residents, citizens of Germany, the Netherlands, Panama, and South Korea and Mexican nationals. Signage should identify the banks of Global Entry kiosks to distinguish them from APC. This is a good opportunity to educate members on the use of the kiosks, and to educate nonmembers about the eligibility requirements and advantages of Global Entry (see Figure 4-24).

Notification Signs: Notification signs convey specific information and instruction to passengers, crewmembers, CBP, and airport/airline staff to help identify procedures, policies, and notices.

Automated Passport Control: APC is available for U.S., Canadian, and eligible Visa Waiver Program international travelers. These kiosks print a receipt for each passenger that identifies the type of processing level that is warranted. The next decision point on which queue to follow may create potential for easy confusion. Clear signage should instruct passengers to the

Source: ACRP 03-35 Research Team

Figure 4-23. Examples of "Welcome to the United States" signage.



Source: ACRP 03-35 Research Team

Figure 4-24. Example of Global Entry identity signage.

appropriate queue based on the status indicated on the receipt: No "X" or an "X" (see Figure 4-25). These signs should display an accurate reproduction of the receipt image to assist passenger understanding of the process. The images in Figure 4-25 show that JFK International Airport Terminal 4 uses signs with a conspicuous color to tie together the separate signs as a system for making a decision. Atlanta International Airport uses the same symbol on the signage for APC and on the directional signs leading to the kiosks.

Statutory/Regulatory Signs: Statutory/regulatory signs provide instructions, information, and official legal notices. Many of these are already designed and available from local CBP. These signs may not be altered. The method of display in the surveyed airports was generally fragmented (one here, one there), but Los Angeles International Airport created a clean display of multiple statutory signs in one location (see Figure 4-26). These signs are clearly visible from the APC kiosks rather than being placed on the arrivals corridor wall where customers pass by without looking.

Video Walls in Passport Control Hall: While the physical environment, access to information, and fairness are the three key factors affecting customer queue experience, psychological factors also play an important role in the queuing systems because it can ease the unavoidably negative reactions of air travelers to airport delays by influencing their perceptions of the situation. The customer survey shows that wait times at CBP, which vary, factor into overall customer satisfaction. An example of how to enhance the customers' perceived wait time is in the queue at passport control at Atlanta International Airport's International Terminal. A large video screen

JFK JFK JFK ATL

Source: ACRP 03-35 Research Team

Figure 4-25. JFK International Airport Terminal 4 and Atlanta International Airport (ATL) APC kiosk receipt instructions.

Source: ACRP 03-35 Research Team

Figure 4-26. CBP statutory signs at LAX.

displays rotating images of local and regional sights in Atlanta and the state of Georgia (see Figure 4-27). These types of digital media can positively influence the customer perception of queue management. Regarding the fairness factor of queue management, research shows that a snake queue is the best solution (de Neufville and Odoni 2003).

Queue management associated with wait times directly affects customer satisfaction. Understanding the factors and psychology that influences perceived wait times is important to understand how to improve this part of the customer experience. This includes close coordination among the entities involved in planning the necessary infrastructure, content development and management, deployment, and maintenance of the system.

Implementation Considerations

Welcome Wall Feature: There are three basic considerations for creating "welcome wall" features.

Step 1 is Location: review the journey segment to locate opportunities to celebrate the arrival experience.

Step 2 is Content: the criteria for content development may vary by airport, but the basics should include making it relevant, recognizable, and engaging.

Source: © Chris Cunningham, Courtesy of Gresham, Smith and Partners

Figure 4-27. Video screen in the passport control hall at Atlanta International Airport's International Terminal.

Table 4-6. Implementation considerations for a welcome wall feature.

Welcome Wall Feature	
Applicability: All international arrivals terminals	**Capital Cost Considerations:** • Welcome Wall artwork or graphics • Installation of artwork or graphics
Implementation Complexity: Minimal planning and design or building modifications required	**Operating Cost Considerations:** • Routine cleaning and maintenance of Welcome Wall
Customer Benefits: • Provides customers with a warm welcome and sense of excitement about their airport experience	
Stakeholder Benefits: • Promotes positive image of airport and local region that may influence customers to return	
Entities Involved: • Terminal Owner Marketing • Terminal Owner/Operator Customer Service • Airport Planning and Engineering • Regional tourism organizations	**Beneficiaries:** • All international arriving passengers, particularly visitors
Brand Relevance: • Sense of Place • Customer-friendly airport	**Representative Airport(s):** • London Heathrow • San Francisco International Airport

Step 3 is the Life Cycle: content can have a shelf life so it is important to plan how and when visual content like a "welcome wall" will be updated.

Table 4-6 provides a summary of the implementation considerations for a welcome wall feature.

Color-Coded Signage System: Interviews with stakeholders from other airports found that simply color-coding the signage to help with customer flow through the passport control hall is not a guaranteed solution. Stakeholders from other airports commented that customers do not pay attention to signage and, surprisingly, U.S. citizens are more likely to follow the crowd than foreign visitors. Therefore, in evaluating what made the color-coded signage successful at Boston Logan International Airport the following attributes were noted and should be considered as part of the implementation:

- Colors are bold and readily distinct from each other.
- The information is repeated several times along the walkway from the gate to passport control.
- The information is posted in multiple languages based on the flight mix at the airport.
- Any solution like this should be based on customer input and combined with thoughtful design of how the information is presented and updated.

Table 4-7 provides a summary of the implementation considerations for a color-coded signage system.

Video Wall in Passport Control Hall: There are three major implementation considerations with a large video wall or collage video wall including: content, content management, and infrastructure. As with any digital signage implementation, deciding what content best helps the customer in the situation takes planning before execution. In the case of the passport control hall at Atlanta International Airport, two purposes were considered, direction and entertainment.

Table 4-7. Implementation considerations for a color-coded signage system.

Color-Coded Signage System	
Applicability: Terminals with more than one entry point to the Passport Control hall or limited queuing in the Passport Control hall	**Capital Cost Considerations:** • Signage design and content development • Signage hardware and installation
Implementation Complexity: Requires minimal building modifications, if any	**Operating Cost Considerations:** • Updates or replacement of signage due to regulatory changes
Customer Benefits: • Reduces customer confusion by educating them prior to entering Passport Control • Provides customers with a positive impression that the airport cares about their experience	
Stakeholder Benefits: • Reduces operating costs by reducing the number of Customer Service staff needed to direct passengers to the appropriate queue	
Entities Involved: • Terminal Owner/Operator Airport Marketing • Terminal Owner/Operator Customer Service • Airport Planning and Engineering • CBP Port Director	**Beneficiaries:** • All international arriving passengers; particularly those with limited English capabilities
Brand Relevance: • Customer-centric airport	**Representative Airport(s):** • Boston Logan International Airport • Dallas/Fort Worth International Airport

One type of video wall was dedicated to entertaining passengers in the queue line while the other gave instruction on the appropriate queue lines in the passport control hall and kept the passengers moving through the lines. When dealing with a large number of displays working as one, the software and hardware need to be configured properly to provide the level of quality expected. Determining the desired video wall size and resolution will dictate software and hardware requirements. A player with four discrete 1080p video outputs may run four screens at 1080p, while to run 4K content the same player may only be able to power one screen. The infrastructure requirements include power and data. Table 4-8 provides a summary of the implementation considerations for a video wall in the arrivals hall.

4.3.6 Arrival Gate to Passport Control Journey Segment Evaluation Tool

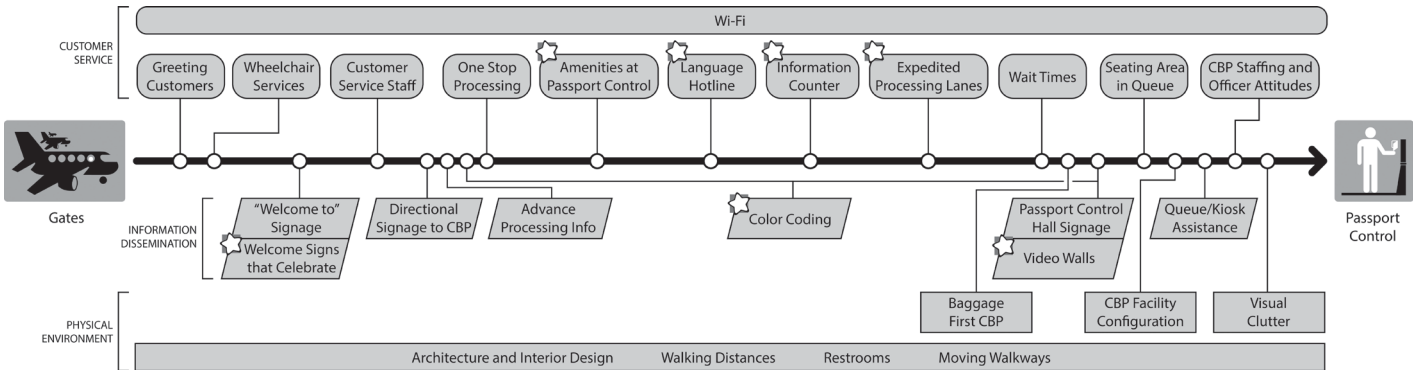
Figure 4-28 provides a summary of the basic requirements and notable innovations described above for the arrival gate to passport control journey segment. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

4.4 Passport Control to CBP Exit Control

The passport control to CBP exit control journey begins after customers complete passport control, includes claiming their checked baggage, and ends when they complete the CBP exit control interview. At that point, the customers have officially entered the United States.

Table 4-8. Implementation considerations for video walls in the passport control hall.

Video Wall in the Passport Control Hall	
Applicability: All international arrivals terminals	**Capital Cost Considerations:** • Video displays and IT infrastructure • Initial content development
Implementation Complexity: Video wall should be incorporated into design for new or renovated facilities	**Operating Cost Considerations:** • Routine maintenance of installation or replacement of hardware • Updates to content
Customer Benefits: • Help ease the negative reactions of travelers to long waits by providing a welcome distraction	
Stakeholder Benefits: • Reduces customer complaints about long waits and allows customer service agents to focus on dealing with customers who need help rather than listening to those who just want to complain • Promotes tourism within the local region	
Entities Involved: • Terminal Owner Marketing • Terminal Owner/Operator Information Technology • Terminal Owner/Operator Customer Service • Airport Planning and Engineering • CBP Port Director • Regional tourism organizations	**Beneficiaries:** • All international arriving passengers
Brand Relevance: • Sense of Place • Customer-friendly airport	**Representative Airport(s):** • Hartsfield-Jackson Atlanta International Airport



Source: ACRP 03-35 Research Team

Figure 4-28. Arrival gate to passport control journey segment evaluation tool.

4.4.1 Key Activities

The passport control to CBP exit control journey includes the following activities:

- Proceed from passport control to baggage claim hall
- Determine which baggage claim carousel is assigned to their flight
- Locate claim device
- Claim checked baggage
- Proceed to CBP exit control
- Queuing and CBP exit control interview
- Exit CBP area

4.4.2 Customer Needs and Expectations

Many passengers experience anxiety while waiting for the baggage to arrive at baggage claim, in particular those in the process of transferring to a connecting flight. Research conducted for *ACRP Report 55* has shown that the longer the wait times, the greater the dissatisfaction experienced by airport passengers. To alleviate the anxiety and anticipation of passengers waiting for their bags to arrive, some airports provide video monitors to distract and entertain passengers as they wait for their baggage. At many airports outside the United States, amenities such as information counters, coffee shops, money exchange kiosks, and duty free shops are provided in the baggage claim area to distract passengers while they wait for their baggage.

4.4.3 Customer Service

Person-to-person customer service during the passport control to CBP exit control journey segment is relatively limited as customers guide themselves to the baggage claim carousel for their flight. Information delivery via signage is the primary means of customer service during this journey segment.

Other elements of the customer experience include baggage delivery wait times, free baggage carts, baggage porter services and airline baggage service offices.

Basic Requirements

Baggage Claim Carousel Identification: In the baggage area, the first element of customer experience is identifying the baggage carousel assigned to their flight. Upon entering the baggage claim area, FIDS should display flight information with the carousel assignment. Each carousel should be clearly identified with signage that can easily be seen from the entrance to the baggage claim hall.

Wait Times: This key element of the customer experience pertains to the amount of time customers wait for checked baggage to be delivered to the assigned baggage carousel. With the introduction of APC, MPC, and trusted traveler programs at many U.S. airports, customers are arriving at the baggage carousel sooner because the wait times at passport control have been reduced. Based on the target average passport control wait time established in the previous section, the target delivery time for the first checked bag should be 20 minutes or less after arrival with the last checked bag arriving no later than 40 minutes after arrival.

Achieving this target should limit the wait times in the baggage claim area to 20 minutes or less for almost every customer. The IATA Optimum level of service recommendation is less than 15 minutes for narrowbody aircraft and less than 25 minutes for wide-body aircraft for delivery of the first bag for economy class passengers (2014). Delivery of baggage for first and business class passengers typically occurs much quicker than economy passengers because those bags are given priority and those passengers are usually the first off the plane and the first through passport control.

Elimination of Baggage Claim and Recheck for Connecting Passengers: As indicated in Chapter 2, the elimination of baggage claim and recheck for international-to-international connecting passengers has been implemented in a few U.S. airports. Eliminating baggage claim and recheck for some or all international-to-domestic connecting passengers would have a profound impact on the customer experience. While this policy has not yet been implemented in the United States, airport stakeholders should continue to discuss the opportunity with their local and national CBP representatives to ascertain the challenges and requirements associated with this change in policy and operations. *ACRP Report 61* provides a detailed description of the various methods for implementing this innovative approach.

Seating: Since it is not likely that waiting in the baggage claim area can be eliminated altogether, providing seating for customers is an important customer service consideration. This is especially beneficial for the elderly or passengers with disabilities who may be traveling with someone who can retrieve their baggage while they wait. The seating should be adjacent to the carousels so that parties can remain within sight of each other.

Baggage Carts: Baggage carts are provided free-of-charge in almost every international arrivals facility across the world, including those in the United States. This creates an expectation that the baggage carts will be readily available at no cost to the customer. While baggage carts are commonly located between the claim carousels, airport should consider staging them at the entry to the baggage claim hall so that customers can more conveniently get a cart when they enter the baggage claim hall. This will also reduce the spacing required between the carousels and allow for more efficient replenishment of the carts that are being returned.

Baggage Porters: Many foreign airports provide for-hire baggage porters in the baggage claim area. This amenity is not common at U.S. airports; however, some customers may expect these services to be available. Airports should routinely survey customers to determine if this service is commonly requested. Customers flying on certain airlines may have a higher expectation for baggage porter services due to the more generous check bag allowances of those airlines. Elderly passengers may also have a higher desire to utilize baggage porters.

Amenities and Services: CBP regulations prohibit the provision of amenities and services in the international baggage claim hall as they have the potential to impede the ability of CBP officers to conduct observations and passenger screening. Amenities such as information counters, coffee shops, money exchange kiosks, and duty free shops are available in many airports outside the United States. Since this decision is made at the national level, airport stakeholders should consider working with their industry representatives to discuss the possibility of providing some level of amenities in the international baggage claim hall.

Airline Baggage Services: Airline baggage services are another component of the customer experience in the baggage claim area. At large international terminals in the United States, it is more common for the hub carriers or primary foreign airlines to provide baggage services within the baggage claim area. However, airlines that provide only one or two international flights per day generally do not provide baggage services in the baggage claim area but rather provide that service at the ticketing counters. The key consideration is that customers are provided with the information that they need to contact their airline to inquire about the status of their baggage. For airlines that do not provide baggage services in the baggage claim hall, an information kiosk should be provided that has the local and global contact information for each of the airlines serving that terminal.

CBP Exit Control: The CBP exit control process can be more stressful for some customers than the passport control process due to the questions about items being brought into the United States. A common point of confusion, especially for foreign visitors, is the need to stop for the exit control interview as many foreign countries utilize a self-declaration and random inspection process

where passengers with nothing to declare proceed through the exit without an interview and those who do have something to declare may be subject to an interview and search. Random interviews are conducted for passengers identifying that they have nothing to declare. CBP is testing a self-declaration model for exit control so airports considering modification to this component of the arrivals process should discuss this potential change with their CBP port director.

4.4.4 Physical Environment

The physical environment of the baggage claim hall should facilitate ease of movement through the facility, identification of the appropriate baggage claim carousel, collection of checked baggage, and location of the CBP exit control.

Basic Requirements

Line of Sight and Natural Wayfinding: International baggage claim halls are typically very large spaces with several claim carousels. Entry to the baggage claim hall should allow for a clear line of sight to each carousel, which should be prominently identified (usually by number). Natural wayfinding is most effective if the entry to the hall is located in the center baggage claim hall or along a perimeter corridor that passes by each claim carousel. The customer should be able to see the CBP exit control point from the entry so they know where to go after they claim their checked baggage. All elements of the interior design—specifically the floor and ceiling patterns, lighting, and the structural grid—should convey the direction customers should flow from the entry to the CBP exit control.

Carousel Layout: Appropriate spacing should be provided between the claim carousels to allow for baggage carts and seating. IATA recommends 36 to 43 feet separation (edge to edge) for baggage retrieval, circulation, and baggage cart staging with additional space to accommodate seating (2014). Seating adds approximately five feet of width for each row of seats. If the baggage cart staging is consolidated at the entry to the baggage claim hall, the carousel spacing could be reduced by 3 to 6 feet. Most airport terminals in the United States have carousels spaced at 50 feet to 60 feet on center, which is in the middle of the range recommended by IATA.

Carousel Sizing: Long-haul international flights often have higher checked bag allowances than short-haul international and domestic flights. Load factors can also be high, especially during the peak travel months. Splitting a flight onto two carousels or using porters to remove bags from a single carousel that is too small creates confusion for customers and greatly diminishes the experience. The use of two carousels for one flight should be considered only when flights can be split into first and business class on one carousel and economy on the second carousel. IATA recommends that carousels for wide-body aircraft provide 230 to 295 feet of presentation length and carousels for narrowbody aircraft provide 130 to 230 feet of presentation length (2014). Carousels for double-deck wide-body aircraft, such as the A380 or 747-800 with very high bag to passenger ratios (greater than 1.5 bags per passenger) should use the upper limits (IATA 2014).

Carousel Type: Baggage claim carousels for international arrivals facilities in the United States are predominantly remote-fed sloped-plate carousels (see Figure 4-29). These carousels provide the highest amount of baggage storage capacity per foot of presentation length due to the ability for the baggage to be double-stacked on the carousel. However, removing baggage that is double-stacked is not an easy task, particularly for the elderly and disabled.

Remote-fed flat-plate devices (see Figure 4-30) are available but do not provide the same amount of baggage storage capacity. This design, however, makes the removal of baggage less arduous. These types of devices are in use at several terminals at Heathrow Airport. The planning and design of new international arrivals facilities should consider these issues.

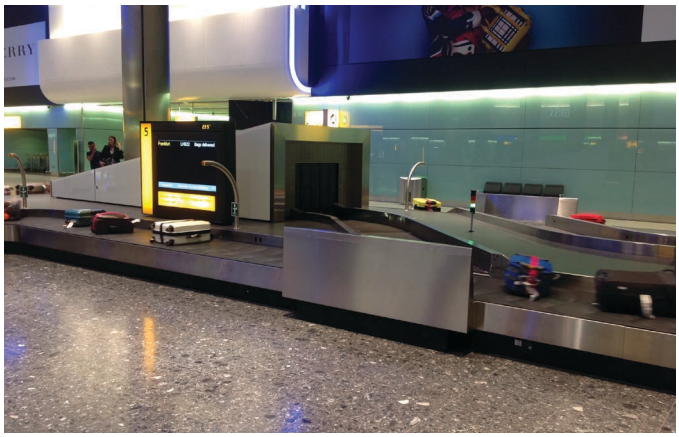
Source: ACRP 03-35 Research Team

Figure 4-29. Example of a remote-fed sloped-plate baggage claim carousel at Chicago O'Hare International Airport Terminal 5.

Restrooms: The baggage claim hall should include restrooms for customers who may have to wait for checked baggage or may have bypassed the restrooms in the arrivals corridor or passport control hall. The restrooms will likely be located on the perimeter of the baggage claim hall and should be positioned so customers do not have to walk the entire length of the hall to reach them.

Baggage Cart Return: The baggage claim hall design should incorporate dedicated corridors for returning baggage carts so that the public entrances and exits do not have to be used as pathways for returning carts. Baggage carts are returned and restocked throughout the day so interference with the passenger flow should be minimized. While this element is not associated with the customer experience, it can affect the airport's strategy for returning the baggage carts.

CBP Exit Control: The implementation of APC and MPC at passport control can negatively affect baggage claim and CBP exit control wait times. With more customers at the baggage claim carousel prior to the baggage being delivered, the surge of customers leaving the carousels and proceeding to CBP exit control has increased, creating long queues at CBP exit control. Many airports provide separate queues at CBP exit control for crew, Global Entry, U.S. citizens, lawful permanent residents, and foreign visitors. Sufficient queuing area should be provided that does not interfere with the circulation around the baggage claim carousels. CBP is testing a self-declaration



Source: ACRP 03-35 Research Team

Figure 4-30. Remote-fed flat-plate baggage claim carousel at Heathrow Airport Terminal 2.

process where the CBP exit control interview would not be necessary for customers with nothing to declare. Airports in the process of planning and designing new or significantly renovated international arrivals facilities should contact their CBP port director to determine the best approach for conducting the exit control process because it will affect the spatial requirements for that process.

Implementation Considerations

Remote-Fed Flat-Plate Baggage Claim Carousel: The replacement of remote-fed slope-plate baggage carousels with remote-fed flat-plate baggage carousels in an existing terminal is highly unlikely due to the decrease in capacity. The best opportunity to incorporate these devices is during the planning and design phases because they will affect the capacity and size of the baggage claim hall. The airport planners and designers should work with the airlines to determine if these types of devices are suited for the operations. Table 4-9 provides a summary of the implementation considerations for implementing remote-fed flat-plate baggage carousels.

4.4.5 Information Dissemination

Basic Requirements

Statutory/Regulatory Signs: All CBP signage must have the advance approval of CBP during the design stage. The CBP ATDS includes a list of information required to post in this area. Statutory/regulatory signs are unique to the CBP facility providing international travelers with statutory/regulatory instructions, information, and official legal notices (see Figure 4-31). The content of a statutory/regulatory sign cannot be altered and must be presented in its entirety.

Table 4-9. Implementation considerations for remote-fed flat-plate baggage claim carousels.

Remote-Fed Flat-Plate Baggage Carousels	
Applicability: All international terminals, particularly those predominately served by narrowbody aircraft	**Capital Cost Considerations:** • Purchase and installation of flat-plate carousel devices
Implementation Complexity: Incorporate into design of new terminals or renovation of existing terminals; utilizes same infrastructure as sloped-plate carousels	**Operating Cost Considerations:** • Routine maintenance and repair; same as other baggage claim devices
Customer Benefits: • Customers, especially the elderly and disabled, are able to remove their checked baggage from the carousel with much less physical strain	
Stakeholder Benefits: • Negative: Additional carousels may be required due to reduced capacity compared to sloped-plate carousels	
Entities Involved: • Terminal Owner/Operator Customer Service • Airport Planning and Engineering • Airlines	**Beneficiaries:** • All international arriving passengers with checked baggage
Brand Relevance: • Customer-centric airport	**Representative Airport(s):** • Heathrow Airport Terminals 2 and 5

Source: ACRP 03-35 Research Team

Figure 4-31. Example of CBP required statutory signs at Dallas/Fort Worth International Airport.

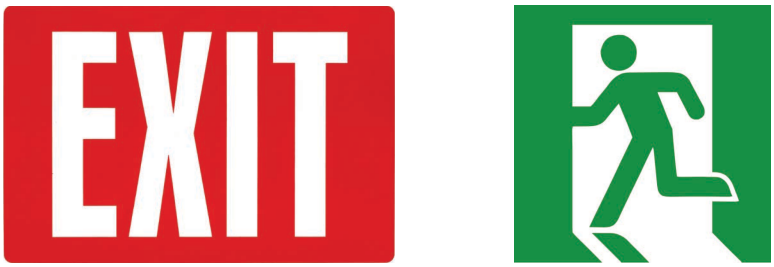
Directional Signage: The majority of bag claim areas within CBP do not have a direct line of sight to the outside, making the task of orienting oneself non-intuitive. Therefore, passengers must rely on the signage to find their way out of the bag claim area. Observations made during site visits show the signage at all five overseas airports include "Exit" as part of the wayfinding system in the baggage claim area. Of the eight U.S. airports visited, seven use the word "Exit" on the signage guiding customers to the CBP exit; each has varying levels of consistency. This is important, because CBP officials have noted that some foreign non-English speaking travelers mistake the emergency exits for the airport exit.

Seven of the eight U.S. airports include "Exit" messaging in the bag claim area and all overseas airports visited clearly emphasize the "Exit" message in the bag claim area.

This issue can be further complicated by the differences between U.S. standard life safety sign versus life safety signage used in other countries (see Figure 4-32). Many other countries use some version of the ISO standard, a symbol developed the in late 1970s by Japanese designer Yukio Ota and adopted for international use in 1985.

Exit is a difficult message to convey via a pictogram. The wide range of different representation used at the airports visited illustrate this point (Figure 4-33). Given the differences in symbology used for EXIT the signage guiding customers on how to exit from an airside to a landside area should use both the word EXIT as the primary means of communication and if a symbol is used it should be a supporting element only.

Baggage Information Displays: The basic primary content required for baggage information displays (BIDs) is the city of origin, flight number, airline, and bag claim device number.



NFPA Standard Exit Sign

ISO Standard Exit Sign

Source: NFPA and ISO

Figure 4-32. Life safety sign comparison.

AIGA AMS LHR MUC PEK

Source: AIGA and ACRP 03-35 Research Team
Notes: AIGA = American Institute of Graphic Arts; AMS = Amsterdam Airport Schiphol; LHR = Heathrow Airport; MUC = Munich Airport; PEK = Beijing Capital International Airport.

Figure 4-33. Exit symbols.

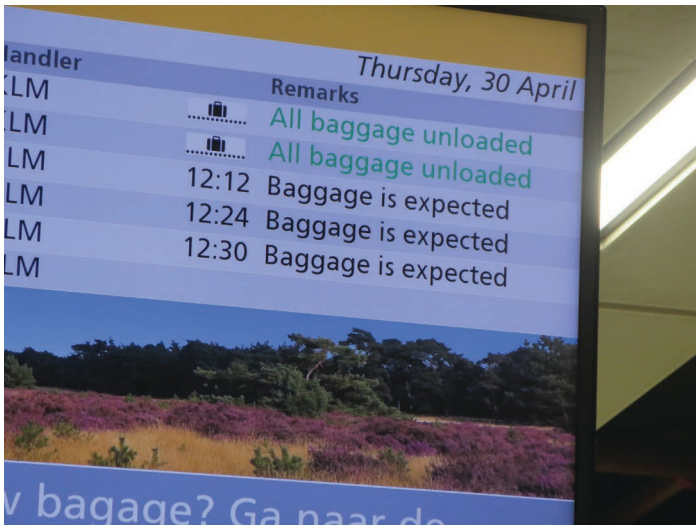
Some of the airports visited, like Amsterdam Airport Schiphol, provide additional remarks that indicate when the baggage is expected to arrive at the device or if all the bags have been delivered (see Figure 4-34). These remarks also toggle between English and Dutch. The BIDs at AMS also include information such as time, date, and what to do if there are problems with baggage. The net result is a solution that adds value to the customer experience.

Directly on or over each claim device, and in other areas within the baggage claim area as appropriate, signs provide more processing instructions and direct passengers to CBP secondary processing and exit control located at the head of the main facility exit lanes.

Beyond exit control, signs direct passengers to the main exit, baggage recheck, connecting flights, and ground transportation as required.

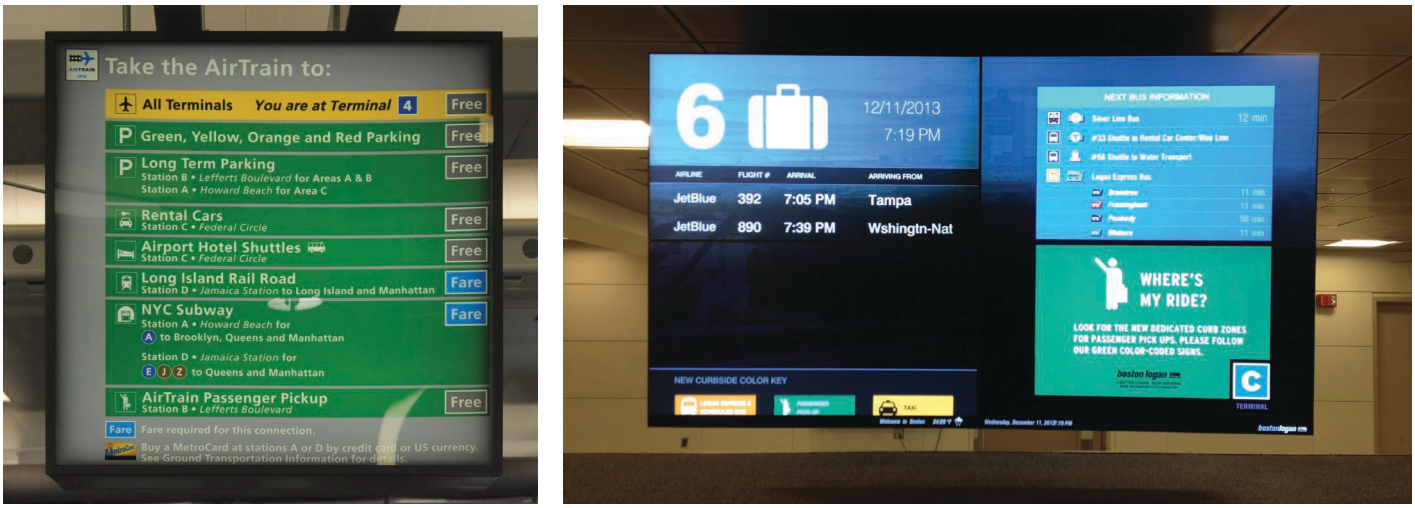
Alternate Content to educate customers about what's next in their journey: Arriving passengers with checked bag(s) are a captive audience while waiting at baggage claim. Airports can make use of this dwell time to provide additional information to educate the customer about the next segment of their journey. Static signage, digital signage, or a combination of both located strategically above or on the carousels can cycle between the primary content and alternate content (see Figure 4-35). The key factor in signage placement is to maintain clear sight lines during peak times when the bag carousels are the most crowded.

CBP Exit Control: After retrieving baggage, passengers proceed to the CBP exit podium. Directly over each exit lane a sign must be located with a message per CBP. A sign viewed by



Source: ACRP 03-35 Research Team

Figure 4-34. BIDs at Amsterdam Airport Schiphol.



Source: ACRP 03-35 Research Team

***Figure 4-35. Signage with alternate content in baggage claim at JFK International Airport Terminal 4* (left) *and Boston Logan International Airport* (right).**

passengers just prior to exiting the CBP facility should express appreciation for their cooperation. Content will be provided by CBP.

Connecting Flight versus Exit: While the physical space of CBP varies in size and configuration from one airport to the other, the CBP typically presents a major decision point in the passenger journey whether to exit into the United States or find a connecting flight. The wayfinding provided in the CBP is important because a connecting passenger who makes a wrong turn and exits into the Arrivals Hall may have to walk a long distance to get to their connecting departure gate.

Most of the circulation path through CBP is unidirectional, and multiple stakeholders classified the passengers flow as herd-like. However, at this point passengers need to choose which direction to go and that decision can be adversely influenced by the large number of passengers exiting CBP at the same time. Therefore, passengers may benefit from having super-sized signage directing them to boarding gates for their next departure or to the exit (see Figure 4-36).

Source: ACRP 03-35 Research Team

Figure 4-36. Super-sized exit signage at JFK International Airport Terminal 4.

Table 4-10. Implementation considerations for BIDS with alternate content.

BIDS with Alternate Content	
Applicability: All international arrivals terminals, particularly connecting hubs and airports with numerous ground transportation options	**Capital Cost Considerations:** • IT infrastructure connections for additional content • Replacement of existing displays
Implementation Complexity: Compatible with existing content management system; minimal building modification required, if any	**Operating Cost Considerations:** • Content delivered through airport-wide content management system • Routine maintenance and replacement of displays
Customer Benefits: • Enhanced customer experience through alternate content that can inform passengers about what to expect next; e.g., ground transportation services, connecting flights, etc.	
Stakeholder Benefits: • Reduces operating costs by reducing the number of complaints from customers due to missed connections or lack of information	
Entities Involved: • Terminal Owner/Operator Customer Service • Terminal Owner/Operator Information Technology • Airport Planning & Engineering	**Beneficiaries:** • All international arriving passengers making connections or utilizing ground transportation services
Brand Relevance: • Informed Passenger	**Representative Airport(s):** • Boston Logan International Airport • Amsterdam Airport Schiphol

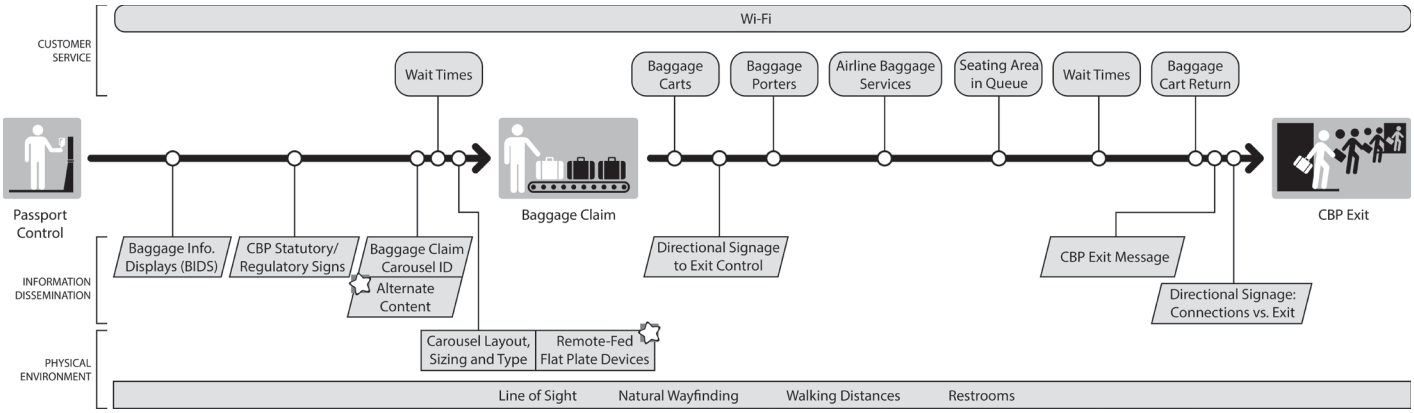
Implementation Considerations

BIDS with Alternate Content: It is not difficult to implement this technology using a mature content management solution; however, careful thought and planning should go into the content displayed. It should be constantly monitored to ensure the customer is receiving correct, updated information. Providing too much or too little information will leave the customer frustrated. Providing direction as to where more information can be obtained will draw the crowd away from the claim area, which can become easily congested during peak times. Useful information that could help arriving passengers includes weather conditions, weather and travel advisories, ground transportation information, and notable local and regional events. Table 4-10 provides a summary of the implementation considerations for BIDS with alternate content.

As for the cost factors, if the system infrastructure is in place, developing the content could be done in house rather inexpensively. For airports with a full CMS this notable innovation is relatively simple to implement, but if it is a common platform that does not allow customization, then a full digital system deployment is required.

4.4.6 Passport Control to CBP Exit Control Journey Segment Evaluation Tool

Figure 4-37 provides a summary of basic requirements and notable innovations described earlier for the baggage claim to CBP exit control journey segment. The items are in chronological



Source: ACRP 03-35 Research Team

Figure 4-37. Passport control to CBP exit control journey segment evaluation tool.

order to give an indication of when or where they should occur in the customer experience for this journey segment.

4.5 Arrivals Hall

The arrivals hall is the point at which passengers enter the non-secure area of the terminal and officially arrive at their destination. The arrivals hall includes the meeter/greeter area, information booths, ground transportation services, a business center, and concessions. The discussion in this section assumes that connecting passengers go through airline recheck prior to exiting the CBP area and then on to the location of their departing flight. Chapter 6 provides discussion about connecting passengers.

4.5.1 Key Activities

The arrivals hall experience for air travel customers includes one or more of the following activities depending on the nature of their travel:

- Meeter/greeter connection
- Commercial or public ground transportation services
- Queuing and waiting areas for commercial or public ground transportation services
- Business center or other commercial services
- Arrivals lounge
- Food and beverage and retail concessions

Meeters/greeters should also be considered customers in the arrivals hall. They may require the following services or amenities:

- Food and beverage and retail concessions
- Seating
- Arriving flight information
- Restrooms

4.5.2 Customer Needs and Expectations

The arrivals hall can be an overwhelming experience as it is usually a larger space that provides many options about available facilities and amenities. In particular, passengers arriving on

a long-haul flight who do not read English could potentially experience a language barrier and culture shock in addition to travel fatigue, jet lag, and information overload.

Some arriving passengers will be looking for a person or group waiting to meet and greet them at the arrivals hall. These passengers require visual cues to direct them to the meeting place. When a large number of greeters are waiting near the doors where passengers exit from passport control, it can be challenging to locate the meeting place and the party they are expecting to find. Thus, enhanced signage may be required to mark the location where arriving passengers can find the person or group waiting for them. The use of landmarks (e.g., a fountain, sculpture, etc.) can be helpful to fulfill this goal.

Some arriving passengers will require information about the location of taxis, limos, hotel shuttles, or other forms of ground transportation. These passengers require wayfinding information to direct them to the appropriate location. Depending on the airport, these services may be accessed at service counters located within the terminal, just outside the doors at the curbside, at the terminal roadway on an outer island, within the parking garage, or at a remote building that can be accessed using a train or shuttle.

Some passengers arriving on business require facilities such as a lounge to refresh before conducting business or a business services center to make last minute preparations before a meeting. These facilities are typically not as prominent as the more primary destinations (e.g., ground transportation, information, concessions, restrooms) and therefore may be more difficult to locate.

4.5.3 Customer Service

The arrivals hall provides the first impression of the destination and therefore is a crucial component of the customer's experience. Person-to-person customer service occurs at several points during this part of the journey, including:

- Information counter or welcome center
- Ground transportation services counter(s)
- Food and beverage and retail concessions
- Commercial services
- Hotel counters and information boards
- Ground transportation service operators

Other elements of the customer experience include: waiting areas or queues for commercial ground transportation services, availability of concessions and other services such as business centers or arrivals lounges.

Basic Requirements

Meeter/Greeter Area: In the arrivals hall, the first impression for the customer is the meeter/greeter area or lobby. The meeter/greeter area should include some physical barrier, such as a rail, to prevent meeters and greeters from congregating around the entry doors to the arrivals hall, but allows customers space to identify the party waiting for them. Video displays providing information about the actual arrival time and estimated time for CBP processing should be considered so meeters and greeters are not waiting at the entrance to the arrivals hall for long periods of time.

The size of the meeter/greeter area varies substantially from airport to airport, as it is based on a number of factors such as the social and religious culture of the customers, distance from the population center, nature of the destination (business or leisure), and common modes of ground transportation. Airports should survey or interview arriving passengers on a regular basis to develop an accurate

Source: ACRP 03-35 Research Team

Figure 4-38. Welcome sign kiosk at Munich Airport Terminal 2.

estimate of the number of meeters and greeters per passenger. IATA (2014) provides a formula for calculating the area of the arrivals hall using a ratio of seated versus standing meeters/greeters and an assigned amount of space for each group (18.3 square feet for seated, 12.9 square feet for standing).

One notable innovation observed during the research was a "welcome sign" printer in the meeter/greeter area in Terminal 2 at Munich Airport (see Figure 4-38). This kiosk allows meeters and greeters to print their own welcome sign so that the passengers can more easily identify them as they exit the CBP area.

Information Counter: Most airports provide an information counter in close proximity to the CBP exit in the Arrivals Hall where volunteers or the terminal owner/operator's staff provide information about ground transportation services, the surrounding region, and other customer services.

Another notable customer service innovation in the arrivals hall was the Welcome Center at John F. Kennedy International Airport Terminal 4 (see Figures 4-39 and 4-40). It is located

Source: ACRP 03-35 Research Team

***Figure 4-39. Welcome center at JFK International Airport Terminal 4* (front view).**

Source: ACRP 03-35 Research Team

***Figure 4-40. Welcome center at JFK International Airport Terminal 4* (back view).**

immediately after the exit from the CBP area and provides ample area for passengers to interact directly with airport staff.

The JFK Welcome Center greets arriving passengers as they pass through CBP exit control. This easily identifiable structure creates a bright, inviting atmosphere staffed by uniformed personnel. The center provides space for passengers to queue to use the courtesy telephones for ground transportation services to hotels and rental car services. A restricted internet browser provides access to Port Authority-permitted websites that support airport services.

Kiosks with touch screens are programmed to provide information about local tourist attractions complete with QR codes for passengers to scan to obtain additional information on their smart phones.

The Welcome Center staff actively engages customers leaving the CBP areas to offer assistance. Some passengers may not realize they require assistance until passing the Welcome Center.

Concessions and Amenities: Since meeters and greeters, including pre-arranged transportation providers, may show up early to pick up passengers exiting the CBP area or may have longer to wait due to flight delays, a wide variety of concessions and amenities should be considered for the Arrivals Hall. This might include small retail shops, coffee shops, and full-service food and beverage outlets. Seating areas should also be provided for meeters and greeters so that they are comfortable while they wait. Restrooms in the Arrivals Hall should consider the number of meeters and greeters and other service providers likely to be in the facility during the peak periods because they will be the most frequent users of the restroom facilities.

Arrivals Lounge: For customers traveling for business, an arrivals lounge or short-stay hotel should be considered so that those customers can refresh before their business obligations. A business center should also be considered for any customer who needs to address business or personal matters before leaving the terminal.

Money Exchange: Money exchanges and ATMs are other important services that should be provided in the Arrivals Hall.

Retail and Shopping: Pharmacies and convenience stores are common at many airports outside the United States as customers can purchase items they need before they leave the terminal. These services are particularly useful for visitors who may not know if it will be convenient to

find certain items near where they are staying; and employees working in the terminal may prefer to pick up certain items rather than make an extra stop on the way home.

Baggage Delivery Services: Arriving passengers may desire to have their baggage forwarded to their home or hotel rather than handle it themselves. Many airports outside the United States and some U.S. airports provide this service via third-party service providers. While international arriving customers will still have to claim their baggage prior to exiting the CBP area, U.S. airports should consider providing this service in the Arrivals Hall.

Ground Transportation Waiting Areas: Waiting areas should be provided for customers utilizing regularly scheduled commercial or public ground transportation services because there may be a long delay between exiting the CBP area and the scheduled time of departure for the ground transportation services. In some cases, an airport may have a consolidated ground transportation center where this type of amenity is provided. The waiting area should display pertinent information about the ground transportation services, such as schedules and contact information. Courtesy phones should be considered for customers who do not have U.S.-based mobile phones.

Taxi Queue: Taxi queues are another important part of the customer experience in the Arrivals Hall. They should be well organized and sized to handle peak period traffic and located in an area that is protected from extreme outdoor environmental conditions.

Ground Transportation Service Providers: Many arriving passengers interface with ground transportation service providers. As discussed in *ACRP Report 157*, developing a customer service training program that established expectations for all service providers is a crucial element in creating a customer service culture and enhancing the customer experience.

Implementation Considerations

Welcome Sign Kiosk: The installation of a welcome sign kiosk is typically a simple process requiring very little infrastructure or equipment, primarily a computer, printer, and the kiosk enclosure, along with an electrical outlet. The airport customer service department should not have to coordinate with any other stakeholders as the kiosk could be used by all meeters and greeters. Table 4-11 provides a summary of the key considerations for implementing a welcome sign kiosk.

Welcome Centers: Many U.S. international terminals provide some type of information booth in the arrivals hall. A welcome center is a larger, more customer-centric version of an information booth so the implementation should primarily involve the replacement of the physical infrastructure and adding some self-service technology components. The staffing for the welcome center would be the same as for an information booth. Table 4-12 provides a summary of the key considerations for implementing a welcome center.

4.5.4 Physical Environment

The physical environment of the arrivals hall is just as important as the services offered. The architecture and interior design should promote a distinct sense of arrival that is reflective of the local community and the layout should facilitate ease of movement for passengers (many of whom will have baggage carts) and meeters and greeters.

Basic Requirements

Sense of Place and Natural Wayfinding: The architecture and interior design of the arrivals hall should promote a welcoming environment that optimizes natural light and provides a visual

Table 4-11. Implementation considerations for welcome sign kiosks.

Welcome Sign Kiosks

Applicability:
All international terminals; particularly those with a high percentage of O&D passengers

Capital Cost Considerations:
- Design, construction and installation of the kiosk
- Printer, touchscreen display and computer

Implementation Complexity:
Installation requires minimal, if any, building modifications

Operating Cost Considerations:
- Routine maintenance and hardware/software updates
- Printing supplies

Customer Benefits:
- Both passengers and meeters and greeters receive an unexpected benefit by being able to print a customized welcome sign at the terminal

Stakeholder Benefits:
- Increased advertising revenue potential
- Increased concession revenue potential due to improved customer satisfaction

Entities Involved:
- Terminal Owner/Operator Customer Service
- Airport Marketing/Public Relations

Beneficiaries:
- Meeters and greeters and the arriving passengers they are meeting

Brand Relevance:
- Customer-centric airport

Representative Airport(s):
- Munich Airport Terminal 2

Table 4-12. Implementation considerations for welcome centers.

Welcome Centers

Applicability:
All international arrivals terminals

Capital Cost Considerations:
- Welcome Center design, construction, and installation
- Computers, displays, and IT connections

Implementation Complexity:
Replaces existing information counters

Operating Cost Considerations:
- Staffing is the same as for an information counter, if not reduced given self-service technology offered at a Welcome Center
- Routine maintenance and update of content and self-service technology

Customer Benefits:
- Customers benefit by having a visually prominent and inviting area where they can seek information by speaking with a customer service representative or using self-service technology

Stakeholder Benefits:
- Customer service representatives are able to assist more customers as there is a seating area for customers to wait and there are self-service options

Entities Involved:
- Terminal Owner/Operator Customer Service

Beneficiaries:
- All arriving passengers in the Arrivals Hall

Brand Relevance:
- Customer-centric airport

Representative Airport(s):
- JFK International Airport Terminal 4

connection to the non-secure areas of the terminal and the outside. Regional artwork or large displays that showcase the surrounding region should be considered to give customers a distinct sense of place. The building structure and other key physical elements should situated so there are clear sight lines from the entry to the arrivals hall to the exit points for various functions. Landmarks or other distinct visual elements should be used to create "meeting points" or way-finding devices that can be used to guide passengers to various ground transportation services (see Figure 4-41).

Vertical Circulation: Since many arriving international passengers use baggage carts, the primary means of vertical circulation from the arrivals hall to other arrivals functions, such as pedestrian bridges to terminal parking garages or ground transportation services, should consist of large-capacity flow-through elevators, ramps, or sloped floors. Escalators should be considered only as a secondary means of vertical circulation. The elevators should be clearly marked and lit so that customers know to use them to get to the next step in their journey.

The elevators and escalators should be located in pairs or banks of three or more to provide sufficient redundancy for periods of scheduled or unscheduled maintenance. They should allow passengers to continue along the path of travel without making U-turns, which can be disorienting. The ramps and sloped floors (shallow ramps that do not require landings) provide much greater capacity and are not subject to periodic maintenance issues; however, they take up substantially more space due to the gradient requirements. Ramp slopes should be between 1:20 and 1:40 (depending on the distance) to provide a comfortable gradient that does not require assistance for customers in wheelchairs or is too arduous for elderly customers with baggage carts.

Inclined moving walkways are used in many airports outside the United States to provide vertical transition between the arrivals hall and the terminal landside area. Special baggage carts with locking casters or automatic brakes are required for use on these devices, which typically have a steeper slope (normally 20 degrees) and therefore do not take up as much space as a ramp. Inclined moving walkways are currently prohibited in the United States by the American Society of Mechanical Engineers (ASME) Safety Code for Elevators, Escalators, and Related equipment, which limits the slope of a moving walkway to 12 degrees and prohibits the use of baggage carts on moving walkways (2013).

Source: ACRP 03-35 Research Team

Figure 4-41. Visual elements used to facilitate wayfinding at Beijing Capital International Airport.

Arrivals Hall Configuration: The layout and size of the arrivals hall should facilitate the flow of customers and meeters and greeters. The primary circulation path should be separate from the meeter/greeter area to minimize congestion. Clear lines of sight and visual landmarks should be used to promote natural wayfinding to the greatest extent possible.

4.5.5 Information Dissemination

The arrivals hall is a hub of activity. With passengers arriving in larger groups that also generate equally large groups of meeter and greeter traffic, anything an airport can do to simplify and streamline this area will be of benefit. At this point, an arriving passenger may be engaged in any of the following:

- Meeting another party, whether personal or business.
- Searching for ground transportation. This can be pre-arranged or secured at the time of arrival.
- Looking for the path to parking lots or structures where they left their car.

Basic Requirements

Arrival Location: For airports with more than one terminal, the first step is to confirm/re-confirm the terminal where the passenger will be arriving so they know where they are and can correctly communicate this information to other persons (see Figure 4-42).

Having clearly identified meeter/greeter areas is also an important part of the customer experience and helps provide a common point of reference (see Figure 4-43).

Exit Identification: Another common point of reference associated with passenger pick-up and or meeter greeter scenarios is the exit vestibule. The inside and outside of each vestibule should use consistent terminology and have specific and unique designations (see Figure 4-44). Unique door designations also benefit airport security to know where to go when responding to a call.

- Terminal identification
- Level
- Unique door identification

One scenario often overlooked is how do passengers arriving at the same airport but in different terminals connect to their departure gate? This can be further complicated if the passengers

Source: ACRP 03-35 Research Team

Figure 4-42. Welcome to Terminal 4 signage at Heathrow Airport.

Source: ACRP 03-35 Research Team

Figure 4-43. Arrivals signage at Heathrow Airport.

from different flights need to meet one another before the connecting flight. Can they meet on the secure side (post-security) of the terminal? Do they both have to exit security and then figure out where they are? To enhance the customer experience upon arrival, a wayfinding system should be developed to provide consistent information identifying the name and location of the arrival terminal in relation to other terminal or gate areas and an information desk (or roving information staff) strategically located along the journey segments. Access to similar information on the airport website allows the customer to engage in pre-trip planning communication and coordination.

Ground Transportation Services: Similar to other journey segments, communicating ground transportation (GT) information is affected by the airport design and the GT service operation itself. The result can be challenging because of the many choices and how to distinguish the decisions to be made.

Because the GT service operation is set up differently at every airport, basic decisions may include: where to go to pick a rental car; can they walk or do they need to take a train or shuttle bus to a remote rental car facility? Is there a fee to ride this shuttle? Some terminals have GT

Source: ACRP 03-35 Research Team

Figure 4-44. Door numbering signage at San Francisco International Airport.

services on one roadway level while others have them on both roadways; this can create basic wayfinding questions such as: do all passengers access all GT services using the same or different routes? For example, at Dallas/Fort Worth International Airport, all customers exit in the same direction to the lower level roadway GT services operation, allowing DFW to use one umbrella term of ground transportation to guide passengers to the vestibule leading to all the GT services. Once on the lower level roadway, the GT services are listed individually according to type and location (see Figure 4-45).

At other airports, like Amsterdam Airport Schiphol, the GT services are accessed via multiple routes that require each GT service to be listed separately. Some airports, like Beijing Capital International Airport, utilize large fruit icons over the vestibules to help guide passengers to the correct door. Figure 4-46 provides examples of these approaches.

Terminology and Symbology: Most customers know what mode of transportation they plan to use before arriving at the airport. For these customers, signage should be a confirmation of their transportation choice. However, as previously discussed, airport terminology and symbology can be confusing for customers with language barriers or the learned experiences and cultural influences they bring with them from other countries.

Terms used to describe modes of ground transportation can be similar, e.g., shuttles versus buses versus vans, and the symbols for these services may look similar (see Figure 4-47). Some services are free while others are for hire. This information is important to customers and it should be provided in the signage.

Airports with trains provide another potential source of confusion for passengers. Train service at airports can connect between terminals or remote services, such as a rental car center,

Source: ACRP 03-35 Research Team

Figure 4-45. Ground transportation signage at Dallas/Fort Worth International Airport.

Source: ACRP 03-35 Research Team

***Figure 4-46. Ground transportation signage at Amsterdam Airport Schiphol* (left) *and Beijing Capital Airport* (right).**

or to mass transit train service. When separated between airside and landside this is typically not an issue, but when access to more than one type of train is provided on the landside it can be challenging to distinguish between the different train services. Airports view their trains as a branding opportunity; mass transit trains typically also will receive some level of branding. If the information is not properly packaged to convey the type of transit services offered, it can result in passenger confusion.

For example, most mass transit train services have a distinct name, BART, DART, MARTA, etc., that does not describe its function. Therefore, consideration should be given to the terminology used on the wayfinding information. The name of the mass transit train serving the Changi Airport in Singapore is MRT; however, the airport uses the simple term of "Train to City" for the primary message on the wayfinding information (see Figure 4-48). MRT is listed as a subordinate message.

4.5.6 Arrivals Hall Journey Segment Evaluation Tool

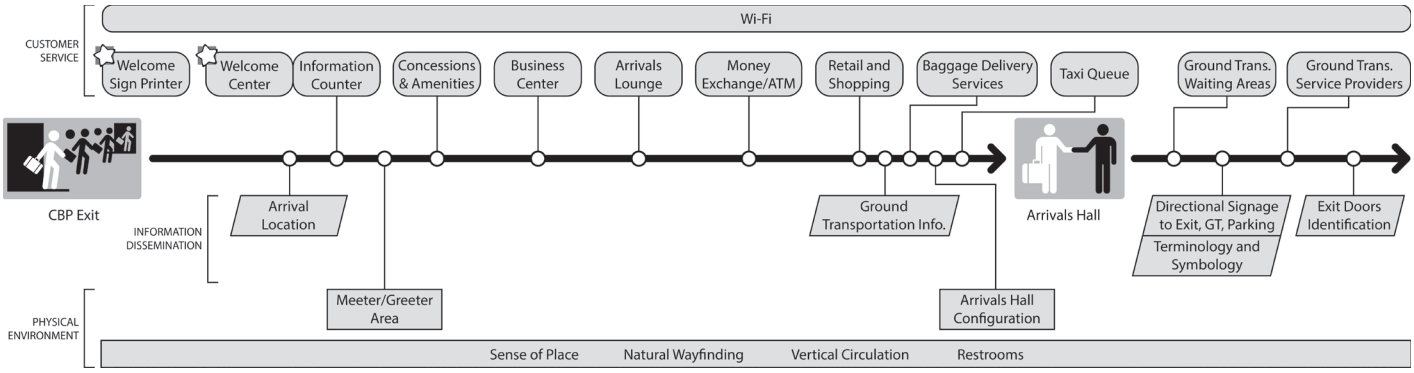
Figure 4-49 provides a summary of the basic requirements and notable innovations described earlier for the arrivals hall journey segment. The items are provided in chronological order to

Source: ACRP 03-35 Research Team

Figure 4-47. Ground transportation information at Changi Airport.

Source: ACRP 03-35 Research Team

Figure 4-48. Train to City messaging at Changi Airport.



Source: ACRP 03-35 Research Team

Figure 4-49. Arrivals hall journey segment evaluation tool.

give an indication of when or where they should occur in the customer experience for this journey segment.

4.6 Terminal Arrivals Roadway/Ground Transportation

The terminal arrivals roadway or ground transportation services often provide the last impression of the customer's arrival experience. This portion of the arriving passenger journey segment primarily involves wayfinding and pedestrian interaction with private and commercial/public vehicles and courtesy shuttles.

4.6.1 Key Activities

The terminal arrivals roadway/ground transportation experience for air travel customers includes one of the following activities, depending on the nature of their travel:

- Private vehicle pick-up
- Terminal parking
- Courtesy shuttle to parking or hotel

- Commercial ground transportation
- Public ground transportation

4.6.2 Customer Needs and Expectations

Depending on the size of the airport, the curbside area just outside the terminal building can be a busy area with a multitude of services occupying specific locations along the length of the terminal building and sometimes spanning several islands. For unfamiliar passengers who may be jet lagged or fatigued, it can be challenging to find the locations for passenger pick-up, taxi stand, limo stand, airport shuttles, public transportation, and other shuttles. It is generally helpful to provide a directory map near each exit door to orient passengers as to where they are and where a service is located. Key considerations include a general level of illumination, crosswalk visibility, and visibility of signs associated with each service.

At some airports, the arrivals curbside is located on a lower level covered by the departures roadway above. Thus, even in the daylight artificial lighting is required to sufficiently illuminate the curbside area. Lower levels of light can make it difficult for passengers to see and read signs at a distance and it can be difficult for drivers to see pedestrians wearing dark clothing.

Crosswalks are a passenger safety feature. These marked areas identify where drivers should expect to see pedestrians crossing the road. Higher levels of light are required in these areas and the pavement markings and signs directing drivers should be well identified.

Signs to identify the location of each service need to be large enough, with sufficient letter height to be noticed and read from distances ranging from 50 to 100 feet or more depending on the distance from the terminal exits and the number of islands at curbside. A general rule of thumb is that the legibility should be 30 feet per inch or better. For example, if the sign is to be read at a distance of 120 feet, the letter height should be a minimum of 4 inches tall. The signs should have sufficient contrast between the letters and the background color. Color-coded signs can help passengers identify their location more quickly.

4.6.3 Customer Service

The terminal arrivals roadway and ground transportation segment of the customers' arrival experience will likely be influenced by their interaction with the following entities responsible for maintaining orderly operations and providing courteous service:

- Law enforcement officers
- Ground transportation managers
- Ground transportation service providers

Basic Requirements

Traffic Enforcement: Traffic enforcement for private vehicles on the international terminal arrivals roadway is particularly important to prevent long dwell times associated with waiting for customers or meeters spending excessive time reuniting with customers. Airport customer service and operations should work with law enforcement officers to establish the best approach for handling these situations, from a person-to-person interaction and through operational policies. Having law enforcement constantly barking at private vehicle operators to move off the curb is not an acceptable customer service and could be viewed as offensive by many foreign cultures.

Ground Transportation Management: Ground transportation managers are responsible for maintaining orderly queues and reviewing operating schedules to make sure the various modes of transportation are performing as scheduled. They also should receive appropriate customer

service training and be provided with access to information since many customers need additional details about their ground transportation arrangements or have questions about their destination.

Ground Transportation Service Providers: The airport customer service training program should include the ground transportation service providers authorized to serve the airport. At a minimum, customer service expectations should be communicated to the service providers and they should be included in any incentive or reward programs that the airport operator maintains for other service providers within the terminal.

Ground Transportation Information: Customer service on the terminal arrivals roadway and ground transportation services includes providing information about scheduled and unscheduled ground transportation services, including the route schedules, booking information, typical fares, and tipping suggestions. This is especially helpful for first time foreign visitors who may be from countries with very different ground transportation operations. Providing this information gives customers confidence that they are not getting "ripped off" by the operators.

Digital Passenger Advisory Signage: In many transit centers, such as those at Boston Logan International Airport (see Figure 4-50) and Baltimore-Washington International Airport, passenger advisory signage is provided to inform passengers when to expect the next airport shuttle bus. At Baltimore-Washington International Airport, over 50 LED signs were installed at the bus shelters and bus stops, in assorted parking lots and garages, and along the arrivals road. The signage is connected to an Automatic Vehicle Location system using GPS and cellular technology to transmit the locations of buses for real-time updates. While this is helpful information for all customers, those in the northern regions of the United States particularly appreciate this information during the winter months, which allows them to find a warm place to wait with the confidence they will not miss their bus.

Implementation Considerations

Digital Passenger Advisory Signage: Because many vendors have a mature, proven product known in the marketplace, implementing the technology is not difficult; it is the installation. With construction projects, there are implications to consider such as infrastructure routing for power and communications or the use of solar and cellular. The buses utilize GPS and cellular to transmit location to a headend system, which updates the signage. This is typically considered a capital improvement project for the airport. Operations and engineering is involved with the design and commission of the project and airport maintenance usually maintains the system.

Source: ACRP 03-35 Research Team

Figure 4-50. Digital passenger advisory signage at Boston Logan International Airport.

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Table 4-13. Implementation considerations for digital passenger advisory signage.

Digital Passenger Advisory Signage	
Applicability: All international terminals	**Capital Cost Considerations:** • Displays • Electrical and data infrastructure • Content management software and hardware
Implementation Complexity: Requires electrical and data connectivity	**Operating Cost Considerations:** • Routine maintenance • Hardware and software updates
Customer Benefits: • Customers are informed of when the next vehicle will arrive and can decide how to use their time while they wait, such as finding a comfortable waiting area or using the restroom without fear of missing the vehicle	
Stakeholder Benefits: • Reduces operating costs by minimizing the need for customer service staff to provide ground transportation information	
Entities Involved: • Terminal Owner/Operator Operations • Terminal Owner/Operator Maintenance • Airport Engineering • Airport Information Technology	**Beneficiaries:** • All arriving passengers utilizing ground transportation services
Brand Relevance: • Customer-centric airport • Convenient ground transportation services	**Representative Airport(s):** • Baltimore Washington International Airport • Boston Logan International Airport

After procuring the initial license for the software, the annual ongoing costs will include contracts to maintain the GPS and cellular connections and specialized product maintenance, i.e., software and route updates. Table 4-13 provides a summary of implementation considerations for passenger advisory signage.

4.6.4 Physical Environment

The physical environment of the terminal arrivals roadway and ground transportation area should minimize pedestrian–vehicle conflicts and promote a sense of safety and security.

Basic Requirements

Pedestrian Safety: Pedestrian safety is the most important consideration for the physical environment of the terminal arrivals roadway and ground transportation area. Most terminal arrivals roadways are split for commercial and private vehicle use. Commercial vehicles and courtesy shuttles are typically on the inner roadway (i.e., closest to the terminal exit). These operators are familiar with the arrival roadway operations and are more observant of pedestrians crossing the road to get to the private vehicle curb. It also allows passengers to wait for their vehicles inside the terminal as opposed to a remote curb. Locating private vehicles on the outer roadway also helps reduce congestion on the inner roadway. Private vehicles also need easy access to hourly parking typically located in the terminal parking garage. While each airport has a unique terminal roadway configuration, airport customer service, operations, and planning should work collaboratively to determine the best roadway allocation that can accommodate demand and considers the customer experience.

Grade-separated pedestrian crossings should be provided to the terminal parking areas. This increases the capacity of the terminal arrivals roadway by reducing pedestrian crossing and improves the customer experience.

Lighting: Because most terminal arrival roadways are located below the departures roadway, the use of natural light should be maximized. Artificial lighting can be used to reduce or eliminate the feeling of being in a dark tunnel.

Covered Loading Areas: If the arrivals roadway is not located below the departures roadway, a canopy should be provided to cover at least one-and-a-half vehicle lanes (approximately 18 to 20 feet) from the edge of the curb to protect meeters and customers from inclement weather.

Hourly Parking: Hourly parking (two hours or less) should be provided close in to the terminal exit near the Arrivals Hall so meeters and greeters can park while waiting for their party. This parking area is commonly located in the terminal parking garage.

Cell Phone Lots: Most U.S. airports provide cell phone lots that allow meeters and greeters to wait in their car until they get confirmation that their arriving party is at the terminal curb. Cell phone lots are especially beneficial for meeters and greeters waiting for international arriving passengers who may get delayed in the CBP area.

4.6.5 Information Dissemination

The arrivals curbside area at most airports tends to be quite congested, especially at peak travel periods. Safety is a primary concern because pedestrians and vehicular traffic occupy the same space. Therefore, appropriate safety and regulatory signage should be implemented as required.

Passengers being picked up by private vehicle need to communicate to the driver where they are on the curbside. The basic information needed by the passenger includes the terminal and terminal level, and some unique identifier along the curbside. This identifier can be a door number, airline name, "Passenger Pick Up" zone signage, etc.

Passengers looking for courtesy shuttles, commercial ground transportation or public ground transportation may need directional signage accompanied by signage that identifies each zone. The majority of the U.S. airport visited use some level of color-coding to help organize the different pick-up point zones along the curbside so passengers know where to wait (see Figure 4-51).

4.6.6 Terminal Arrivals Roadway/Ground Transportation Journey Segment Evaluation Tool

Figure 4-52 provides a summary of the basic requirements and notable innovations described earlier for the terminal arrivals roadway/ground transportation journey segment. The items are provided in chronological order to indicate when or where they should occur in the customer experience journey segment.

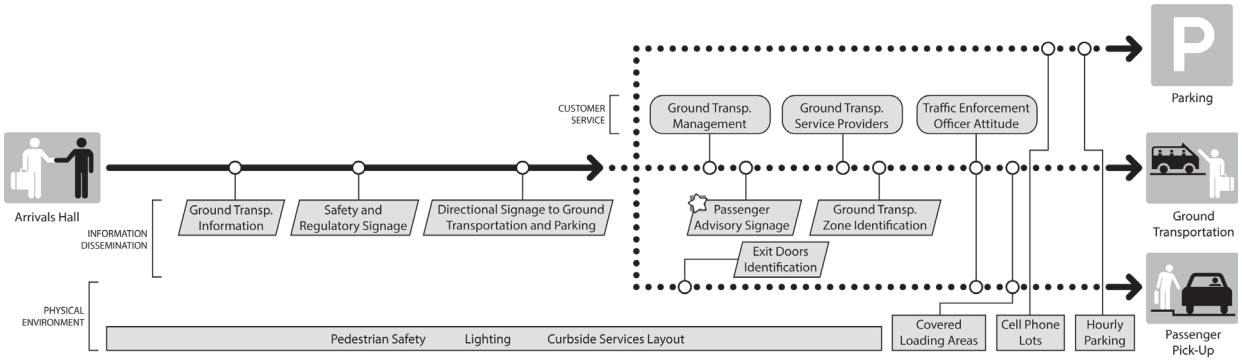
4.7 Airport Egress Roadway

The airport egress roadway provides access from the airport to the community that the airport serves. While many customers may utilize commercial or public ground transportation services or be picked-up by family or friends, some customers will rent a car and use the egress roadway for the first time. Some drivers may be driving a car in the United States for the first time.

Clear information should be provided along the roadway so drivers can connect to the major arterial roadways.

Source: ACRP 03-35 Research Team

Figure 4-51. Color-coded ground transportation signage at Dallas/Fort Worth International Airport.



Source: ACRP 03-35 Research Team

Figure 4-52. Terminal arrivals roadway/ground transportation journey segment evaluation tool.

4.7.1 Customer Needs and Expectations

Drivers leaving the airport bring with them all of their experiences and expectations about roadway design and traffic control. Passengers leaving the parking garage may be familiar with the roadway network or they may be driving a rental car with no prior experience driving in the area. It is assumed that the design driver is unfamiliar with the area and driving under less than ideal conditions, such as at night or fatigued. The roadway network should be easy to understand and the signage should meet five basic requirements:

- Fulfill a need;
- Command attention;
- Convey a clear, simple meaning;
- Command respect from road users; and
- Give adequate time for proper response.

For more information about the design of effective wayfinding and signage systems for airport roadways, refer to *ACRP Report 52: Wayfinding and Signing Guidelines for Airport Terminals and Landside*.

CHAPTER 5

Connecting Passengers

The connecting passenger experience in the United States is different from many other countries, particularly for international arriving passengers connecting to domestic or international flights. In the United States, all international arriving passengers connecting to other flights must go through the CBP inspection process, claim their checked baggage, and recheck it with the airline operating their connecting flight. Connecting passengers arriving on a U.S. domestic flight or a precleared flight and connecting to an international flight are processed in the same way as international departing passengers, except they do not need to go through the ticketing/check-in process.

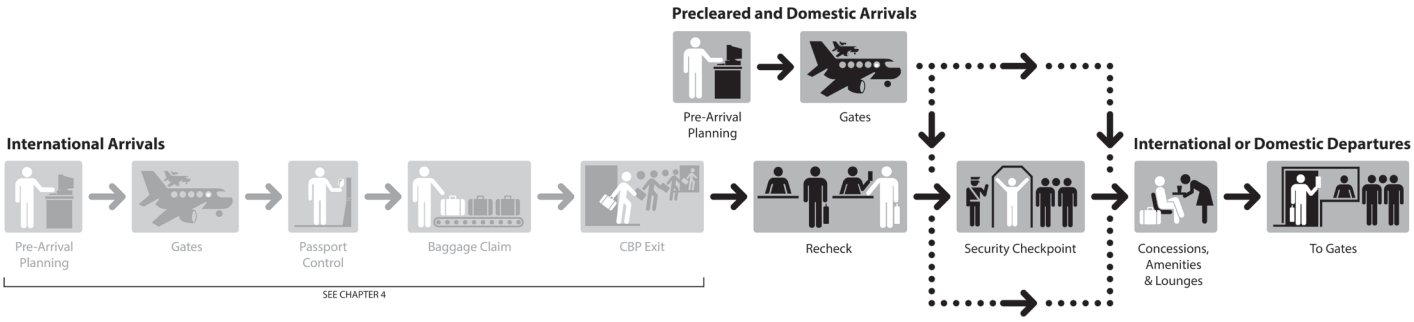
The purpose of this chapter is to provide airport stakeholders with guidelines specific to the unique needs of connecting passengers, whether arriving via international or domestic/precleared flights, so the appropriate services and facilities can be provided to enhance their airport experience.

5.1 Overview of the Connecting Passenger Journey Segment

The connecting passenger journey segment, as illustrated in Figure 5-1, focuses on the processes customers experience after they have completed the CBP inspection process or upon their arrival on a domestic flight along the way to their departing flight. International arriving passengers connecting to another flight must recheck their checked baggage and go through the security checkpoint before they can proceed to their departure gate. Customers arriving on domestic or precleared flights do not have to claim their checked baggage and may or may not have to go through the security checkpoint before they can proceed to their departure gate, depending on the location of their departure flight and configuration of the airport terminals.

The journey of an international arriving passenger connecting to a domestic or international flight includes the following steps:

- Pre-arrival planning (described in Chapter 4)
- International arrivals corridor (described in Chapter 4)
- Passport control (described in Chapter 4)
- International baggage claim (described in Chapter 4)
- CBP exit control (described in Chapter 4)
- Airline recheck
- Security screening (described in Chapter 3)
- Post-security concessions and amenities (described in Chapter 3)
- Departure gate (described in Chapter 3)



Source: ACRP 03-35 Research Team

Figure 5-1. Connecting passenger journey segment.

The journey of a domestic arriving passenger connecting to an international flight includes the following steps:

- Pre-arrival planning (described in Chapter 4)
- Domestic arrival
- Security screening (if necessary, described in Chapter 3)
- Post-security concessions and amenities (described in Chapter 3)
- Departure gate (described in Chapter 3)

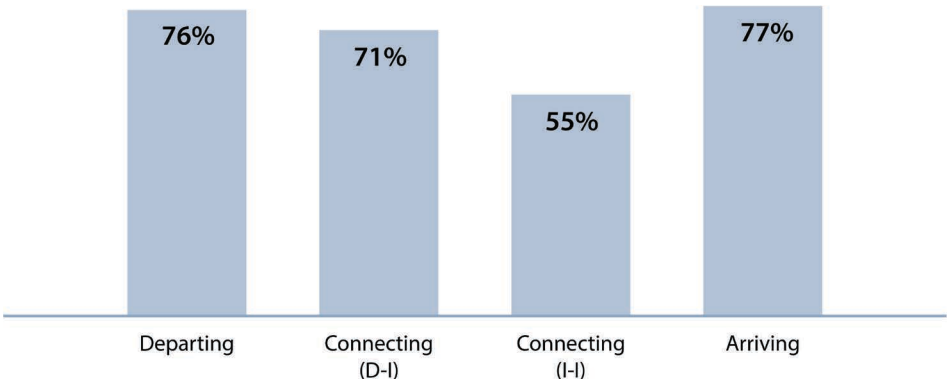
5.1.1 Customer Needs and Expectation

Customer Needs: Connecting passengers experience the airport as both arriving passengers and departing passengers. These passengers could be transitioning between two international flights arriving on an international flight and departing on a domestic flight, or arriving on a domestic/precleared flight and departing on an international flight. In the first two cases, these passengers will experience the following processes: passport control, baggage claim, baggage re-check, and wayfinding to their departure gate. As described in Chapters 2 and 4, some of the challenges these passengers may experience include travel anxiety, jet lag, travel fatigue, culture shock, and language barrier.

Travel anxiety research has shown about one-third of passengers who experience travel anxiety identified the customs and baggage claim processes as the source of their anxiety (McIntosh et al. 1998). FAA reports indicate medical emergencies are generally caused by stress related to flight delays, border control inspection, security screening, and baggage handling (McIntosh et al. 1998). In addition, connecting passengers may also have potential feelings of anxiety about the amount of time before their next flight.

The complexity of the journey through an airport has an effect on passenger satisfaction with their experience in the building. Research has shown there is a strong correlation between time spent waiting in line and passenger satisfaction ratings; and depending on the effectiveness of the wayfinding system, the passenger experience may be stressful or enjoyable (Cave et al. 2013).

In the survey, all passengers were asked to rate their overall satisfaction with the airport. Most departing and arriving passengers rated their overall satisfaction as "Excellent" or "Very Good" (76 to 77 percent, respectively). Conversely, about half of those passengers making a connection between two international flights had a similar positive experience (55 percent), as shown in Figure 5-2. Connecting passengers also had lower ratings of satisfaction with walking distance, waiting time, ease of wayfinding, and helpfulness of staff as compared to departing and arriving passengers. The survey findings confirm that due to the complexity of their journey through



Source: ACRP 03-35 Research Team

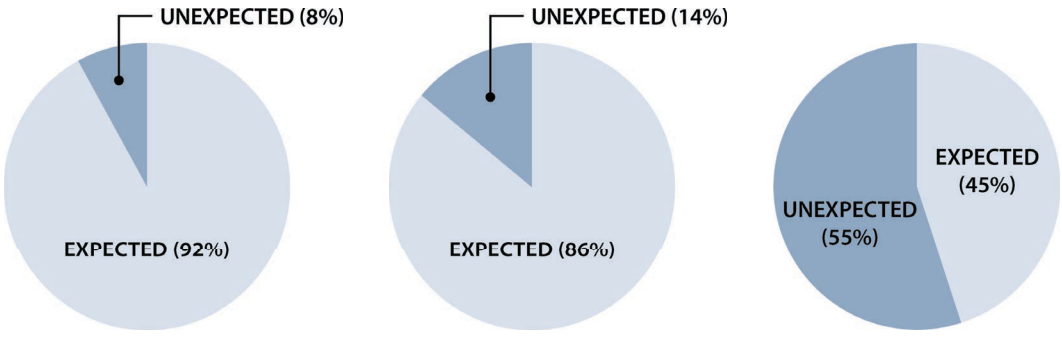
Figure 5-2. Passenger survey results: Overall satisfaction with the airport (ratings of "Excellent" or "Very Good").

the airport, traveling through CBP inspection, baggage claim, security screening, and traveling between arrival gate and departure gate, connecting passengers are more likely to have a stressful experience as compared to those passengers simply departing or arriving at that airport.

Passenger Expectations: According to the survey, about one-third of passengers could only read a little or no English (34 percent). For passengers connecting between two international flights, most passengers (86 percent) expected they would have to go through border control at that airport, but less than half (45 percent) expected they would be required to collect their baggage at that airport and then re-check it after clearing border control. Nearly all passengers expected they would have to go through security (92 percent), as shown in Figure 5-3.

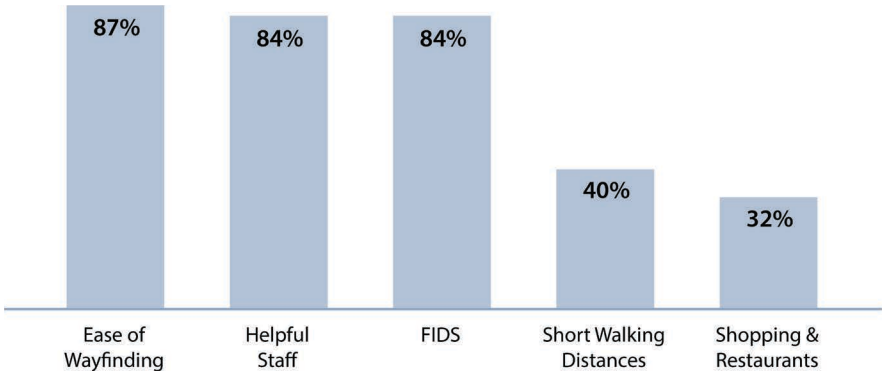
In the survey, connecting passengers were asked to rate the relative importance of 15 airport features. As shown in Figure 5-4, the most important features were ease of wayfinding (87 percent), helpful staff (84 percent), and FIDS (84 percent). The least important features included shopping and restaurants (32 percent) and short walking distances (40 percent).

For long layovers between flights, international connecting passengers may expect to find that the facilities in overseas airports may not be available at airports in the United States (e.g., transfer lounge, hotel within the airport, showers, spa, movie theater, etc.).



Source: ACRP 03-35 Research Team

Figure 5-3. Passenger survey results: Connecting passenger expectations regarding required airport processes.



Source: ACRP 03-35 Research Team

Figure 5-4. Passenger survey results: Most important airport features to connecting passengers.

5.2 Airline Recheck to Security Checkpoint

International arriving passengers connecting to another flight need to recheck their baggage with the airline before proceeding to the security checkpoint. Once this is complete, they can proceed to a security checkpoint designated for connecting passengers or one in the terminal where their flight is departing.

5.2.1 Key Activities

As connecting passengers exit the CBP facilities, they need to determine where to recheck their baggage and confirm which terminal their next flight is departing from. Once these activities are complete, they can proceed to the security checkpoint serving their departure gate.

5.2.2 Customer Needs and Expectations

After exiting the CBP facilities, passengers require directional information to the airline baggage recheck point. Given this procedure is unusual for many foreign passengers, this should be a primary destination on directional signage and be available in multiple languages. In the survey, it was determined that one-third of connecting passengers speak very little or no English. Also, because many foreign passengers may not expect this additional step in the connection process, these passengers are more likely to experience elevated levels of anxiety if they must wait in line to drop off their bags. Flight information screens for departing flights are important at this location to provide passengers with information about the status of their upcoming departing flight.

5.2.3 Customer Service

Person-to-person customer service during this journey segment is commonly provided by airport customer service representatives and airline agents at the recheck counters.

Basic Requirements

Customer Service Representatives: Airport operators should position customer service representatives near the CBP exit to direct connecting passengers to the recheck counters or provide information about where their airline is located so they can recheck their baggage. Customers commonly exit the CBP area in a steady flow and may follow the person in front of them by default. The customer service representative can provide active guidance to connecting passengers to reduce congestion and cross-flow at the CBP exit.

Source: ACRP 03-35 Research Team

Figure 5-5. Customer service representative positioned near the FIDS for connecting passengers at Atlanta International Airport International Terminal.

Customer service representatives may also be positioned within the airline recheck area to provide customers with directions about how to reach their departure gate and where they should go through security. As shown in Figure 5-5, the customer service representatives would ideally be located near the FIDS monitors as customers are likely to stop and determine what gate or terminal their flight is departing from.

Airline Agents: Airline personnel should be located at the recheck counters and at the entry to the recheck area to inform passengers about the requirements and processes for rechecking their baggage. In many cases, checked baggage is tagged to the final destination and the customer only has to deposit their baggage with the airline rather than standing in a queue at the counters (see Figure 5-6). Other customers may need to change travel arrangements due to flight delays or other issues and must see an agent to complete the transaction.

Source: ACRP 03-35 Research Team

Figure 5-6. Airline agents in the baggage recheck area at Los Angeles International Airport Tom Bradley International Terminal.

Source: Photo courtesy of Gresham,Smith and Partners

Figure 5-7. The airline recheck counters are in direct line of sight as connecting passengers exit the CBP facilities at Atlanta International Airport International Terminal. Floor patterns and ceiling lighting reinforce the natural wayfinding.

5.2.4 Physical Environment

The physical environment of this journey segment should facilitate natural wayfinding and minimize any impediments to passenger flow.

Basic Requirements

Natural Wayfinding: The most important aspect of natural wayfinding for connecting passengers as they exit the CBP facilities is a direct line of sight to the airline recheck counters as shown in Figure 5-7. This will minimize the natural tendency for customers to pause after they exit the CBP facilities to assess which direction they need to go next. In cases where the recheck counters are not within the line of sight when passengers exit the CBP facilities, very clear directional signage should be provided, as shown in Figure 5-8.

Source: ACRP 03-35 Research Team

Figure 5-8. Directional signage that separates connecting passengers and terminating passengers at JFK International Airport Terminal 4.

Airline Recheck Location: Because many customers will be using baggage carts, it is preferred that the airline recheck counters be located on the same building level as and immediately after the international baggage claim and CBP exit, but just prior to the exit to the Arrivals Hall. If this is not possible, long, shallow ramps or sloped floors should be used to provide a continuous flow of passengers from the CBP exit to the airline recheck counters.

Unimpeded Passenger Flow: To maintain smooth passenger flow, the area outside the CBP exit should be large enough for passengers to pause briefly and assess which direction they need to go to reach the recheck counters. As shown in Figure 5-9, clear circulation paths should be provided through the airline recheck area so customers in queue at the counters do not impede the flow of other customers. Special consideration should be given to the number of customers that could be in queue during irregular operations where many customers may need to change their travel itinerary.

Connecting Passenger Security Checkpoint: The security checkpoint for connecting passengers would ideally be located immediately after the airline recheck area (as shown in Figure 5-10), especially for customers whose connecting flight is departing from the same terminal. Airports with a secure connection between all terminals should provide a security checkpoint immediately after the airline recheck area to maximize customer convenience. For those airports with multiple terminals without a secure connection, a kiosk with gate locations, directions, and walk time information should be provided, as shown in Figure 5-11. Smaller international terminals should consider combining the recheck checkpoint with a primary departing passenger security checkpoint to optimize staffing.

5.2.5 Information Dissemination

As discussed previously in this chapter, the survey results indicate that international connecting passengers experience more difficulty than arriving or departing passengers. The survey also indicates that the majority of international passengers making a connection did not expect to recheck their baggage after completing the border control process. The combined survey results for wayfinding and connecting passengers indicates that to meet customer needs and expectations, information should be communicated effectively at these points in the travelers' journey. Accommodations for communicating with passengers with LEP should also be considered.

Source: ACRP 03-35 Research Team

Figure 5-9. Clear circulation path in the airline recheck area at Dallas/Fort Worth International Airport Terminal D.

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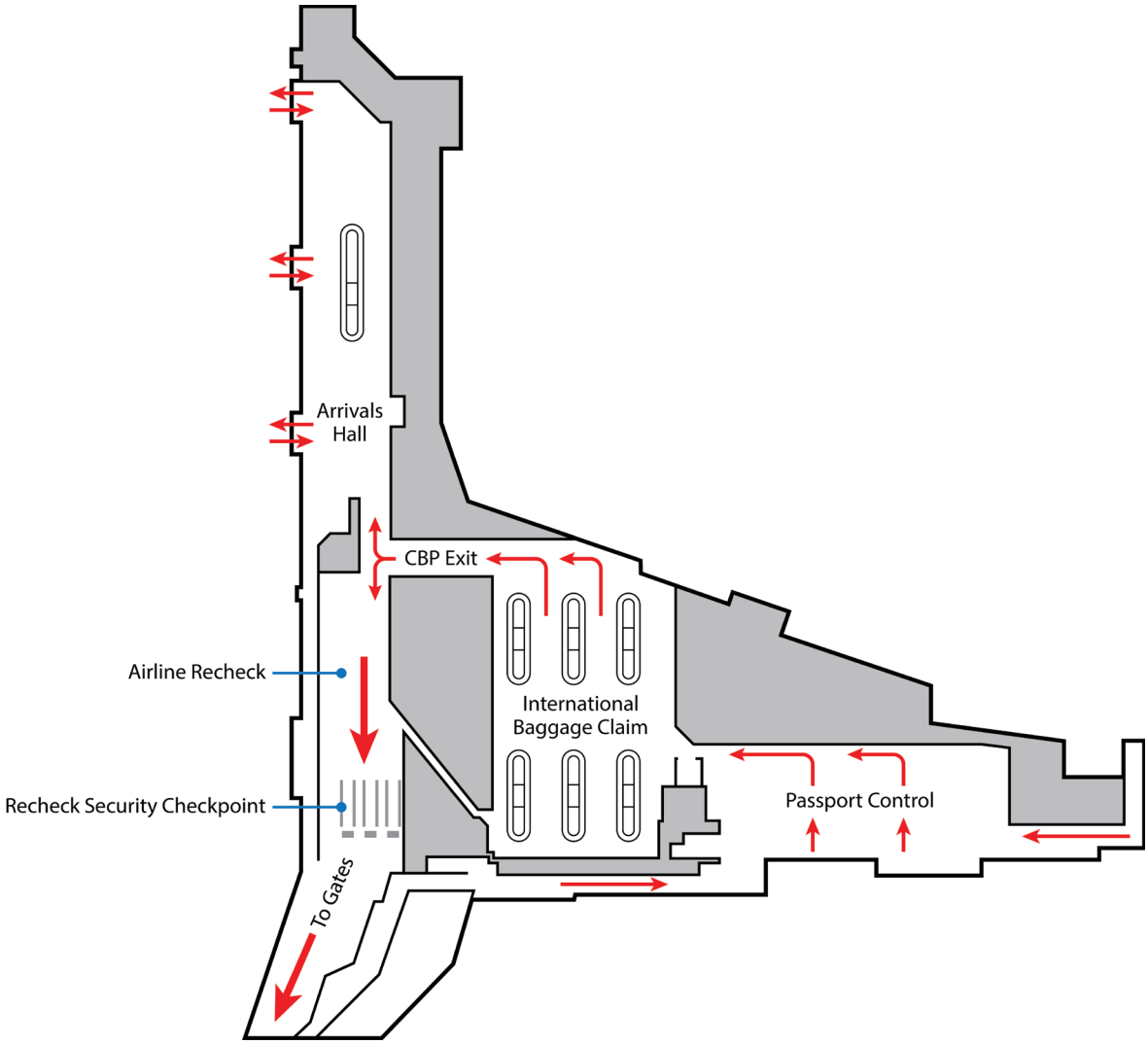


Source: ACRP 03-35 Research Team

Figure 5-10. Location of the security checkpoint for connecting passengers at Atlanta International Airport International Terminal.

Source: ACRP 03-35 Research Team

Figure 5-11. Information kiosk in the airline recheck area providing gate location and walking directions for connecting passengers at Boston Logan International Airport Terminal E.

Basic Requirements

The best wayfinding is intuitive but very few airport terminals are designed to take advantage of natural wayfinding like the International Terminal at the Atlanta International Airport (see Figure 5-7). More commonly, the architecture determines the passenger flow and it varies at each airport, which requires wayfinding information to be communicated. Therefore, when evaluating how to communicate information at this journey segment to the international connecting passenger, keep in mind the basics of the three Vs of communication:

- Visual communication through clear directional signage; see Figure 5-8
- Verbal communication using customer service representatives can be positioned at key decision points; see Figures 5-5 and 5-6
- Virtual communication using:
  - FIDS listing airport-wide flight schedules; see Figure 5-5
  - Kiosks with gate locations, directions and walk time information; see Figure 5-11
  - Airport website; see Figure 5-12
  - Airport and/or airline apps

Connecting Passenger Guides: The first step in international travel is to book the flights and plan for the trip. Some airports offer helpful guides on their websites to assist the traveler and familiarize them with the airport.

Heathrow Airport's website is a prime example. The website motto is "Making every journey better." Connecting passengers can select their inbound and outbound terminals and the website provides a step-by-step plan to guide them to their outbound flight (Figure 5-12). The website lists the estimated connection time and includes a video that sets clear expectations, step-by-step. The passengers are introduced to the purple color-coding used in signs for connecting passengers, so by the time they physically arrive in the terminal, passengers already know what color signs to follow (Figure 5-13). Heathrow Airport's website also offers a simple but entertaining animated video to educate unfamiliar travelers about what to expect and look for when making their connection.

5.2.6 Airline Recheck to Security Checkpoint Journey Segment Evaluation Tool

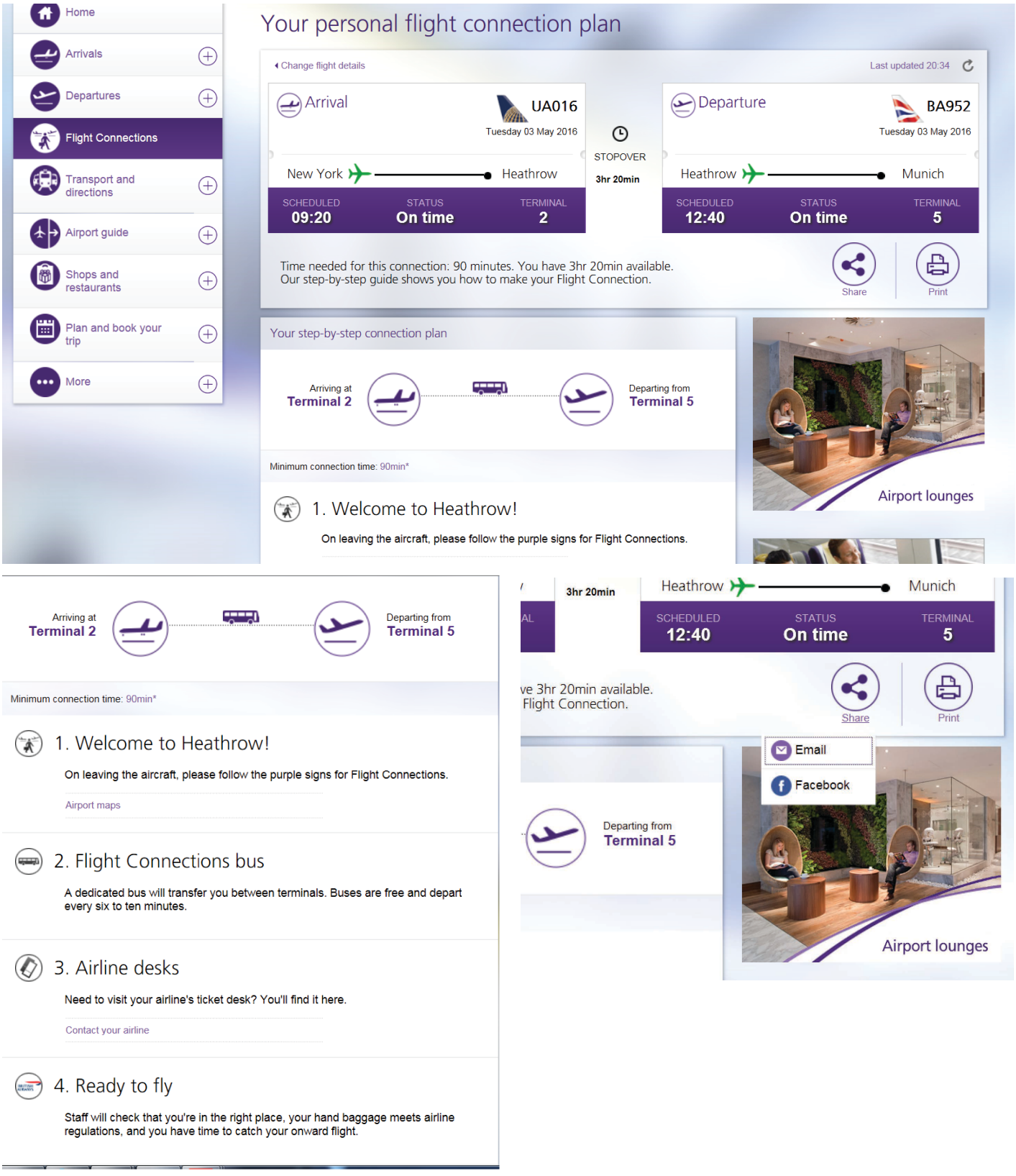
Figure 5-14 provides a summary of the basic requirements and notable innovations described earlier for the airline recheck to security checkpoint journey segment. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

5.3 Domestic Arrival to International Connecting Flight

Domestic arriving passengers connecting to international flights commonly are provided the same information as domestic passengers connecting to domestic flights. While there are no basic differences in the processing requirements for these customers, consideration should be given to how familiar a customer may be with making flight connections at U.S. airports as well as their ability to communicate in English.

5.3.1 Key Activities

There are essentially no activities unique to domestic passengers connecting to international flights as compared to domestic passengers connecting to domestic flights. These customers



Source: http://www.heathrowairport.com/heathrow-airport-guide/flight-connections

Figure 5-12. Example of connecting passenger guides on Heathrow Airport's website.

Source: ACRP 03-35 Research Team

Figure 5-13. Purple color-coded signage reinforces pre-trip information from Heathrow Airport's website and provides clear guidance for connecting passengers.

require information about their connecting flight, including up-to-date flight time, gate location, and directions to the departure gate.

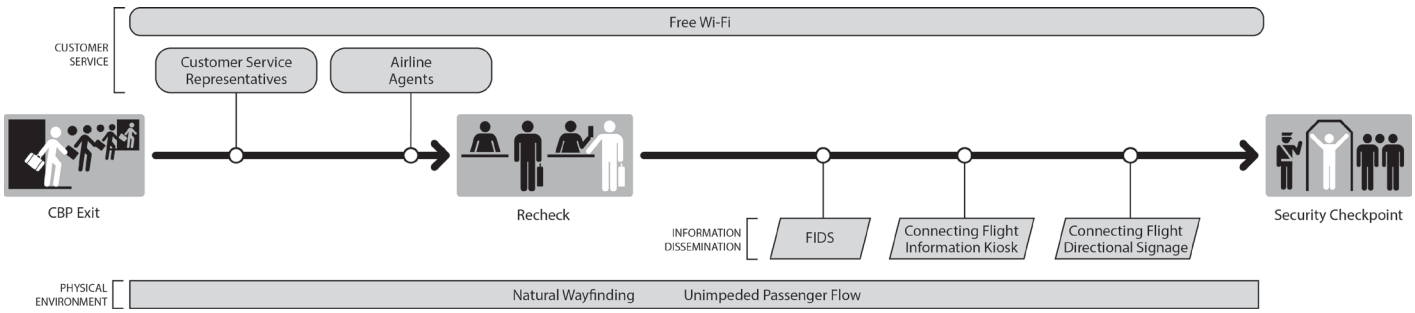
5.3.2 Customer Needs and Expectations

After deplaning at their arrival gate, connecting passengers need the following information: the status of their next flight (e.g., on time, delayed), the location of their next flight (terminal and gate), what options are available to get there (e.g., walk versus ride), and how much time would it take to reach their gate. Although short walking distance was not identified as being very important by most passengers in the survey, connecting passengers were much more likely to express dissatisfaction about walking distances as compared to departing or arriving passengers.

Depending on the airport, connecting passengers may be required to leave a secure area to get to their departure gate and they may not be expecting to do so. To avoid confusion and potential frustration about having to go through an additional security checkpoint, passengers should be provided with this information before they leave a secure area.

5.3.3 Customer Service

Person-to-person customer service for these passengers is primarily delivered by airline gate agents who meet arriving passengers and provide information about connecting flights. Other forms of customer service should include information kiosks along the route to provide



Source: ACRP 03-35 Research Team

Figure 5-14. Airline recheck to security checkpoint journey segment evaluation tool.

customers with confirmation they are going in the right direction or information about amenities and services along the way. This is particularly useful for airports with terminals that do not have a secure connection between terminals, which requires customers to exit the secure area and re-enter through a security checkpoint.

Basic Requirements

Airline Staff: Airline staff should be available at each arrival gate to provide connecting flight information and point customers in the direction of their departure gate.

Information Kiosks: Information kiosks (Figure 5-15) provide walking directions and information about amenities and services available along the way by simply scanning a boarding pass. They are especially useful for customers connecting between terminals.

5.3.4 Physical Environment

Walking distances and building level changes are key issues to consider for connecting passengers.

Basic Requirements

Passenger Conveyances: Inter-terminal connections can be especially arduous so a variety of passenger conveyances, such as moving walkways, electric carts, automated people movers, and shuttle buses, should be provided to reduce the physical and mental stress on customers. As indicated in Chapter 3, passenger conveyances should be provided for walking distances that are more than 1,000 feet or in long connecting corridors between terminals.

Vertical Circulation: Building level changes should be accomplished with escalators and elevators, with elevators placed in prominent locations so customers can flow through them without making changes in direction. Long, shallow ramps and sloped floors should also be considered where applicable.

Source: ACRP 03-35 Research Team

Figure 5-15. Information kiosk in the airline recheck area providing gate location and walking directions for connecting passengers at Boston Logan International Airport Terminal E.

5.3.5 Information Dissemination

As discussed previously, navigating long walking distances and level changes are key drivers in the physical environment that affect the connecting passenger experience. To overcome these challenges, an airport needs a well-developed and thorough wayfinding strategy to effectively communicate the basic information to the traveler. A successful strategy evaluates how the three Vs of communication can improve the international connecting traveler experience.

- Verbal communication: whether it is an actual information booth, roving information staff, or volunteers, some tangible source of verbal communication should be provided in the secure area with necessary multilingual support.
- Visual communication: use traditional static signage to communicate to the passengers their current location in the airport, for example, include a header or a footer on directional information (Figure 5-16).
- Virtual communication: FIDS can also incorporate a header or footer on each screen to display where the passenger is in the airport. Interactive directories can add more value by showing a passenger where they are, identify where they want to go, and whether it is better to walk or ride (Figure 5-17).

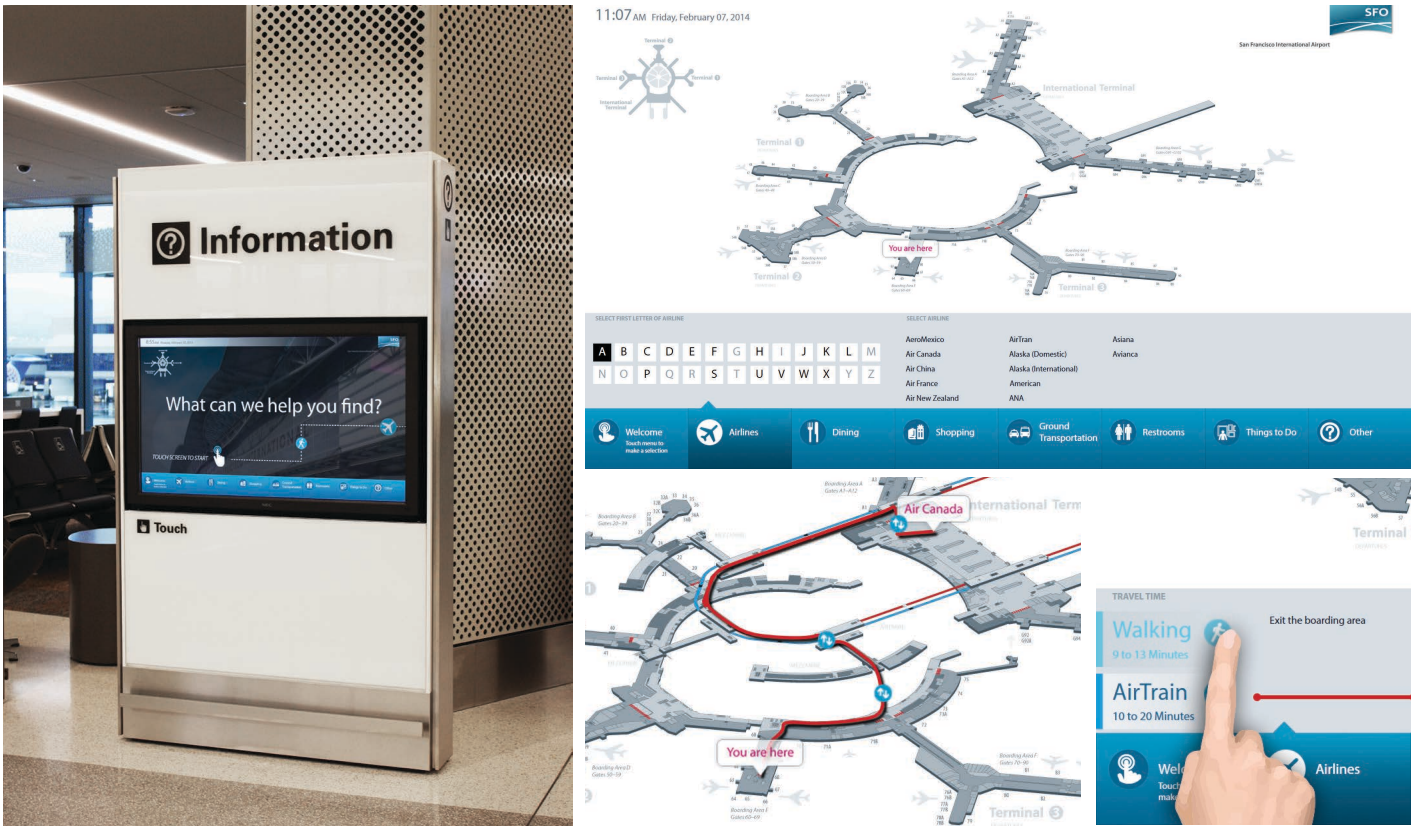
Basic Requirements

Where Am I? This basic wayfinding 101 requirement is critical for connecting passengers, specifically international travelers who are typically less familiar with their surroundings. For arriving domestic or precleared passengers, there tends to be little, if any, information communicated about where they are in the airport. Using the three Vs strategy outlined earlier will help an airport provide the basic information of "Where am I?"

Meeting Point: Related to the previously described scenario, but often overlooked, is the need for connecting passengers arriving from different originating cities to find one another upon arriving at different gates or in a different terminal. For example, some airports use an alpha prefix to identify gate numbers, which provides some information as to the terminal

Source: Courtesy of Gresham, Smith and Partners

Figure 5-16. Footers on static directional signs help passengers at Philadelphia International Airport know what terminal they are in.



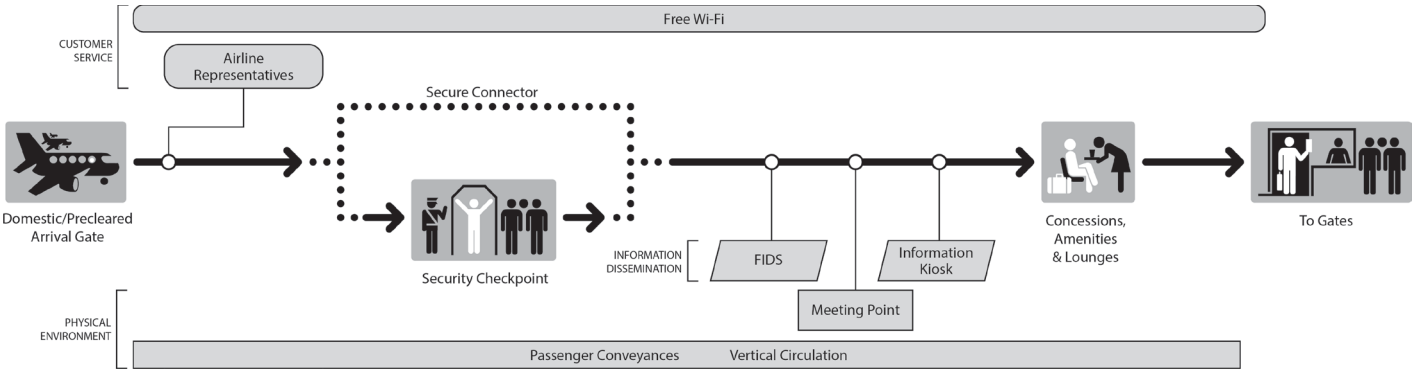
Source: Omnivex.com

Figure 5-17. Maps on the interactive information kiosk at San Francisco International Airport show where you are, communicate options of whether to walk or ride, and highlight points of vertical transition.

or gate location. Other airports use a numeric only gate designation that does not communicate where the gate is located in the terminal. Even when the airport has provided clear information about the gate and terminal location, it is often not sufficient for international passengers to understand how to find one another. Communication tools like airport-wide FIDS and maps showing how to navigate between gate areas and terminals can bridge this gap (Figure 5-18).

Source: Photo courtesy of Gresham, Smith and Partners

Figure 5-18. Airport-wide FIDS showing both departures and arrivals at Atlanta International Airport.



Source: ACRP 03-35 Research Team

Figure 5-19. Domestic arrival to international connecting flight journey segment evaluation tool.

5.3.6 Domestic Arrival to International Connecting Flight Journey Segment Evaluation Tool

Figure 5-19 provides a summary of the basic requirements and notable innovations described earlier for the Domestic Arrival to International Connecting Flight Journey Segment. The items are provided in chronological order to give an indication of when or where they should occur in the customer experience for this journey segment.

CHAPTER 6

Precleared Arriving Passengers

Precleared arriving passengers go through the same U.S. CBP processes as international arriving passengers (discussed in Chapter 4), except the CBP preclearance facilities are located at the departure airport in a foreign country. Precleared arriving passengers are essentially treated as domestic passengers from a processing standpoint upon their arrival in the United States. However, even though precleared, they are still international travelers and have many of the same needs as international arriving passengers.

The CBP inspection process conducted at the foreign airport is defined in the CBP ATDS and may be handled slightly differently at each foreign airport depending on the configuration of the facilities. However, the inspection process includes the same basic components, passport control and customs inspection, as at U.S. airports. The key difference is the precleared departing passengers may have their checked baggage with them at passport control and deposit it with the airline after they complete the customs inspection. Upon arrival in the United States, precleared arriving passengers claim their baggage at a domestic baggage claim area or proceed to their connecting flight, without the need to claim their check baggage.

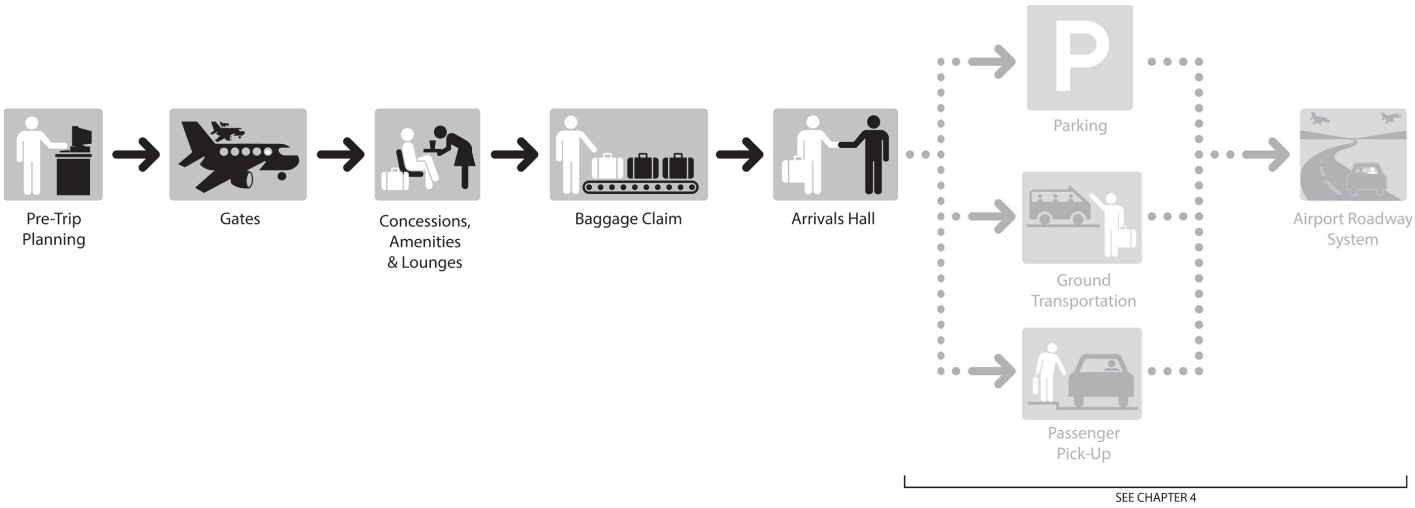
The purpose of this chapter is to provide airport stakeholders with guidelines specific to the unique needs of precleared arriving passengers so the appropriate services and facilities can be provided to enhance their airport experience.

6.1 Overview of the Precleared Arriving Passenger Journey Segment

Figure 6-1 illustrates the journey for precleared arriving passengers. It begins with the arrival of precleared passengers at the U.S. airport and considers both connecting passengers and those whose final destination is the region served by the arrival airport. This chapter covers the unique needs of precleared arriving passengers who are connecting or completing their journey.

As described in Chapter 2, the journey of a precleared arriving passenger includes the following steps:

- Pre-trip planning
- CBP preclearance (located at foreign airport)
- Arrival gate (domestic or international terminal) to Connecting Flight Departure Gate
- Arrival gate to baggage claim
- Baggage claim to arrivals hall (covered in Chapter 4)
- Terminal arrivals roadway/ground transportation (covered in Chapter 4)
- Airport egress roadway (covered in Chapter 4)
- Journey from the airport (covered in Chapter 4)



Source: ACRP 03-35 Research Team

Figure 6-1. Precleared arriving passenger journey segment.

6.1.1 Customer Needs and Expectations

As described in Chapter 2, the challenges experienced by international arriving passengers may include general travel anxiety, jet lag, travel fatigue, and language barrier. Research suggests that anxiety among passengers arriving on an international flight is most likely to occur at border control and at baggage claim.

In the survey, about half (53 percent) of all departing passengers were infrequent travelers, having taken only one or two flights in the last year. For some of these passengers, the preclearance process at the foreign departure may be unexpected. This is an important consideration since some foreign airports may experience long lines at the CBP preclearance facility during peak periods (e.g., Monday mornings at Toronto Pearson International Airport). These passengers may need to get to the airport earlier than if they were taking an international flight that did not require them to go through border control at the departure airport.

Upon arrival to the United States, precleared passengers arrive at the gate in the same manner as domestic passengers. Terminating passengers require directional information to baggage claim. At some airports, precleared arriving passengers collect their bags in the same area as domestic passengers and at other airports the precleared baggage claim is in a separate location from the domestic baggage claim. The information for the connecting passenger must be easy to locate and easy to read. The signage should provide information about the connecting flight including gate information, flight updates, and directional information to the departure gate.

Short walking distances are very important to international arriving passengers because this group is likely to experience jet lag and travel fatigue, particularly passengers on long-haul flights who may have spent up to 16 hours on a flight spanning multiple time zones. Travel fatigue causes passengers to feel disoriented and decreases their ability to carry out the physical and mental tasks essential to navigate within an airport.

6.2 Pre-Trip Planning

Most passengers are likely unaware of whether their flight to the United States from a foreign airport is a precleared flight or a normal international flight with the border control processes conducted at the arrival airport. It is important for the airport and airline websites to provide

information about whether or not a flight will be precleared so passengers can familiarize themselves with the process and set their expectations accordingly before they begin their journey.

6.2.1 Key Activities

The pre-trip planning activities unique to precleared arriving passengers primarily involve the use of the airport and airline websites to understand how the border control process at the departure airport will affect their travel plans and to identify their arrival terminal so they can coordinate how to connect to another flight or claim their checked baggage.

6.2.2 Customer Needs and Expectations

Completing CBP inspection at a foreign airport can be convenient for frequent travelers aware of which foreign airports provide this service for international passengers traveling to the United States. However, for less frequent travelers going through CBP inspection at the foreign airport, the process may be unexpected. The consequence of not realizing they need to go through border control at the departure airport could result in passengers missing their flight if the lines are long at the CBP preclearance facility, particularly during peak periods when many flights are departing to the United States within a short period of time.

6.2.3 Customer Service

Person-to-person customer service during this segment of the precleared arriving passenger journey is limited to airport or airline telephone help desks or social media links provided on the stakeholder's websites.

6.2.4 Physical Environment

There is no physical environment associated with this segment of the precleared arriving passenger journey.

6.2.5 Information Dissemination

Because the CBP inspection process is conducted at the foreign airport, the pre-trip planning information for a precleared arriving passenger is primarily communicated through the arriving airport's website. Of particular importance to precleared arriving passengers is information about the terminal where they will be arriving, where they will claim their baggage or how they will connect to their departing flight, and the services and amenities available within the terminal.

6.3 Precleared Arrival Gate to Connecting Flight

Precleared arriving passengers connecting to other flights are handled the same as domestic arriving passengers connecting to other flights. Once they deplane, customers will need connecting flight information and directions to their departure gate for the connecting flight. While most precleared arriving passengers will be aware they do not have to go through the border control inspection process again, they may not understand the security procedures required, if any, to get from their arrival terminal to their departing flight. They may also be uncertain about whether they have to claim their checked baggage or if it will be checked through to their departing flight.

6.3.1 Key Activities

Precleared arriving passengers connecting to another flight are likely to utilize the following:

- FIDS
- Airport maps illustrating how to get to each terminal
- Airport information counters

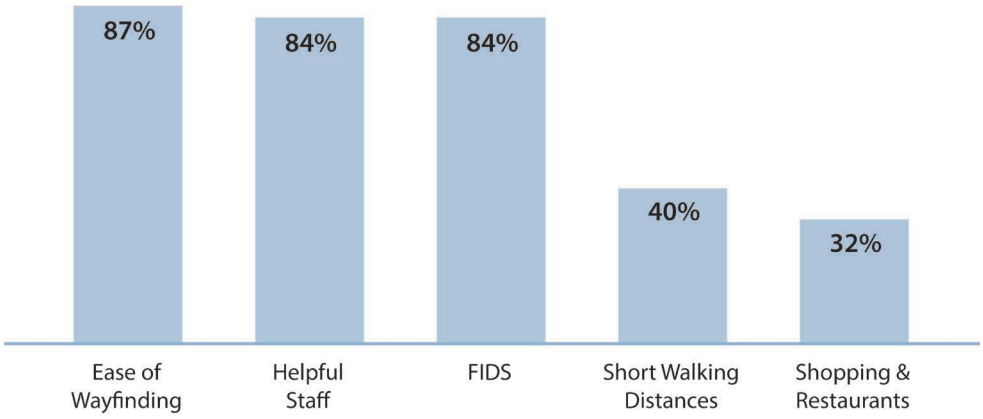
6.3.2 Customer Needs and Expectations

After passengers deplane, they need specific information about their next flight. First, they need to know where they are in the airport (i.e., gate, concourse or terminal). Gate numbers are usually easy to find but not all airports include terminal or concourse information on wayfinding signage. Second, these passengers need to determine at which gate their connecting flight can be found and the status of their flight (i.e., on time, delayed, etc.). These passengers will be on the lookout for FIDS for this information. Lastly, these passengers require directions to their next flight. Wayfinding signs should be spaced at regular intervals and at decision points to reassure passengers they are following the correct path.

Some connections require passengers to change terminals. In these situations, connecting passengers need to know the options available to get there (e.g., walk versus ride) and how much time would each option take to reach their gate. Depending on the airport, connecting passengers may be required to leave a secure area to travel to their departure gate and they may not be expecting to do so. To avoid confusion and potential frustration about having to go through an additional security checkpoint, passengers should be provided with this information before they leave the secure area.

In the survey, connecting passengers were asked to rate the relative importance of 15 airport features. The most important airport features were ease of wayfinding (87 percent), helpful staff (84 percent), and flight information screens (84 percent). The least important features included shopping and restaurants (32 percent) and short walking distances (40 percent), as shown in Figure 6-2.

Although short walking distances were not identified as being very important by most passengers in the survey, connecting passengers were much more likely to express dissatisfaction about walking distances as compared to departing or arriving passengers.



Source: ACRP 03-35 Research Team

Figure 6-2. Passenger survey results: most important airport features to connecting passengers.

6.3.3 Customer Service

Person-to-person customer service is a critical element for precleared arriving passengers connecting to other flights. Customer service may also be delivered through visual and virtual sources, such as wayfinding signage and digital information kiosks.

Basic Requirements

Customer Service Staff at the Arrival Gate: Airlines operating preclearance flights should provide customer service staff at the arrival gate to assist customers connecting to other flights. The staff should be able to provide updated flight information, departure gate location, information about checked baggage, and the best way to reach the departure gate. They should also make customers aware of whether they will have to pass through security to reach their departure gate or if they will have to claim their checked baggage and recheck it with the airline providing their connecting flight. This will help customers determine if they have time to shop and dine in the arrival terminal or if they should proceed to the departure terminal as soon as possible.

Airport Information Counters: Precleared arriving passengers should have access to airport information counters as they enter key intersections within their arrivals terminal. The information counter staff should be able to provide information about how to get to their connecting flight and the services and amenities available along the journey to their departure gate. The information counters may also need access to language services as some precleared arriving passengers may have limited English language capabilities.

6.3.4 Physical Environment

There are no unique physical environment requirements for precleared arriving passengers.

6.3.5 Information Dissemination

Information needed for precleared arriving passengers making a connection is essentially the same as international connecting passengers once they re-enter the secure area. They need information to understand:

- Where they are, i.e., which terminal or gate area
- Their connecting gate information
- The location of their departure gate
- The best way to get to their departure gate, which may involve a walk versus ride decision
- Confirmation they have arrived at the correct destination

This information is commonly delivered through a combination of static and digital signage and verbal communication. Accommodations for passengers with LEP should be considered based on the country of origin. Chapter 5 provides a more detailed description of the methods for disseminating important information to international connecting passengers.

6.4 Precleared Arrival Gate to Domestic Baggage Claim

Most U.S. international airports are frequently used by domestic flights and therefore are equipped to handle precleared international arriving passengers who do not have to be processed through the CBP facilities. While the journey from the arrival gate to the baggage claim for precleared arriving passengers is the same as domestic arriving passengers, it is important to remember they are not domestic passengers. Specifically, the baggage claim physical environment considerations and arrivals hall needs and expectations must be the same as international arriving passengers.

6.4.1 Key Activities

Precleared arriving passengers not connecting to other flights move on from the arrival gate to the designated baggage claim to claim their checked baggage. These passengers may require the following services:

- Baggage carts or baggage assistance
- Airline baggage service assistance

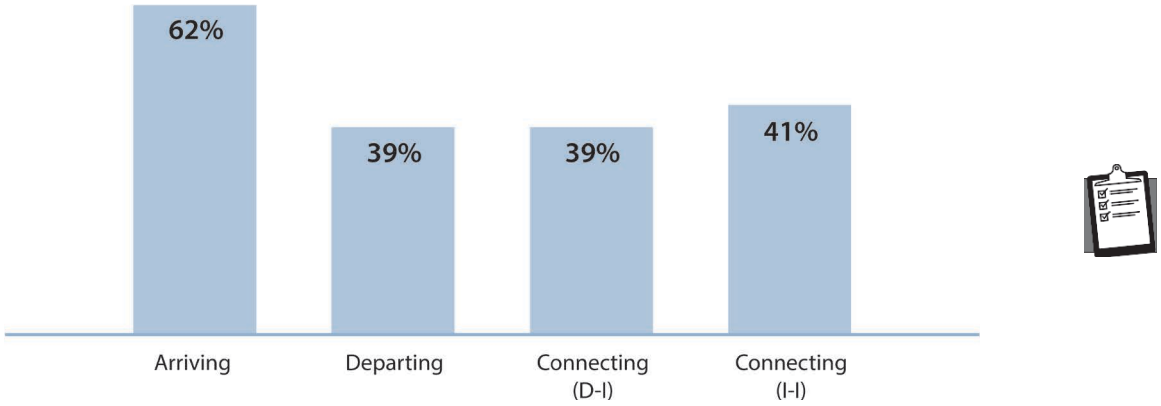
Some precleared arriving passengers connecting to other flights may have to claim their checked baggage and recheck it with their departing airline. The customer service, physical environment, and information dissemination considerations for these passengers would be the same as international connecting passengers, which is described in Chapter 5.

6.4.2 Customer Needs and Expectations

Since precleared passengers have already completed CBP inspection before they arrive at a U.S. airport, these passengers experience the airport in the same way as a domestic arriving passenger. Depending on the airport and airline, the arrival gate may be located with other international flights or other domestic flights; these passengers may be directed to the general baggage claim area (e.g., baggage claim) or a specific baggage claim area for precleared arriving passengers (e.g., international baggage claim versus domestic baggage claim).

Short walking distances are important to international arriving passengers as this group is likely to experience jet lag and travel fatigue, particularly passengers on long-haul flights who may have spent up to 16 hours on a flight spanning multiple time zones. Travel fatigue causes passengers to feel disoriented and decreases their ability to carry out the physical and mental tasks essential to navigate from the gate to baggage claim.

In the survey, all passengers were asked to rate how important short walking distances were at any airport using a three-point scale (very important, somewhat important, or not important). Overall, 41 percent of passengers said short walking distances were very important. As shown in Figure 6-3, arriving passengers were much more likely to indicate short walking distances were very important (62 percent) as compared to departing passengers (39 percent) or connecting passengers (39 percent to 41 percent depending on connection type).



Source: ACRP 03-35 Research Team

Figure 6-3. Importance of short walking distances to arriving passengers as compared to departing and connecting passengers.

6.4.3 Customer Service

Person-to-person customer service during this segment of the precleared arriving passenger journey is focused on airline personnel providing customers with directions to the domestic baggage claim hall and to baggage service assistance for lost or damaged baggage.

Basic Requirements

Customer Service Staff at the Arrival Gate: Airlines operating preclearance flights should provide customer service staff at the arrival gate to direct customers to the domestic baggage claim devices assigned to their flight. They should also provide baggage claim information for connecting passengers who may have to reclaim their baggage and recheck it before proceeding to their departure gate.

Baggage Carts/Baggage Assistance: Precleared arriving passengers have the same checked baggage characteristics as international arriving passengers. These customers typically have more checked baggage than domestic passengers; since the aircraft can be much larger than most aircraft used for U.S. domestic flights, there can be significantly more checked bags than for a domestic flight. As discussed in Chapter 4, international arriving passengers are typically provided free baggage carts in the international baggage claim hall. This is not the case for domestic passengers. Airport operators receiving precleared arriving flights should consider providing free baggage carts in the domestic bag claim hall during the periods it is being used for precleared flights. Airports should also consider providing for-hire baggage assistance during preclearance flights as many customers may be traveling with their entire family or in large groups and have more checked baggage than they can easily handle. Baggage assistance is also very important for elderly or passengers with disabilities who have difficulty or are unable to transport their own baggage.

Baggage Delivery Times: Baggage delivery times for precleared flights should be, at a minimum, the same as those for international arriving flights (as described in Chapter 4) or faster as customers do not have to go through the CBP inspection process prior to reaching the domestic or precleared baggage claim hall. Long baggage delivery times will likely result in severe congestion in the baggage claim hall, especially for wide-body precleared flights.

Seating: Because precleared arriving passengers are likely to arrive in the domestic baggage claim hall well before their baggage is delivered, seating for customers is another important customer service consideration. This is especially beneficial for the elderly or people with disabilities who may be traveling with someone who can retrieve their baggage while they wait. The seating should be adjacent to the carousels so parties can remain within sight of each other.

Airline Baggage Services: Airlines operating precleared flights should consider providing baggage services within the domestic baggage claim area, similar to the domestic airlines. However, foreign airlines operating only one or two international flights per day may only provide that service at the ticketing counters. The key consideration is for customers to be provided with the information to contact their airline to inquire about the status of their baggage. For airlines that do not provide baggage services in the baggage claim hall, an information kiosk should provide the local and global contact information for each airline serving that terminal.

6.4.4 Physical Environment

The physical environment consideration for precleared arriving passengers is the domestic baggage claim hall, particularly when wide-body aircraft are used for precleared flights. The domestic baggage claim hall should be able to accommodate all of the passengers from precleared flights in a manner similar to international baggage claim halls. Precleared flights operating on narrowbody aircraft have similar physical environment requirements as domestic flights.

Basic Requirements

Inbound Baggage Delivery: Checked baggage from wide-body precleared flights will arrive in containers as compared to domestic narrowbody flights which are bulk-loaded. At a minimum, the inbound baggage delivery area for the domestic baggage claim hall used for precleared flights should be configured to allow the unloading of three or four containers at one time. It would be preferable for the baggage claim devices to have dual feed conveyors so two sets of three or four containers can be unloaded at the same time, substantially reducing the baggage delivery times.

Baggage Claim Hall Capacity: Because passengers do not have to go through the CBP inspection process, they will likely arrive at the baggage claim carousel well before the airline can deliver the checked baggage. The domestic baggage claim hall should have adequate space to accommodate the passenger capacity of wide-body aircraft to avoid potential congestion in the domestic baggage claim hall. Airport terminal planners and designers should consider providing similar space in domestic baggage claim halls as in the international baggage claim halls to adequately accommodate precleared arriving flights.

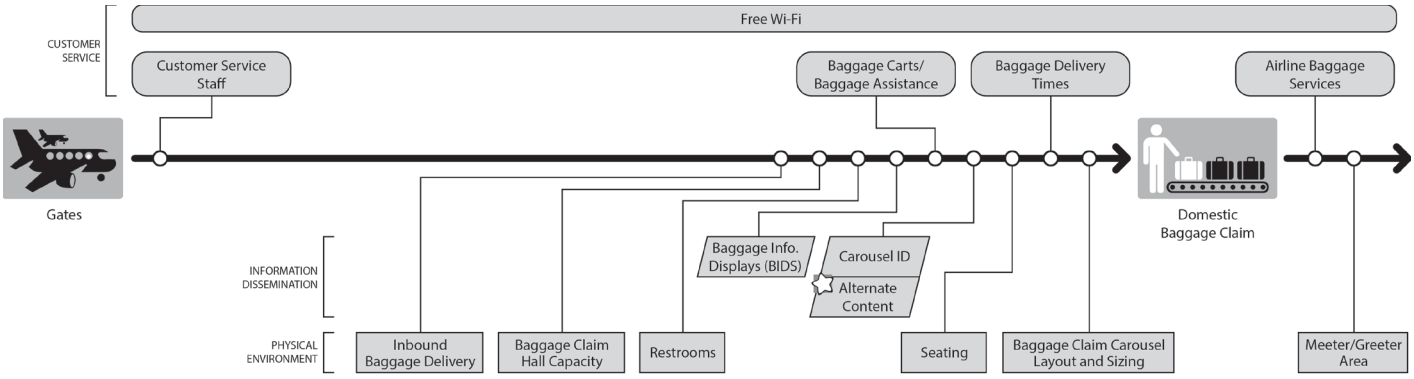
Baggage Claim Carousel Layout and Sizing: The baggage claim devices used for precleared flights should be sized and configured similar to those in the international baggage claim hall. Guidelines for the layout and sizing of the international baggage claim devices are provided in Chapter 4. Remote-fed flat-plate baggage claim devices should be considered because many customers are likely to have large pieces of checked baggage. Airports utilizing existing baggage claim devices not sized to handle all of the baggage from a wide-body precleared flight may consider using two devices: one for first and business class and the other for economy class. Removing baggage from a device and staging it on the floor may be another option but it is strongly discouraged because it may require customers to search for multiple pieces of baggage in different locations.

Restrooms: The domestic baggage claim hall should include restrooms sized appropriately based on the anticipated number of precleared arriving passengers per flight; passengers may have to wait for checked baggage or may have bypassed the restrooms in the terminal concourse. The restrooms will likely be located on the perimeter of the baggage claim hall or within close proximity so customers can easily locate them while waiting for the delivery of their check baggage.

Meeter/Greeter Area: Precleared arriving passengers will likely be met in the baggage claim hall by family and friends or pre-arranged ground transportation services, similar to international arriving passengers as they exit the CBP area. Airports with multiple wide-body precleared flights each day should consider installing a barrier, such as a rail, or designate an area for meeters and greeters to wait while precleared passengers retrieve their checked baggage. This will lessen congestion around the baggage claim devices. Guidelines for sizing the meeter/greeter area and the amenities and services that should be considered for meeters and greeters are provided in Chapter 4.

6.4.5 Information Dissemination

The baggage claim area for precleared arriving passengers is located outside the CBP area in the same location as the baggage claim devices for all international arrivals. The primary information dissemination challenge for precleared arriving passengers during the arrival gate to baggage claim journey segment is when the terminal layout or operations create a non-linear or non-intuitive wayfinding scenario. For example, in some international terminals the bag claim devices are isolated from a logical, intuitive path of circulation. The solution relies heavily on clear signage to effectively guide precleared passengers through a step-by-step series of non-intuitive, non-linear decision points to locate their baggage. Proper planning and coordination



Arrival Gate to Domestic Baggage Claim

Source: ACRP 03-35 Research Team

Figure 6-4. Precleared arrival gate to domestic baggage claim journey segment evaluation tool.

is necessary to identify these types of scenarios and develop effective solutions. The consistent pairing of the international symbol with the term "baggage claim" is essential in assisting precleared passengers with LEP to follow the signage.

6.4.6 Precleared Arrival Gate to Domestic Baggage Claim Journey Segment Evaluation Tool

Figure 6-4 provides a summary of the basic requirements described above for the precleared arriving passengers' journey from the arrival gate to baggage claim. The items are provided in chronological order to indicate when or where they should occur in the customer experience for this journey segment.

6.5 Domestic Baggage Claim to Arrivals Hall

After retrieving their checked baggage, precleared arriving passengers may need to utilize the services and amenities commonly found in an international terminal arrivals hall (see Chapter 4). They may also need information about ground transportation services from the airport. This may be a challenge at airports where precleared flights are being accommodated in terminals that do not have international arrivals facilities or an arrivals hall suited for international customers. In this case, airport and airline stakeholders should provide at least the minimum services necessary, including information counters and ground transportation services.

6.5.1 Key Activities

Since precleared arriving passengers who have claimed their checked baggage are essentially the same as international arriving passengers once they exit the CBP facilities, they may need to utilize the following features commonly found in the arrivals hall:

- Commercial or public ground transportation services
- Queuing and waiting areas for commercial or public ground transportation services
- Business center or other commercial services
- Arrivals lounge
- Food and beverage and retail concessions

6.5.2 Customer Needs and Expectations

Some arriving passengers will require wayfinding information to locate taxis, limousines, hotel shuttles, or other forms of ground transportation. Depending on the airport, these services may be accessed at service counters located within the terminal, just outside the doors at the curbside, at curbside on an outer island, within the parking garage, or at a remote building that can be accessed using a train or shuttle.

As described in Chapter 4, depending on the size of the airport, the curbside area just outside the terminal building can be a busy area with an array of services occupying specific locations along the length of the terminal building and sometimes spanning several curbside islands. For unfamiliar passengers who may be jet lagged or fatigued, it may be challenging to find the locations for passenger pick-up, taxi stand, limo stand, airport shuttles, public transportation, and other shuttles. Therefore, providing a directory map near each exit door to orient passengers to their location and the location of services is suggested. Key considerations include a general level of illumination, crosswalk visibility, and visibility of signs associated with each service.

6.5.3 Customer Service

The customer service considerations for the arrivals hall are the same for international arriving passengers, as described in Chapter 4. However, if precleared flights are accommodated in terminals without international arrivals facilities, other means of delivering customer service to precleared arriving passengers may have to be considered, such as digital information kiosks or customer service hotline phones.

6.5.4 Physical Environment

The physical environment considerations for the arrivals hall are the same as for international arriving passengers, as described in Chapter 4. When planning and designing new international terminals, the location of the domestic baggage claim hall in relation to the arrivals hall should be examined to provide the precleared arriving passengers with convenient access to the same services and amenities as international arriving passengers.

6.5.5 Information Dissemination

Information dissemination consideration for the arrivals hall is the same as for international arriving passengers, as described in Chapter 4. However, the wayfinding signage from the domestic baggage claim utilized by precleared flights should provide clear direction for customers who need to utilize the services available in the arrivals hall, particularly if it is located in the same terminal. If there is not an arrivals hall in the terminal where precleared flights arrive, information counters or digital information kiosks should be provided so customers can get directions to the amenities or services they require.

CHAPTER 7

Gateway of the Future

The Gateway of the Future will enhance the customer experience by combining the most innovative approaches to the key elements of customer service, physical environment, and information dissemination. Customer service will be provided in a variety of ways and will be customized to meet the unique needs of the various types of passengers. The physical environment will create a comfortable, straightforward journey that reduces anxiety and allows customers to view the airport as a part of their trip, rather than a means to get from the beginning to the end of their journey. Relevant information about customers' airport journey will be delivered through several forms of media and will be adaptable to the ever-changing airport environment.

The purpose of this chapter is to summarize the notable innovations that airports around the world have deployed to enhance the customer experience in each of the primary journey segments. Emerging technologies and practices that have not yet been implemented in the airport environment, but should be considered, will also be identified.

7.1 Key Elements to Improving the Customer Experience

Improving the customer experience begins with understanding customer needs and expectations. The survey conducted for this research provides some insight as to the needs and expectations of passengers arriving or departing on international flights. A summary of those findings is provided in this section. While these provide a good general indication, airports are encouraged to conduct their own passenger surveys because the unique circumstances at each airport will influence customer needs and expectations.

As described in detail in the previous sections, the customer's experience during their airport journey is influenced by three primary elements: customer service, the physical environment, and information dissemination. The following section provides a brief description of each of these key elements.

7.1.1 Understanding Customer Needs and Expectations

Language: According to the survey, one in four international passengers can read only a little English, or none at all. This has important implications regarding the design of the wayfinding signs and the dissemination of information in multiple languages at security checkpoints, customs and border patrol, information kiosks, and interactive directories. While it is not possible to accommodate all languages, the Gateway of the Future should provide information in the most common used foreign languages of the international passengers at that airport.

Jet Lag and Travel Fatigue: International passengers arriving or making a connection at a U.S. airport may have spent upwards of 16 hours on an overseas flight spanning multiple time zones.

Long-haul travel causes passengers to experience fatigue or other symptoms such as difficulty concentrating, memory loss, anxiety, and confusion. Jet lag makes it more difficult for passengers to concentrate and carry out the essential physical and mental tasks essential to finding their way within an airport (Waterhouse et al. 2007).

Air Travel Anxiety: One in three passengers experience air travel anxiety (Dean and Whitaker 1982). About half of passengers experience anxiety during takeoff and landing while about one-third experience anxiety within the airport at customs, security checkpoints, and baggage claim (McIntosh et al. 1998). Due to medical emergencies that can occur as a result of elevated anxiety, airport physicians believe that the airport segment of travel may be more hazardous than the in-flight segment (McIntosh et al. 1998).

Passenger Expectations: Based on the survey, about half of international passengers interviewed said they were infrequent travelers, having been on at most one other international flight in the last year. It is important to consider that each airport is unique and although the same essential processes are carried out at each airport, there may be subtle or significant differences that may be unexpected. For example, passengers making a connection to an international flight following a domestic flight may assume they will not need to go through security at that airport. Some airports provide secure connections between gate areas whereas other airports do not. Passenger satisfaction with security wait times was twice as positive when passengers were expecting to go through security as compared to when they were not expecting to go through security.

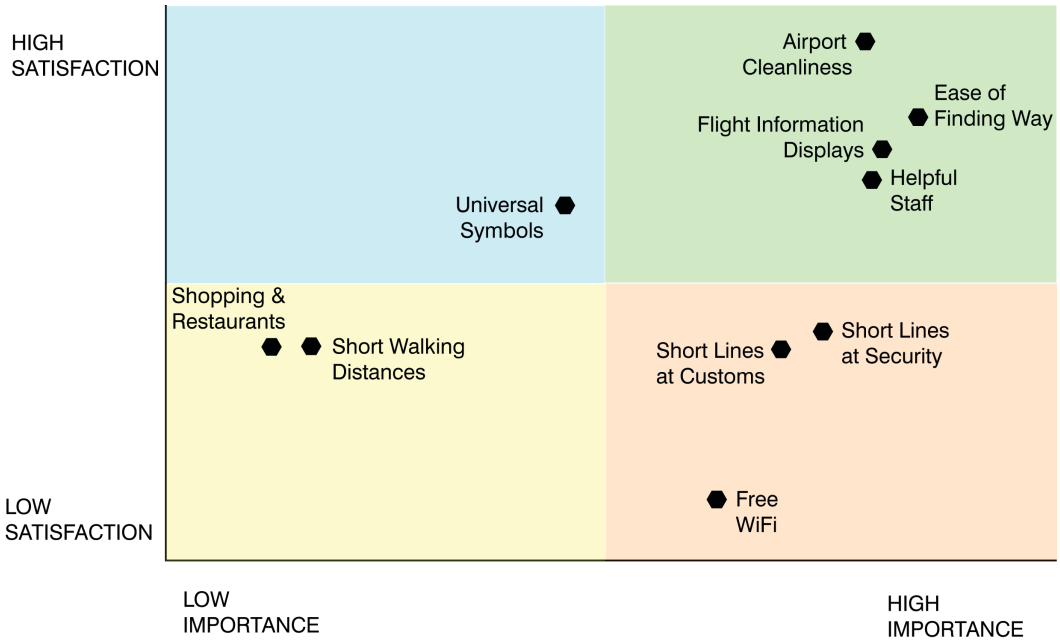
A situation unique to U.S. airports is that all passengers making a connection between two international flights must collect their bags as part of the CBP process and then recheck their bags. In the survey, half of all international passengers making a connection to another international flight did not expect they would have to collect and recheck their bags at that airport.

Passengers anticipate what they will encounter at a new place based on their prior experiences; many passengers will visualize themselves in the new setting based on their expectations. If the new place is similar to places they have already visited, passengers will have an easier time adjusting. The more different the new place, the more difficult it will be for the passenger to cope with a new environment. Providing passengers with information about different or unique situations that may occur along their journey will make it easier for them to adjust (e.g., non-secure connections between concourses or terminals, security screening requirements, documents required at customs, need to collect and recheck bags, etc.).

Subject Ratings of the Relative Importance of Airport Features: In the survey, passengers were asked to rate the importance of 10 airport features. Passengers who said the feature was very important are:

1. Ease of finding way inside airport, 82 percent
2. Helpful staff, 81 percent
3. Flight information screens, 79 percent
4. Airport cleanliness, 78 percent
5. Short lines at security, 75 percent
6. Short lines at customs, 72 percent
7. Free internet access / WiFi, 69 percent
8. Universal symbols on signs, 57 percent
9. Short walking distances, 41 percent
10. Shopping and restaurants, 36 percent

As shown in Figure 7-1, the most important airport feature was ease of wayfinding within the airport. When people have difficulty finding their way they (1) blame themselves; (2) feel frustrated and anxious because being lost may cause them delay; or (3) feel anger or resentment



Source: ACRP 03-35 Research Team

Figure 7-1. Subjective ratings of importance of airport features versus passenger satisfaction.

that an easy task is difficult to carry out. Navigating within an airport can be challenging when there is a lack of signage, too much signage, ambiguous information on signs, multiple directions to reach the same destination, or when changes in level and direction are required.

In the survey, in addition to being asked about the importance of airport features at any airport, passengers also were asked how satisfied they were with those airport features at the airport where the interview took place. Survey results suggest there is a correlation between passenger expectation and passenger satisfaction. However, there were instances where airport features were perceived to be very important but received lower ratings of satisfaction, including (1) long lines at CBP; (2) long lines at SSCP; and (3) freely available WiFi.

7.1.2 Customer Service

The customer's airport experience is directly influenced by interaction with a number of different entities. According to the survey, 81 percent of passengers rate helpful staff as very important. Creating a seamless transition of customer service is critical to improving the customer's airport experience.

Through the evolution of technology, personal customer service can be delivered in a variety of ways. Airport and airline websites and mobile apps provide customers with a wide range of information that can be accessed on-demand. More recent innovations such as interactive information counters allow airport customer service staff to interact with customers on a face-to-face basis from a remote location—optimizing customer service staffing efficiency while providing a high level of customer service.

Process performance (i.e., wait times) is another important component of customer service. Short lines at the security checkpoint and CBP were rated very important by 75 percent and

72 percent of all passengers, respectively. Achieving high levels of customer satisfaction in these areas requires close coordination among airport stakeholders and government agencies.

7.1.3 Physical Environment

The physical environment of an airport terminal influences the customer experience both mentally and physically. The key elements of the physical environment that affect the customer experience include:

- Ambience
- Natural wayfinding
- Cleanliness and maintenance
- Walking distances
- Spatial requirements

The ambience of the terminal is the visual, sensual, and social atmosphere influenced by the architecture, interior design, and other visual and auditory elements within the building. Together these elements can ease customer anxiety about traveling and provide them with a distinct experience of the local community, rather than simply being a means to an end.

Natural wayfinding reduces customers' reliance on directional signage to find their way through the airport terminal facilities. According to the survey, 82 percent of all passengers rated the ease of finding their way inside the terminal as very important, the highest rating of any airport feature. Reducing the number of decisions customers have to make about which way to go and providing visual cues as to the location of the next step in the journey have a substantial effect on the customer experience.

The cleanliness of terminal facilities is an important component of the physical environment. According to the survey, 78 percent of all passengers rated the cleanliness of the airport as very important. This requires close coordination with janitorial service providers and should be considered in the design of the facilities. Clean and properly functioning facilities, especially restrooms, are a hallmark of the most highly rated airports in the world.

Walking distances and the amount of space provided are other important customer experience considerations. While short walking distances are near the bottom of the rankings of "very important" airport features, international passengers are accustomed to being provided with conveyance assistance, such as moving walkways, wherever practical, especially in the international arrivals corridor and between terminals. Terminals designed to accommodate primarily international flights should provide ample space to allow for unencumbered movement of customers in large groups or with several checked or carry-on bags. This is particularly important in waiting areas, such as the departures hall and international baggage claim area. Consideration must also be given to the higher number of well-wishers and meeters and greeters that accompany international travelers.

7.1.4 Information Dissemination

Airport terminals are complex spaces with numerous processes and options that customers must navigate, some of whom may be traveling for the very first time. The effective communication of information is paramount to improving the customer experience. In addition to a high rating for ease of finding their way within the airport, 79 percent of passengers surveyed rated flight information screens as very important and more than half rated universal symbols on signs as very important.

The effective communication of information extends well beyond FIDS and symbols. Many of the world's leading airports are delivering information through new, innovative digital solutions via websites and displays at the airport. This ranges from departure gate locations for connecting passengers, information about baggage delivery for arriving passengers, and amenities and services available within the terminal for departing passengers.

Informing customers about their airport journey is critical to improving the overall experience. This is true for international travelers who may travel infrequently, are coming to the United States for the first time, or may have limited English capabilities and need assistance in their native language.

7.2 Enhancing Customer Service

Enhancing customer service is a deliberate effort that requires a high degree of coordination among all stakeholders. Training programs alone are not sufficient to develop a culture of excellent customer service. *ACRP Report 157: Improving the Airport Customer Experience* provides a thorough description of the components of successful airport customer service programs.

International travelers however have unique needs when compared to the domestic counterparts. Through the research conducted for this study, the key elements of providing excellent customer service to international customers were identified. Table 7-1 provides a summary of the key customer service elements to assist international customers along each segment of their airport journey. Each is described in detail in the referenced chapter.

7.2.1 Notable Innovations

Stakeholder Meetings: Customer service stakeholder meetings are a critical component of providing customer service for international customers. While most airports conduct these meetings on a monthly basis, at Hartsfield-Jackson Atlanta International Airport more frequent

Table 7-1. Summary of key customer service elements.

Chapter 3: International Departing Passengers	Pre-Trip Planning	• Airport/airline websites & mobile apps
	Arriving at the Terminal Departures Roadway	• Customer service training for ground transportation service providers • Curbside check-in • Baggage carts
	Terminal Curb to Check-in	• Airport information counter • Virtual information counter • Services such as foreign currency exchange and baggage shrink wrapping • Amenities such as food and beverage outlets, retail shops, entertainment and business centers • Premium concierge services
	Check-in to Security Checkpoint	• Staff and officer attitudes • Wait times at the security checkpoint
	Security Checkpoint to Gate	• Airport information counters • Customer satisfaction feedback kiosks • Customer service performance information • Free Wi-Fi • Amenities and services such as foreign currency exchange, food and beverage outlets, art exhibits, worship facilities, quiet areas, live entertainment, nursing rooms and play areas • Smoking areas

Table 7-1. (Continued).

Chapter 4: International Arriving Passengers	Pre-Trip Planning	• Airport/airline websites & mobile apps • Government agency websites and mobile apps
	Arrival Gate to Passport Control	• Airline staff greeting customers • Wheelchair services • Free Wi-Fi • Airport customer service staff with foreign language capabilities ✩ Language hotline ✩ Water and snacks during long waits ✩ Information counter at Passport Control • Expedited processing lanes ✩ Seating area for elderly and families • Wait times ✩ CBP processing options such as APC, MPC and One-Stop • Passport Control staffing and officer attitudes
	Baggage Claim to CBP Exit Control	• Baggage claim carousel indentification • Wait times for baggage • Seating • Free baggage carts • Baggage porters • Airline baggage service offices • CBP Exit Control options
	Arrivals Hall	• Meeter/greeter area ✩ Welcome sign printer • Information counter ✩ Welcome Center • Concessions and amenities • Arrivals lounge • Money exchange • Retail and shopping • Ground transportation waiting areas • Taxi queue • Ground transportation service provider customer service training
	Terminal Arrivals Roadway/ Ground Transportation	• Traffic enforcement • Ground transportation management • Ground transportation service provider customer service training • Ground transportation information • Digital passenger advisory signage
Chapter 5: Connecting	Airline Recheck to Security Checkpoint	• Customer service representatives • Airline agents
	Domestic Arrival to International Connecting Flight	• Airline staff • Information kiosks

(continued on next page)

Table 7-1. (Continued).

Chapter 6: Precleared Arriving Passengers	Pre-Trip Planning	• Airport and airline websites
	Arrival Gate to Connecting Flight	• Airline staff greeting customers • Airport information counters
	Arrival Gate to Domestic Baggage Claim	• Airline staff greeting customers • Baggage carts/baggage assistance • Baggage delivery times • Airline baggage services
	Domestic Baggage Claim to Arrivals Hall	• Meeter/greeter area ✪ Welcome sign printer • Information counter ✪ Welcome Center • Concessions and amenities • Arrivals lounge • Money exchange • Retail and shopping • Ground transportation waiting areas • Taxi queue • Ground transportation service provider customer service training

meetings (weekly or bi-weekly) are conducted with key stakeholders, such as terminal management, customer service managers, and CBP officials. These frequent meetings were established to enhance the coordination between the entities and address issues as they arise rather than weeks after they occur.

Virtual Information Counters: At Munich Airport, InfoGate counters (see Figure 7-2) provide face-to-face interaction between customers and customer service personnel via life-sized videoconferencing.

Source: ACRP 03-35 Research Team

Figure 7-2. InfoGate counter at Munich Airport Terminal 2.

The key benefits of this innovation include:

- Customers are provided with the opportunity for face-to-face interaction with customer service representatives at multiple locations throughout the airport.
- More efficient use of airport customer service staff as compared to traditional information counters.

Water and Snacks at Passport Control: At Boston Logan Airport, customer service staff provide customers waiting in long queues at passport control with water and snacks to help make their wait less arduous.

The key benefits of this innovation include:

- Customers perceive that airport staff are aware of the long queues and appreciate the unexpected gesture of hospitality while they wait.
- Customer service agents and CBP officers can spend more time processing passengers versus dealing with complaints.
- Customers are more likely to utilize airports and airlines where they felt their needs were being addressed and undesirable conditions were mitigated to the best of everyone's ability.

Language Hotline: The PANYNJ operates a language hotline where customer service agents can find a Port Authority staff member with the necessary language skills to assist customers not able to communicate in English.

The key benefits of this innovation include:

- Customers can obtain information in their native language about any part of their journey.
- Hotline operators can convey customer questions or needs to the customer service agents.
- Airport operators can provide a wider range of language capabilities at any location as compared to only the languages spoken by staff assigned to a particular location.
- All airport stakeholders can utilize the language hotline, providing language assistance for customers at any stage of their airport journey.

Information Counter in Passport Control: Information counters, as shown in Figure 7-3, are provided near the entrance to the passport control hall at Los Angeles International Airport Tom Bradley International Terminal and Miami International Airport South Terminal to help customers complete their entry documents and to answer questions about the border entry process.

Source: ACRP 03-35 Research Team

Figure 7-3. Information counter in the passport control hall at Los Angeles International Airport Tom Bradley International Terminal.

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The key benefits of this innovation include:

- Customers can obtain information necessary to complete their entry documents.
- Customers can obtain information in their native language about the arrivals process.
- CBP officers can focus on inspection rather than answering questions or rejecting passengers with incomplete forms.

Seating Area for Elderly and Families: A seating area designated for the elderly, families, and passengers with reduced mobility is provided as part of the queue in the passport inspection hall at Heathrow Airport Terminal 2.

The key benefits of this innovation include:

- Allows one person representing a family to remain in the queue while others wait comfortably.
- Elderly customers and passengers with reduced mobility have a designated waiting area better suited to their needs.

CBP Processing Options: In additional to APC and MPC that are widely implemented within the United States, Dallas/Fort Worth International and Chicago O'Hare International airports also provide one-stop passport control and CBP exit control processing for customers who do not have checked baggage (as shown in Figure 7-4). APC and Global Entry kiosks are provided at the one-stop locations for passport control. A CBP officer then performs the exit control inspection.

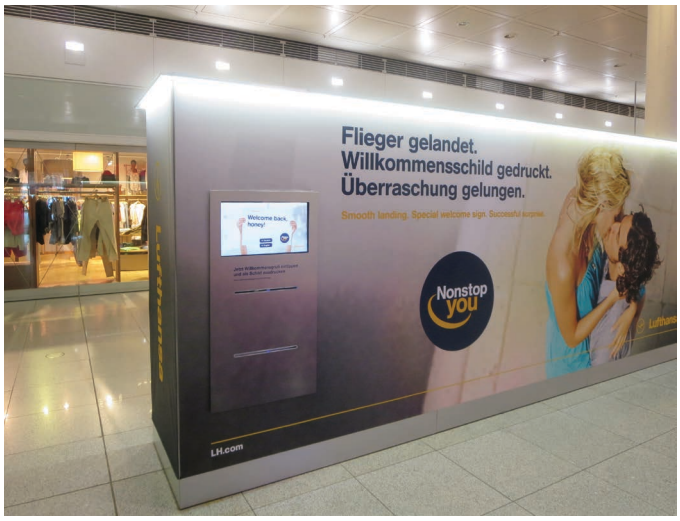
The key benefits of this innovation include:

- Customers without checked bags to claim avoid the longer queues commonly associated with passport control and bypass the baggage claim and CBP exit control areas.
- Airline crew members can utilize the one-step processing because they typically do not have checked baggage.
- Reduced wait times at CBP exit control for customers with checked baggage.

Welcome Sign Printer: Meeters and greeters should also be viewed as airport customers. At Munich Airport, a Welcome Sign printer is provided in the Arrivals Hall for meeters and greeters to make signs to welcome passenger(s), as shown in Figure 7-5.

Source: ACRP 03-35 Research Team

Figure 7-4. CBP one-stop processing Carry E-Z at Dallas/Fort Worth International Airport.



Source: ACRP 03-35 Research Team

Figure 7-5. Welcome sign kiosk at Munich Airport Terminal 2.

The key benefit of this innovation includes:

- Passengers and meeters and greeters receive the unexpected benefit of being able to print a customized welcome sign at the terminal.

Welcome Center: Most airports provide an information counter near the center of the arrivals hall. At JFK International Airport Terminal 4, the information counter has been expanded to include a seating area, ground transportation information, interactive local attractions kiosks and internet kiosks, as shown in Figure 7-6. The Welcome Center is visually prominent and staffed by customer service representatives.

The key benefits of this innovation include:

- Customers benefit by having a visually prominent and inviting area where they can obtain information by speaking with a customer service representative or using self-service technology.

Source: ACRP 03-35 Research Team

Figure 7-6. Welcome Center at JFK International Airport Terminal 4 (back view).

Source: ACRP 03-35 Research Team

Figure 7-7. Digital passenger advisory signage at Boston Logan International Airport.

- Customer service representatives are able to assist more customers because a seating area is provided so customers can wait and self-service options are provided.

Digital Passenger Advisory Signage: Digital passenger advisory signage, available at Boston Logan and Baltimore-Washington International airports, provides customers with real-time information about when to expect the next airport shuttle or public transportation vehicle (as shown in Figure 7-7) via a link to the airport's automatic vehicle location system.

- Customers are informed of when the next vehicle will arrive and can decide how to use their time while they wait, such as finding a comfortable waiting area or using the restroom without fear of missing the vehicle.

7.3 Ideal Physical Environment

The ideal physical environment creates a distinct sense of place that allows customers to navigate easily between each step of their airport journey. The architecture and interior design along with the various services and amenities should be used to create a unique ambience allowing customers to enjoy their time at the airport rather than view it as a step in their journey. Well-designed airport terminals minimize the number of level changes within each journey segment and have linear passenger flows that are logical and intuitive. The smaller the number of decisions a customer has to make about the direction they need to travel through the terminal or between terminals lowers anxiety.

The physical environment is important to international customers as they may be less familiar traveling through U.S. airports, be fatigued from long-haul flights, or have limited capabilities in English making it difficult to understand directions from other customers or English-only directional signage. For these customers, the logical flow and reduced decision-making greatly improve natural wayfinding. International customers also typically have more checked baggage and travel in larger groups, requiring more space for maneuvering and fewer level changes to ease the burden of transporting their baggage.

The arriving international passenger is the most unique of the international customer base. Particular attention should be paid to the physical environment for these customers. The terminal interior design should provide an immediate sense of welcome as passengers deplane.

Ideally, the arrivals corridor and the CBP facilities (passport control, baggage claim, and exit control) would be on the same building level to facilitate passenger flow and CBP staffing efficiency. The burden of collecting and transporting checked baggage should be reduced to the greatest extent possible. The arrivals hall should provide sufficient space for passengers and meeters and greeters and offer a direct line of sight to the various ground transportation services customers may require.

7.3.1 Key Elements

As discussed throughout this report, a wide variety of factors should be considered to provide the ideal physical environment for international customers. Table 7-2 provides a summary of the key elements to achieve this along each segment of the customer's airport journey. Each is described in detail in the referenced chapter.

7.3.2 Notable Innovations

Smart Security: Amsterdam Airport Schiphol introduced a new approach to security checkpoint design, as shown in Figure 7-8, by creating an environment that makes the security process as pleasant and efficient as possible. The checkpoint equipment arrangement is based on the Smart Security initiative, a joint program between IATA and ACI to strengthen security, increase operational efficiency, and improve the passenger experience.

The key benefits of this innovation include:

- Reduced customer anxiety due to enhanced interior design of the checkpoint area and operational process.
- Lower wait times due to higher processing rate.
- Fewer lanes potentially reduce TSA staffing.
- Reduced wait times increase time for post-security shopping and dining.
- Fewer departure delays or missed flights due to long waits at the security checkpoint.

Table 7-2. Summary of key physical environment elements.

Chapter 3: International Departing Passengers	Arriving at the Terminal Departures Roadway	• Grade-separated pedestrian crossings • Covered unloading areas • Hourly parking
	Terminal Curb to Check-in	• Natural wayfinding • Logical passenger flow • Airline check-in options • IATA Fast Travel Program initiatives • Unencumbered passenger flow
	Check-in to Security Checkpoint	• Restrooms prior to security checkpoint • Security checkpoint area interior design ⬠ Smart Security
	Security Checkpoint to Gate	• Architecture and interior design with clear lines of sight and natural wayfinding • Assistance for longer walking distances • Restroom design and spacing • Departure gate holdrooms with amenities

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Table 7-2. (Continued).

Chapter 4: International Arriving Passengers	Arrival Gate to Passport Control	• Architecture and interior design that creates a great first impression • Assistance for longer walking distances • Restroom design and spacing • Moving walkways • Single-level CBP facility configuration ✩ "Bags first" CBP facility configuration
	Baggage Claim to CBP Exit Control	• Architecture and interior design that creates clear lines of sight • Adequate spacing between baggage claim carousels • Baggage claim carousels sized according to aircraft type ✩ Remote-fed flat-plate baggage claim carousels • Restrooms in the baggage claim hall • Baggage cart return corridors • Adequate capacity at CBP Exit Control
	Arrivals Hall	• Architecture and interior design that creates a welcoming environment • Large-capacity flow through elevators as the primary means of vertical circulation • Layout that facilitates smooth flow of passengers and meeters and greeters
	Terminal Arrivals Roadway/ Ground Transportation	• Grade-separated pedestrian crossings • Adequate lighting on the lower-level roadway • Covered loading areas • Hourly parking
Chapter 5: Connecting	Airline Recheck to Security Checkpoint	• Direct line of sight to the airline recheck counters • Airline recheck counters adjacent to CBP Exit Control • Unimpeded passenger flow • Connecting passenger security checkpoint located immediately after airline recheck
	Domestic Arrival to International Connecting Flight	• Passenger conveyances for inter-terminal connections • Vertical circulation suitable for passengers with check baggage
Chapter 6: Precleared Arriving Passengers	Airline Gate to Connecting Flight	*Same as for international departing passengers from security checkpoint to departure gate*
	Arrival Gate to Domestic Baggage Claim	• Sufficient inbound baggage delivery area for wide-body international flights • Adequate baggage claim hall capacity for wide-body international flights • Baggage claim devices sized for wide-body international flights • Seating near the baggage claim devices • Restrooms in the baggage claim hall • Sufficient area designated for meeters and greeters
	Domestic Baggage Claim to Arrivals Hall	*Same as for international arriving passengers*

Source: Amsterdam Airport Schiphol. Accessed at http://www.schiphol.nl/B2B/RouteDevelopment/NewsPublications1/RouteDevelopmentNews/AmsterdamAirportSchipholNewSecurityControlEnhancesComfort.htm

Figure 7-8. Smart security checkpoint at Amsterdam Airport Schiphol.

Bags First CBP Facility Configuration: CBP facilities at Austin-Bergstrom International and Fort Lauderdale-Hollywood International Airport are configured to allow customers to claim their checked baggage first (bags first) and then complete the passport control and CBP exit control procedures at one location.

The key benefits of this innovation include:

- Customers claim checked baggage first and then proceed to a one-step CBP inspection point.
- Combining passport control, secondary inspection, and exit control in one location improves CBP officer staffing efficiency.
- Improved CBP staffing efficiency can reduce customer wait times.

Remote-Fed Flat-Plate Baggage Claim Carousels: Remote-fed flat-plate baggage claim carouses, such as those used at Heathrow Airport Terminal 2 (see Figure 7-9), are easier for customers to remove large checked bags.

The key benefits of this innovation include:

- Customers, especially the elderly and people with disabilities, are able to remove their checked baggage from the carousel with much less physical strain.

7.4 Effective Information Dissemination

Effective information dissemination will be a core element of the Gateway of the Future. Through the use of personal and mobile technology, airport stakeholders can provide customers with information to personalize their airport journey. This is particularly important to international travelers with a variety of needs ranging from quick processing to an explanation of the processing requirements to assistance with directions in their native language.

Airport and airline websites and mobile apps are already key elements of many travelers' tools for navigating through the airport. New and innovative add-ons, such as language translation videoconferencing and indoor 3D mapping will further enhance the customer's ability to use these tools during their journey.

Source: ACRP 03-35 Research Team

Figure 7-9. Remote-fed flat-plate baggage claim carousel at Heathrow Airport Terminal 2.

Static and dynamic signage will also continue to be important components of the customer's airport experience. Using the familiar symbols and terminology from airports across the world, U.S. airports can reduce the anxiety of customers traveling through the United States for the first time. Digital signage can be used to convey information and provide customers with a distraction while waiting in queues for key processes, such as passport control or baggage claim. They also can be used to create an inviting environment that reflects the culture of the surrounding region.

Providing the information customers need or want at each stage of their journey is critical to enhancing the passenger experience. Table 7-3 provides a summary of the key elements of

Table 7-3. Summary of key information dissemination elements.

Chapter 3: International Departing Passengers	Pre-Trip Planning	• Airport and airline websites with terminal facility guides ✩ 360° views of the terminal facilities ✩ Websites with video conference translation capabilities
	Arriving at the Terminal Departures Roadway	• Airline terminal listings • Airline identification signage
	Terminal Curb to Check-in	• Information counter • Information center • Check-in location signage • Tactile routes accessible to key points like an information counter or ticket counter • Flight Information Displays ✩ Flight Information Displays with alternate content • Directories (static, dynamic or digital)
	Check-in to Security Checkpoint	• SSCP procedure information • Dedicated lines for passengers with disabilities
	Security Checkpoint to Gate	• Directories (static, dynamic or digital) • Information counters • FIDs • Clear directional signage • Wayfinding apps • Mobile apps with speech translator

Table 7-3. (Continued).

Chapter 4: International Arriving Passengers	Pre-Trip Planning	• Airport and airline websites with terminal facility guides ✩ Animated 3D maps of the terminal facilities
	Arrival Gate to Passport Control	• "Welcome to" signage to greet customers ✩ Welcome signs that celebrate the local culture • Directional signage at intersections and decision points ✩ Color-coded signage for Passport Control queuing • CBP standard Passport Control signage • Specific signage for expedited entry programs • Identification signage, including CBP seal • Global Entry signage • Notification signage to convey information to passengers and crew • APC and MPC kiosk signage with instructions • Statutory and regulatory signage conveying legal information ✩ Video walls that distract passengers waiting in the queue
	Baggage Claim to CBP Exit Control	• Statutory and regulatory signage conveying legal information • Directional signage indicating the location of the CBP Exit Control • Baggage information displays indicating which carousel each flight is assigned • Signage with content about the next steps in the customer's journey • CBP Exit Control signage • Clear wayfinding signage for connecting and terminating passengers
	Arrivals Hall	• Identification of the arrival terminal—"Where am I?" • Signage that identifies each exit location for pick-up reference • Information counters or digital information kiosks • Ground transportation information • Common terminology and symbology that is easy to understand
	Terminal Arrivals Roadway/ Ground Transportation	• Safety and regulatory signage • Location identification signage for pickup reference • Directional signage to ground transportation services
Chapter 5: Connecting	Airline Recheck to Security Checkpoint	• Clear directional signage • Information kiosk with connecting flight information • Access to multilingual information
	Domestic Arrival to International Connecting Flight	• "Where am I" information that confirms a passenger's location • Visual cues that serve as meeting points • Walk versus ride to connecting gate information • Flight Information Displays • Static, dynamic or interactive directories
Chapter 6: Precleared Arriving Passengers	Arrival Gate to Connecting Flight	• "Where am I" information that confirms a passenger's location • Walk versus ride to connecting gate information • Flight Information Displays • Static, dynamic or interactive directories
	Arrival Gate to Domestic Baggage Claim	• Flight Information Displays • Airport Maps • Clear directional signage that can overcome any non-intuitive or non-linear wayfinding scenarios
	Domestic Baggage Claim to Arrivals Hall	• Identification of the arrival terminal – "Where am I?" • Signage that identifies each exit location for pick-up reference • Information counters or digital information kiosks • Ground transportation information • Common terminology and symbology that is easy to understand

information dissemination for international customers during each journey segment. Each is described in detail in the referenced chapter.

7.4.1 Notable Innovations

360-Degree Interactive Mapping: Third-party companies are providing airports such as Dubai International Airport and Salzburg Airport with high-definition 360-degree virtual tours using panorama photography allowing passengers to familiarize themselves with the airport in advance of their flight (see Figure 7-10). As compared to a video, customers are able to take a virtual tour of the terminal based on their preferences and needs.

The key benefits of this innovation include:

- Provides customers panoramic images of the actual facility and facilitates choices at junction points to choose their route as if actually there.
- Gives the customer confidence by having knowledge about the airport through state-of-the-art technology.

Websites with Videoconference Translation: Utilizing an innovative voice-to-text language translation tool developed by Microsoft Skype, two people who do not speak the same language can have a conversation by speaking in their native language.

The key benefits of this innovation include:

- Customers can use the application linked through the website to speak with an international representative in their native tongue via videoconferencing technology.
- Airports and stakeholders can provide additional language assistance without hiring additional staff.

Source: Dubai360 website

Figure 7-10. Dubai360: 360-degree panoramic images where customers can choose their path by interacting with the image.

FIDS with Alternate Content: FIDS are a key touch point in the passenger journey that creates a natural opportunity to communicate additional alternate content as means to enhance the customer experience. As shown in Figure 7-11, the FIDS at Heathrow Airport confirms flight status and provides check-in zone information to connect passengers with the large overhead zone designation signage guiding them to the correct ticket counter area. Additional displays are used to educate departing passengers on check-in information relevant to boarding passes, bag drop, and special assistance. This type of information can be especially helpful for international travelers unfamiliar with U.S. airport check-in procedures.

The key benefits of this innovation include:

- Customers can get additional information about their journey from a commonly used point of information dissemination.
- Key information can be provided to customers at multiple points within the departures hall and other areas of the terminal without the need for extra information counters with airport staff.

Animated 3D Mapping: Some airport websites, such as the one for Boston Logan Airport shown in Figure 7-12, provide videos or animated maps consistent with what customers will experience at the terminal. This allows them to familiarize themselves with the process, such as the international arrivals process, before arriving at the airport.

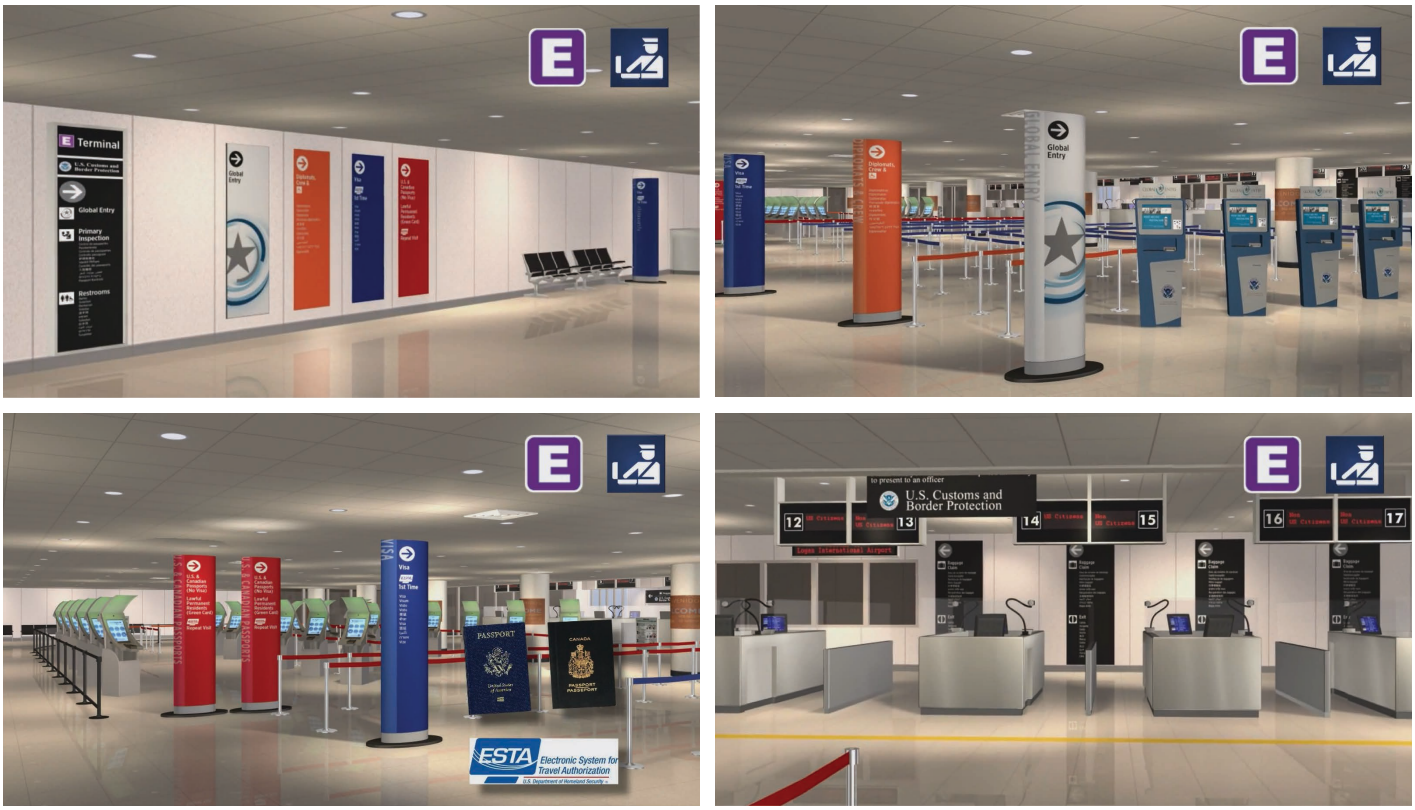
The key benefits of this innovation include:

- Provides 3D animated videos to walk the customer through a variety of different airport experiences prior to arrival.
- Gives the customer confidence by having knowledge about the airport.
- Allows customer service representatives to focus on helping customers with the greatest needs.

Welcome Signs that Celebrate: Signage at the entrance to the terminal from the aircraft is an opportunity to promote the airport brand and celebrate a city's image. Figure 7-13 illustrates how the airport name, brand, image, and welcome are all incorporated to celebrate the arrival experience.

Source: ACRP 03-35 Research Team

Figure 7-11. FIDS at Heathrow Airport Terminal 4 departures hall use alternate content (on first and fourth displays) to enhance the customer experience.



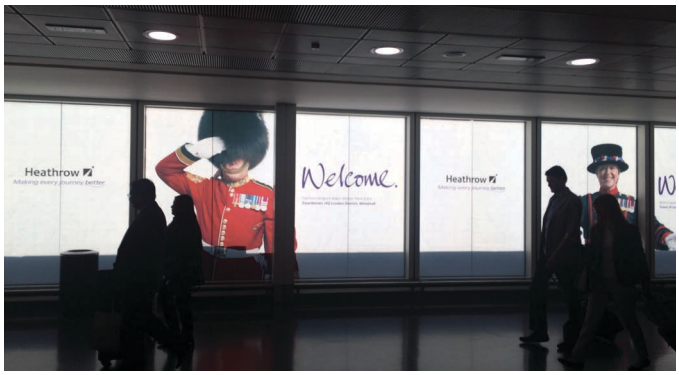
Source: Boston Logan International Airport website (www.massport.com/logan-airport)

Figure 7-12. Screen shots from Boston Logan International Airport Wayfinder app.

The key benefits of this innovation include:

- Provides customers with a positive first impression of the airport and city and can also help promote tourism.

Color-Coded Signage at Passport Control: Airports such as Boston Logan International and Dallas/Fort Worth International have implemented a color-coded signage system along the arrivals corridor to educate customers by associating entry status with a particular color.



Source: ACRP 03-35 Research Team

Figure 7-13. Welcome sign in the arrivals corridor at Heathrow Airport Terminal 5.

Source: ACRP 03-35 Research Team

Figure 7-14. Color-coded signage leading to passport control at Boston Logan International Airport.

As shown in Figure 7-14, the queuing area in the passport control hall is arranged by the entry status, which corresponds to the color-coded signage.

The key benefits of this innovation include:

- Reduces customer confusion by educating them prior to entering passport control.
- Provides customers with a positive impression that the airport cares about their experience.
- Reduces the number of customer service agents needed in the passport control hall to direct passengers to the appropriate queue.

Video Walls: Large video walls can be used to reduce the customers' perception about wait times at key areas, such as Passport Control. Figure 7-15 shows large video screens displaying rotating images of local and regional sights in Atlanta and the state of Georgia in the International Terminal at Hartsfield-Jackson Atlanta International Airport.

Source: © Chris Cunningham, Courtesy of Gresham, Smith and Partners

Figure 7-15. Video screen wall in the passport control hall at Hartsfield-Jackson Atlanta International Airport's International Terminal.

200 Guidelines for Improving Airport Services for International Customers

The key benefits of this innovation include:

- Help ease the negative reactions of travelers to airport delays by influencing their perceptions of the situation.
- Allows customer service agents to focus on dealing with customers who need help rather than listening to those who just want to complain.

7.5 Use of Emerging Technology

Airports are quickly becoming leaders in applying emerging technology to enhance the customer experience and improve operational efficiency. In many cases, the two objectives are symbiotic. Following is a list of the emerging technologies likely to make their way into airports in the very near future.

Augmented Reality: Mobile applications using Augmented Reality (AR) have the potential to become a cost-effective way to enhance the customer experience at various touchpoints along the journey. Advances in the triangulation and signal strength in existing WiFi access points for geolocation have made the transition from traditional outdoor GPS applications to indoor a reality, transforming airports into intelligent ecosystems by offering location-based services for navigation. Using a smartphone camera, an app allows the customer to scan the terminal capturing points of interest and highlight information such as distance and directions to navigate to these points. As this technology matures, integrating social media websites that provide customer reviews can allow customers to make intelligent decisions about where they shop and eat in real time.

Wearables: Future customer benefits from wearable technology can be drawn from the convergence of developing programs, for example, the marriage of the Google Glass and AR. Transferring AR from a smartphone platform to the Google Glass seems like a natural progression. Wearables may have a consumer benefit in the nearer future by taking existing uses, such as smartphone boarding passes, and moving to future platforms, i.e., smartwatch. Other potential uses may be on the enterprise side as demonstrated by Virgin Atlantic's six-week Google Glass trial aimed to improve business efficiency and create a more personal travel experience for customers through the use of technology.

Proximity Communications: Bluetooth, NFC, and RFID share several features, both being forms of close proximity wireless communication, but it is the differences that define the potential uses. Specifically, power consumption, connection time, and range make up are the characteristics that determine the appropriate technology to employ based on the intended purpose. Bluetooth offers longer ranges (up to 30 feet) at a cost of higher energy consumption and longer connection time, but as the technology advances, BLE devices are targeting lower power consumption, which are becoming the preferred communication choice for beacons. NFC's closer range (a few inches) and quick connection make it a more secure and personal type of communication. Combining the two technologies has allowed NFC to make a quick, secure connection between devices, then hand it over to Bluetooth as the devices move further away. RFID is primarily used in airports today to scan badges for access control purposes, and a tag can come in two forms, active and passive. Active tags utilize an internal power source to continuously power the communications circuitry whereas passive relies on power from the transponder to excite the tag. Passive tags are less expensive but come with a lower read range (under 9 feet); active tags can communicate up to 300 feet but require a battery and can cost up to $100 each. As technology in these fields advances, these communication forms are expected to continue to develop and more uses will become apparent.

WiFi Geolocation: This technique uses the intensity of the received signal strength from a transmitting source to a wireless access point by using triangulation algorithms to determine the

user's position within an indoor location. A database is populated with the client smartphone's MAC address, the SSID of each WAP and the signal strength to output a location, with accuracy levels based on the quantity of readings taken in a set amount of time. The process of geo-tagging assets consists of installing small wireless transmitters on items a facility intends to track. Geo-tagging and tracking assets expedite the services of airport associates for people in need, such as for wheelchairs, and allows the airport to keep track of their assets.

Beacons: Beacons received a lot of attention from airports in 2015. While only about 9 percent of airports currently have beacons installed, 44 percent report installation is planned within the next three years (*The Economist* 2015). Beacons use BLE technology to communicate with customer's smartphones to deliver information such as directions to lounges and baggage claims and retail advertising and promotions. Bluetooth also can be used to determine proximity by creating a geo-fence that differs from a positioning solution to determine a more accurate position. Many of the airports with beacons or planning to install beacons are still working to harness the power of this technology to use it in a highly functional way. The ability to reach so many potential end users with low-cost implementation, reliability, and ease may one day be the solution to a problem that does not yet exist

Airport Guidance Display Card: The idea behind Airport Guidance Display Cards is to help passengers unfamiliar with the airport make decisions quickly in case of a short layover or if they are late to board their plane. A combined number of communication technologies (including Bluetooth beacons and RFID tags) provides customers with real-time updates on boarding times, estimated walk times, and directions to the gate. Customers are handed a lightweight card with an RFID chip and utilize e-paper to display electronic information that is scanned as they enter an airport or deplane with the intention to make a connecting flight. The scan is then transmitted wirelessly to a system that updates the display card with the customer's next flight information. As customers walk through the airport, they receive real-time updates about their upcoming flight including delays or gate changes. If the customer makes a wrong turn, the card will display an alert.

7.6 Opportunities to Develop New Innovative Processes, Technologies, and Strategies

The greatest opportunities for developing new innovative processes, technologies, and strategies come from combining current and emerging technologies to better address customers' needs and expectations, while addressing operational objectives and constraints. The InfoGate kiosks at Munich Airport are an example of how the convergence of these factors led to a successful service that enhances the customer experience and addresses operational realities. The following are some additional opportunities for creating products or services that would enhance the customer experience.

Wayfinding Asset Management: Creating a wayfinding asset management system would greatly improve an airport operator's ability to communicate information more consistently and achieve a higher level of integrity in wayfinding information regardless of changes in operation and locations of services as well as during periods of construction.

Intelligent Messaging: Beacons create an opportunity to customize the information customers receive throughout their airport journey. More than simply providing locational information, personalized messages can be tailored to each passengers' needs and delivered in their native language. When connected to the common database, these could include real-time information about total time it will take to travel through the airport terminal, including check-in, security screening, walking or riding an APM, international arrivals processing, baggage claim, ground transportation pick-up, or transfer to a connecting gate.

On-Demand Customer Service: Building on the proliferation of mobile apps and widespread use of mobile devices by passengers, airport operators could deliver personalized customer service, including one-on-one live interaction, via existing technologies and programs such as FaceTime or Skype. Similar to the InfoGate kiosks, customers would be able to contact a live customer service representative via their mobile device whenever they need assistance. The customer service representative would receive information regarding the customer's location and flight details and be able to provide whatever support is necessary to aid the passengers in their journey. Additional tools, such as voice-to-text translation, would allow customer service representatives to work with customers in their native language without having those language capabilities.

Active Level of Service Management: Through the use of WiFi geolocation, airport operators can not only provide customers with information about wait times at key processing points, but they can also collect real-time information on wait times and walk distances to determine the level of service that customers are experiencing. This information would allow airport operators and stakeholders to make real-time adjustments to staffing levels or provide additional services (such as courtesy carts) to maintain the target level of service and enhance the customer experience.

Adaptive Facilities: Flexibility to accommodate future changes is a key objective in airport terminal planning and design. The next step in this approach is to leverage technology to allow facilities to adapt to the ebb and flow of passenger traffic throughout the day. Examples of this might include monitoring the utilization of restrooms and providing passengers with information about the location of the next restroom that may be underutilized but along the route to their destination within the terminal. Alternatively, real-time passenger traffic data could be utilized by the building management system to decrease energy consumption in certain parts of the terminal by reducing the number of operational fixtures and equipment or lighting levels during slower times of the day.

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APPENDIX A

Common Sign Design Elements

Overview of Airport Sign Design

Many physical aspects of a sign influence how effectively an airport customer can utilize the information presented to them. Following are summaries of these factors, which are not meant to be viewed as a complete how-to manual, but rather as a primer on the elements relevant to international travelers and should be considered when developing the design of a signage system. For a complete discussion for all sign design elements, please refer to *ACRP Report 52: Wayfinding and Signing Guidelines for Airport Terminals and Landside.*

Bilingual and Multilingual Messaging

The use of more than one language on static signage creates certain design challenges that need to be considered. A few basic considerations include:

- Formatting and layout of multiple languages will impact letter heights that can effect legibility and overall sign size, which may be constrained by architectural factors (e.g., low ceiling heights) as illustrated in Figure A-1.
- Access to personnel with the skill set or resources to ensure accurate translations of foreign languages and dialects.
- Additional cost considerations of updating or changing messages for more than one language.
- Visually distinguished English from the foreign language(s) by using graphic devices of different text weights, and/or copy height, positioning and/or color.

Of the eight U.S. airports surveyed, one airport used bilingual messaging in the CBP area on a limited basis, one airport used all static signage, and one airport used 12 languages on selected signage. Two of the eight airports used bilingual signage—English and Spanish—in public areas with no airports using multilingual signage. The results of the survey indicate that, at the two airports with bilingual signage, Spanish-speaking international travelers were more satisfied with their experience as compared to other international travelers whose first language was not English or Spanish.

Terminology and Symbology

A key companion to terminology is the consistent application of the symbols. The combination of terminology and symbology form the mainstay of an airport wayfinding system. A message and its accompanying symbol should be perceived as belonging together; the two elements are mutually beneficial. Virtually every research document and every survey confirms this basic philosophy.

Source: ACRP 03-35 Research Team

Figure A-1. Bilingual signage used airport-wide at Atlanta International Airport. Signs with four languages at Changi Airport.

With the goal of improving the international traveler's understanding and utilization of the airport, the consistent pairing of text and related symbols can provide a powerful communication tool for travelers. Once symbols are learned they become a visual shorthand, and a means of communication for those who do not understand the local language. This technique offers an added benefit of shortening the time required for a traveler to perceive and process the information.

Some symbols are more universally understood than others. For example, the airplane is recognized by any traveler whereas the symbols representing connecting flights or elevator may be less concrete or subject to differing interpretations. Figure A-2 illustrates various symbols for elevators. Other symbols like chapel can be influenced by cultural and religious backgrounds. Even the term chapel is used inconsistently and replaced with a host of other terms, such as prayer room, interfaith room, meditation room, and reflection room, being used.

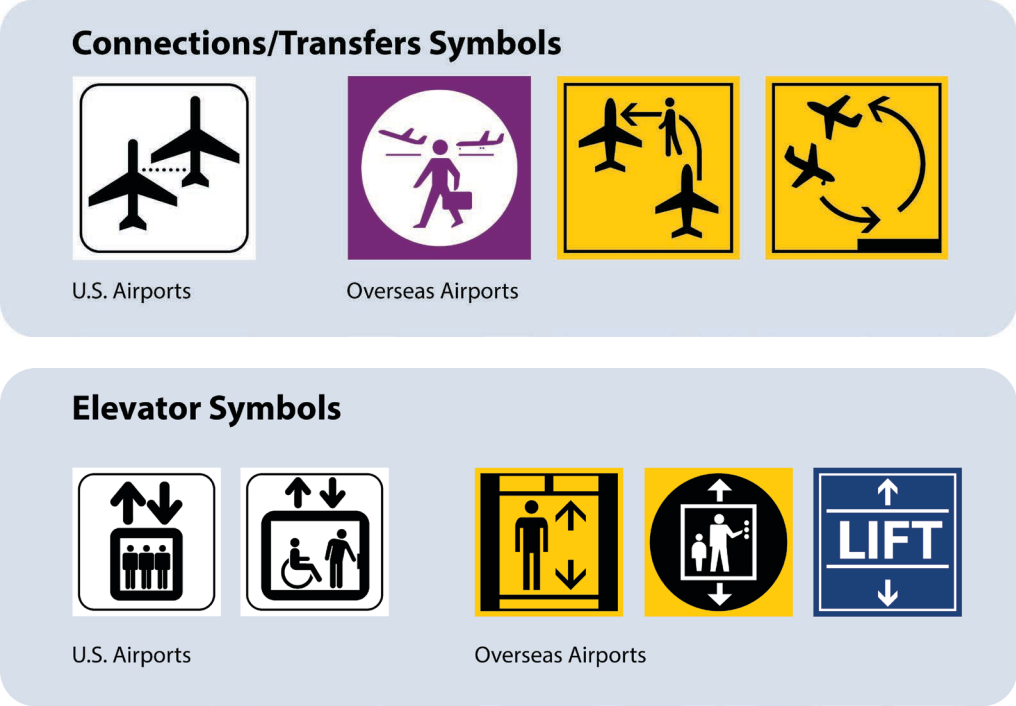
Consistency is the backbone of any wayfinding system, worth understanding how inconsistencies can lead to confusion. Airports should have a quality control process in place for periodic assessment that ensures the terminology is applied consistently to all forms of communication, including:

- Signs, static and dynamic
- Directory maps
- Handout maps
- Website maps
- Verbal communication (e.g., information desks)

The following list is provided to improve the international traveler wayfinding experience through consistent use of terminology. The intent of these examples is to help airports be aware of how terminology can impact the international traveler experience and is not intended to be all inclusive.

Baggage Claim versus Luggage – While sometimes attached with words like belts or reclaim, Baggage is the term most commonly used at airports worldwide.

Connecting Flights versus Transfers – The term connecting flights is used consistently in North America but varies internationally.



Source: ACRP 03-35 Research Team

Figure A-2. Symbol variations between U.S. airports versus overseas airports.

Gate versus Concourse – Gate is the actual destination. Concourse is an architectural term that is not always well understood. Using gate in lieu of concourse provides a simple and clear message.

Ground Transportation is commonly used on a global basis. However, it is an umbrella term used to describe multiple modes of transportation including taxis, buses, shuttles, trains, rental cars, etc.

Passport Control versus FIS, Federal Inspection Service or CBP, Customs & Border Protection. Communication of this fundamental procedure is based on the fact that international travelers are required to have their passport to enter the country.

Restroom versus Toilet – The term restroom is used consistently in North America, but toilet is more commonly used internationally. Regardless of which message is used, this is one example where the symbol can stand alone without using either term.

Welcome – Many airports use the term welcome on signage where passengers can see it immediately after deplaning or at some point along the journey through the terminal. At U.S. airports, this type of sign varies between using English only and using multiple languages. Using multiple translations of the message, as shown in Figure A-3, contributes positively to the foreign visitor's experience at U.S. airports. It is also helpful to include where the passenger is being welcomed to, e.g., the city and/or the terminal building.

Current Symbol Standards

Contrary to perception, there is no universal airport symbol library. The most commonly recognized symbols are the set of 50 pictograms developed by the American Institute of Graphic Arts (AIGA) for the U.S. Department of Transportation. The AIGA set is used as the foundation

Source: ACRP 03-35 Research Team

Figure A-3. Multilingual welcome message at Chicago O'Hare International Airport Terminal 5.

of aviation symbol libraries for the vast majority of airports in the United States. However, there are variations of the symbols found at U.S. airports that create inconsistency, and the set itself is by no means complete with respect to the modern airport and its symbol requirements.

Comprehension

Symbols are most effective when representing a tangible object such as an airplane for an airport. Some, but not all, services can be represented by symbols. Baggage Claim is a good example of a service that can be easily represented by a symbol. However, the symbols commonly used for ground transportation services can be problematic. A taxi or bus is pretty recognizable, but at large airports with many modes of service (e.g., multiple types of shuttles and buses) the symbols, as shown in Figure A-4, begin to all look the same without the message to help clarify the meaning. Comprehension is even less effective when symbols try to convey a process such as connecting flights.

An important point of emphasis: symbols are important tools in communicating with foreign travelers, but when a new symbol is introduced or is copied without proper testing for comprehension, the result can be a disservice to the intended audience.

Source: ACRP 03-35 Research Team

Figure A-4. Comparison of various Ground Transportation symbols.

Source: ACRP 03-35 Research Team

Figure A-5. Symbols consistently used with corresponding message at Dallas/Fort Worth International Airport.

Application

The effectiveness of symbols when used alone is limited and should be incorporated as part of an overall sign system strategy. An airport's sign system should be based on the clear and consistent pairing of the symbol and associated message, which reinforces the symbol's effectiveness, as illustrated Figure A-5. Once this association has been firmly established, some of the more common symbols can function as stand-alone communicators, as shown in Figure A-6. This may be useful for limited-space display of key destinations like restrooms, but should be used only for the most commonly understood symbols and key destinations.

Accessibility Symbol

For restrooms, it is very important to include the symbol of accessibility as shown in Figure A-7, because not all countries have restrooms that are accessible, unlike the United States

Source: ACRP 03-35 Research Team

Figure A-6. Symbols used effectively without corresponding messages at Dallas/Fort Worth International Airport.

Source: Photo courtesy of Gresham, Smith and Partners

Figure A-7. Restroom signage at Philadelphia International Airport with the symbol of accessibility.

where all restrooms are required to be accessible per the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

Future Trends – Emerging Symbols

The need to clearly communicate new types of information must keep pace with the new technologies, processes or operations that are constantly evolving at airports. The effects of this evolution can be seen in a snapshot of current events through passenger processing technologies, such as MPC, and services like ridesharing, that impact the airport ground transportation curbside operation. Tomorrow's future events will have a similar impact.

The site visits to U.S. gateway airports showed how the MPC app, which is aimed at improving the international traveler experience by speeding up the passport control process and allows the traveler to use a special lane, is affecting wayfinding. As shown in Figure A-8, some airports in search of a symbol utilized the icon associated with the app, while other airports developed their own symbol along with similar efforts for a new symbol for the APC process.

Source: ACRP 03-35 Research Team

Figure A-8. Examples of symbols being used for MPC and automated passport control.

Source: ACRP 03-35 Research Team

Figure A-9. Color-coded signage for each passenger type in the passport control hall at Boston Logan International Airport Terminal E.

Given the limitations relative to symbol comprehension that have been noted previously, it is important to evaluate and test new symbols before they are introduced to the traveling public. Based on research by Hora (2005), this process involves three distinct dimensions:

- Semantic – how well does the symbol represent the meaning?
- Syntactic – how well does the symbol relate to other symbols?
- Pragmatic – can the person see the symbol?

Color-coding

Color-coding can be used as a design element to support wayfinding but should not be used as the primary wayfinding device. As noted in Chapter 4, a good example of color-coding that helps improve the international traveler experience can be found at Boston Logan International Airport (see Figure A-9). The signage prior to CBP primary processing is color-coded to aid in segregating types of passengers. Displaying the color-coding on information signage along the route from the gate to passport control educates international arriving passengers about the different lines, and the colors help them find their line more quickly and reduces bottlenecks prior to the queue area.

Lighting/Illumination

Of the eight U.S. airports surveyed, all but two use internal illumination for directional signs. All five of the overseas airports visited use internal illumination. An argument can be made that the international traveler has come to expect illuminated signs in airports. However, while there is general agreement that illuminated signage provides a higher level of visibility, the research does not provide quantitative proof that passengers actually experience an improvement in way-finding performance.

The decision of whether or not to use illuminated signs ultimately depends on an individual airport's needs. The most critical determining factor is the level of ambient light. Without sufficient ambient light, the decision to use illuminated signage becomes easier, especially when

Source: ACRP 03-35 Research Team

Figure A-10. Examples of sign illumination methods: Top left – fully internally Illuminated (Heathrow Airport); Top right – illuminated legend only (Miami International Airport); and Bottom – externally illuminated (Philadelphia International Airport).

considering elderly international travelers with poor visual acuity. They have to deal with two impediments: (1) reading signs that are not written in their primary language and (2) the sight limitations brought on by age. The elderly are particularly affected by low-light environments.

Three types of illuminated signs are commonly found in airports, as shown in Figure A-10:

- Internal illumination of the entire face that typically provides the highest level of conspicuity
- Internal illumination of the legend only (symbols and messages) with an opaque background
- External illumination that washes the sign face which requires careful attention to avoid unwanted glare

Reference

Hora, Mies. 2005. Official Signs and Icons 2. Ultimate Symbol Inc. Stony Point, NY. Chapter 4—Symbol Signs: Transportation I (AIGA/DOT).

APPENDIX B

Primer on Planning, Deploying, Operating and Maintaining a Digital Information Program

Introduction

Since the early-2000s, the aviation industry has embraced digital signage to display dynamic messages such as flight and baggage information. The digital signage industry has continued to mature using advanced information delivery methods to provide a higher level of customer satisfaction through interaction and personalization. With careful planning, organizations have the ability to not only provide a world-class level of customer service, but rethink the way they collectively manage data.

Advanced CMS can reduce the quantity of disparate systems preforming background tasks, organize data into useable information, and ultimately minimize repetitive work by building a single asset library. The information provided in this appendix details the scale, scope, and complexities involved with a digital information program to help an entity make an informed decision prior to engaging the process.

What is the Information Space?

The information space in an airport consists of all the information passengers could possibly require from the time they leave their home until they arrive at their destination. In a virtual environment, the space includes all the information produced and extracted automatically from a multitude of networked computer systems through a variety of data feeds. The majority of digital systems will accept the major universal transport mechanisms that support open standards and operate over TCP/IP and other common protocols such as XML, RSS, HTTP, ODBC, FTP, CSV, etc. Once the data is received and processed it becomes useable information. In any organization the management of data can be an arduous task. Over the past 10–15 years, many data management services and solutions have been sold to organizations, each with their own parameters and capabilities. As new technologies emerge, many individual services have not advanced to be able to take on the management of the new technology. This requires a new set of services to manage this new technology while the old services have been left in place. This leaves many management systems running individual applications which become a systems management nightmare. As these systems mature from disparate services that produce information for a single purpose to a converged network capable of combining useable information for a greater cause, the organization has entered the information space.

In an airport, automated services provide the information passengers require during all phases of their journey. To provide this information in an accessible and convenient manner, it should be in multiple media formats. This could be as ubiquitous as flight information to something requiring a deeper level of data collection such as traffic conditions from the passenger's home to the airport.

B-2 Guidelines for Improving Airport Services for International Customers

The information for services in this space generally includes:

- Weather in current and destination city
- Traffic around airport and to first/final destination
- Airport maps/concessions/services
- Flight information
- Gate information
- Baggage information
- Emergency notifications
- Passenger notifications
- Ground transportation including parking, airport shuttles and taxis/passenger pick-up
- Rent-A-Car facilities
- Hotel information, including shuttles

The data feeds for the above services are routed through multiple types of content aggregators. Content aggregators for dynamic digital signage are companies that provide services for a set (typically monthly) fee. These specialized organizations provide a product selection that includes feeds for news, sports, weather, traffic, graphics, and video. Flight and gate information are typically controlled by the individual airlines and the FAA. ASDI is a feed provided by the FAA to flight information aggregators such as Flight Stats and Flight View for industry flight tracking.

From Data to Information

Once the data is collected from the array data aggregators (including any in- or out-of-house content production), it is most common to store it in a single and easily manageable location, commonly known as an Assets Library. The format used for an Assets Library may differ from system to system but typically, the most common is open database connectivity (ODBC) applications such as Microsoft SQL (other name brands may also apply). Another common process to organize and retrieve content is through a typical windows filing system and referencing the URL path in a comma-separated values (CSV) file to call upon within the CMS.

Once organized, the data is typically scrubbed and put into a useable format. With this collected and formatted information, the airport can then develop multiple passenger-facing digital platforms, such as web, mobile, and digital signage interfaces.

The practice of data sharing uses a unified source of information to create multiple outputs. Because it is only updated in one location, data sharing increases the accuracy and consistency of the information displayed across platforms. The key to a successful digital campaign is to provide passengers accurate and consistent information across each platform. Figure B-1 depicts the flow of data within the information space. Multiple independent feeds in different formats enter a single database that are then structured to a single format and used to create multiple separate but similar output platforms.

Organization Chart and Responsibility

Airport IT Group

Because of the technical nature with digital signage, the IT group will assume a large role in the overall program and be the largest stakeholder in the setup and implementation of the digital information software and hardware. Their role will decrease after the initial systems deployment.

The IT group will be accountable for the setup, planning and programming of all new network hardware, system players, servers, and content databases in coordination with the selected software

Source: ACRP 03-35 Research Team

Figure B-1. Data flow chart.

vendor. Their involvement after the initial deployment will change to software maintenance, network infrastructure maintenance, occasional hardware programming for hardware that may fail, and managing the unified information database and sources.

Aviation Operators

Aviation operators are individuals at an airport whose day-to-day responsibilities revolve around the physical operation of the airport: terminal managers, airline station managers, airfield operations staff, airport maintenance, planning and engineering. Some aviation operators listed may not directly interface with the day-to-day digital signage operations; however, their value should not be overlooked when it comes to implementation and ongoing operation of digital systems.

When deploying digital hardware in an airport, infrastructure is a large consideration. An understanding of the airport's expansion, renovation, and modification plans is also essential in the planning stages. Planning and engineering will play an important role because of their understanding of construction requirements for the installation of infrastructure (e.g., power and data) and associated structural and architectural support for display banks and future projects. Planning and engineering also has expertise in capital projects, construction project quality control, and understanding how to expand upon existing systems, which will be crucial to the system's deployment success. Once deployed, airport engineering should be consulted on all future system expansions because of the infrastructure and construction components.

B-4 Guidelines for Improving Airport Services for International Customers

Involvement of the airport maintenance groups is required in the deployment and operation of any system at the airport. Typically, the airport maintenance group encompasses an electric shop and/or an electronics shop. The airport maintenance group has no involvement or input on the content; their involvement is required for the maintenance or replacement of the equipment in the field. Specifically, the airport maintenance department in coordination with airport IT and the system maintenance vendor will typically handle the power devices. Airport maintenance will coordinate with airport IT prior to interruptions in power as well as maintenance of power equipment associated with any digital equipment and or scheduled power outages.

Airport Communications Group

The airport communications group consists of departments having the most verbal communication with the public either through incoming phone calls and e-mails or face-to-face interaction. Because of this daily interaction they are the most valuable resource when it comes to feedback regarding customer issues. Prior to the digital age, the communications group were the people who would make the decisions on how and what signage and communication tactics would be used to convey information to the passengers. Marketing and public relations, customer service, airport signage and airport properties were the main contributors to the communications group.

The most public-facing staff, customer service employees may be polled to indicate what they feel are the most frequently asked questions or most requested information when passengers call the airport. The results of this poll could be considered for content development. Pulling in their experience of dealing with the public could prove valuable during the program definition and throughout the content development process.

The marketing department traditionally handles all promotion campaigns in addition to website design and management. As more airports are displaying information digitally and recognize the diversity of their passengers, uniform information integration between platforms becomes a vital necessity. Marketing staff will be heavily involved in the decision-making of what external feeds are important to display, content template layout and continuing updates and changes.

Along with the marketing staff, the person(s) or group responsible for the airport signage will have knowledge of where important information should be provided. They are most familiar with what type of signage, font sizes, and styles are appropriate along with the symbols used domestically and internationally. Multilingual and ADAAG requirements between static print signage and digital signage differ and the airport signage personnel are the most familiar with this realm and will add great value and knowledge to best practices when it comes to building a digital platform.

Tenant managers/airport properties department and the airport group that manages concessionaires play a vital role in making certain that concession updates occur in real-time as changes take place. An example is when a concession closes for tenant construction. Tenant coordination will play a role in the ongoing concessions content updates. One of the main goals of any digital program is to enhance the airport customer experience. Concession promotions and coupons can be made available through the use of digital dynamic signage as agreed to between the tenant managers and concessionaires. The tenant manager should have no responsibility to create or schedule the content, but their input is vital to keeping content current.

Content Development Team

The content development team consists of a graphic designer, developer/programmer and an information coordinator. These positions may be full-time or outsourced based on the daily needs and size of the digital program. Multiple personnel may be required to fill the roles of each platform the program touches. It is not uncommon to have a web developer, mobile app developer, and digital signage content manager working together. The information coordinator position at the

STAKEHOLDER SUB-UNIT RESPONSIBILITY MATRIX														
STAKEHOLDER	DEVELOPMENT					SOFTWARE MAINTENANCE				HARDWARE MAINTENANCE				
	Program Definition	Data Collection	Cross Platform Coordination	Content Development	Content Approval	Content Updates	Content Database Maintenance	Update Airport Database(s)	Maintain Airport Databases and External Information Feeds	Program Hardware	Maintain Hardware (Displays, Players)	Maintain Network Hardware (Servers, Infra.)	Maintain Cable Infrastructure	System Implementation and Expansions
Airport IT	x	x							x	x	x	x		x
Airport Engineering	x												x	x
Airport Maintenance											x		x	
Marketing/PR	x		x		x			x						
Customer Service	x		x		x			x						
Airport Signage	x		x		x			x						
Properties	x		x		x			x						
Content Development Team		x	x	x		x	x	x	x					

Source: ACRP 03-35 Research Team

Figure B-2. Stakeholder responsibility matrix.

airport should be considered so that all of these efforts are channeled in an efficient manner; this person would be the overall content manager. This individual is responsible for the development of templates, coordination of content, scheduling and deployment of content and coordination with all the other stakeholders specifically to successfully deploy valid information to passengers. This individual does not need the specific knowledge of the operation of databases where content and lists reside, external sources or network infrastructure, but does have the ability to continuously update content generated by the other stakeholders, make signage template changes, and push the appropriate content to all digital signage applications. In case of problems with the deployment of content, the content manager would report the problem to the appropriate stakeholder group. This person is typically an individual with some knowledge of marketing and graphics and different development platforms.

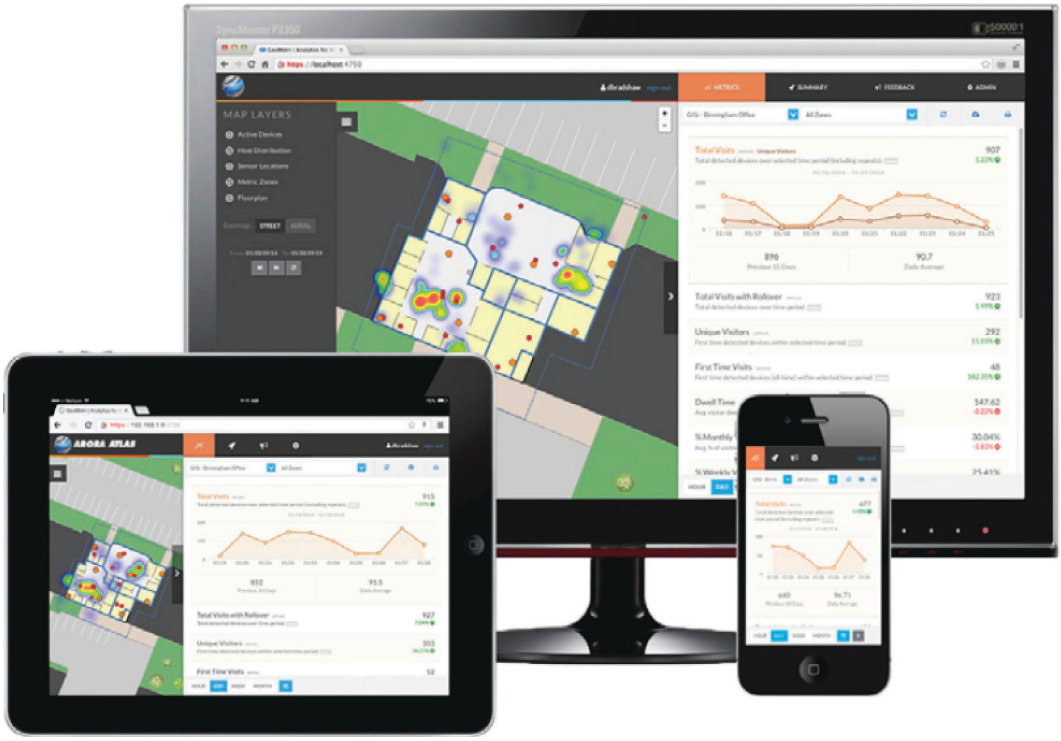
Figure B-2 is an example of a stakeholder responsibility matrix. The green highlights are key players in content creation and the team that guides the overall program.

Cross Platform Branding

Once the information, regardless of origin, is filed correctly or located in an ODBC interface, each platform should be able to pull content from this location and use it to achieve a uniformed look. This information is most effective when collected and displayed to passengers in a clear, concise, and consistent format. The branding and message must be clear. If the same information is displayed across multiple formats, each one must have a common layout that is familiar and easy to navigate. Every wayfinding map must be navigated correctly so passengers can orient themselves according to the layout of the building. Figure B-3 is an example of cross platform branding where all digital formats are consistent.

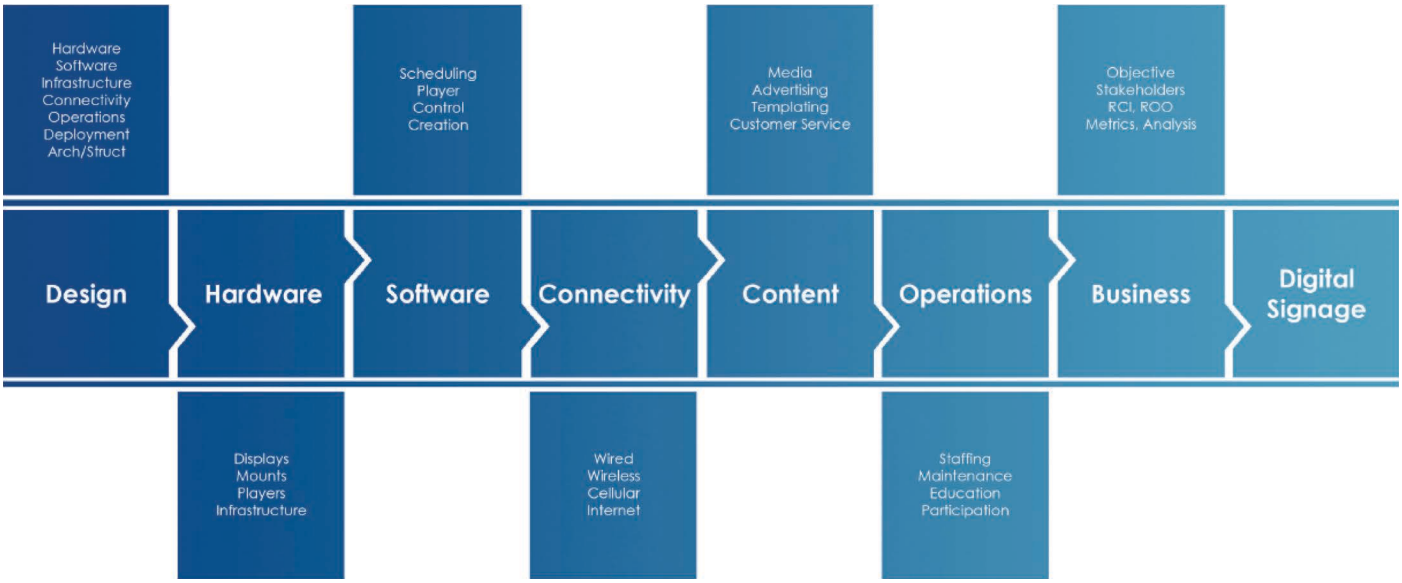
How to Implement a Digital Information Program

The use of digital signage at airports continues to grow as technology advances and passengers become increasingly reliant on real-time, dynamic information. A digital information program, whether new or an augmentation or expansion of an existing system, needs to be approached from the design side as a holistic solution. In order to get the ideal result, the program must be viewed from a coordinated, holistic approach that is consistent, clear, continuous, and improves the customer's experience at the airport. Figure B-4 illustrates the key elements of a digital signage program.



Source: ACRP 03-35 Research Team

Figure B-3. Example of cross platform branding.



Source: ACRP 03-35 Research Team

Figure B-4. Key Elements to achieve a successful digital information program.

Program Design (Definition)

To understand the fundamental nature of the design elements of a digital information program, an in-depth review of the existing digital program must be completed. This review must cover all digital aspects of each platform in order to understand the overlying objectives the current model favors. An airport looking to redefine their digital information program will most likely have certain aspects previously developed, most typically a website. This investigation will provide the information needed to make a decision whether a complete overhaul or a realignment is required. Working with the proper stakeholders once these findings are documented will help make that decision. The key aspects to be considered in the investigation are provided in Figure B-5.

The first step in the program definition process is an airport ergonomic study. This study will provide an analysis of the passenger flow and the passenger's interaction and efficiency with the existing systems. It can be divided into two pieces, the physical and practical aspects. First, the study will identify specific physical locations for the deployment of digital directories and content relevant at each location. Recommendations can be made to reuse sign placement, change sign placement, and indicate new sign placement as well as sign form and size. This part of the study contributes to the design of the placement of digital static, dynamic, and interactive signage within the facility as well as the relevant content at that location, otherwise known as content strategy.

Second, the practical aspect of the study will be accomplished by a thorough review of the existing data feeds and systems. This will directly contribute to the content development phase. Recognizing and identifying all available data sources will contribute to developing the appropriate graphics that will be used later in the program.

Business, Operation, and Maintenance

Without having a solid grasp on the reason behind the digital information program, a successful deployment is unlikely. For example, "To portray information to the passengers" is a good start, but is short-sighted. Identifying measurable Return on Objectives (ROO) by each stakeholder is a critical path that must be defined up front after assessing the current conditions of any systems. Research by Brawn (2014) shows that the most significant percentage of failures in digital signage projects fall under the areas of poor due diligence up front and business planning. The business plan must begin with a clear understanding, consensus, and articulation of the objectives or purpose of the digital signage network and exactly what the system should do and how it should work.

PROGRAM DEFINITION: WHAT TO LOOK FOR		
Platform	Front End Design	Back End System
Website	Information available Website navigation Content flow	Data Feeds Programming Management System
Mobile	Mobile Features	
Digital Signage	Passenger Flow Environmental Fit Content Relevance	

Source: ACRP 03-35 Research Team

Figure B-5. Program definition matrix.

Another important element of a digital signage project is how the systems will function and what to expect when it comes to maintaining the system. Prior to any discussions about how to build the system, the operational requirements must be identified in relation to staffing and recurring maintenance; workflows would then be developed to update the system. Running any digital information platform requires dedicated staff members who understand their roles in the system, how each aspect of the system functions and at least, who to contact in case there is a malfunction. This requires an understanding of the stakeholder working groups to develop the appropriate workflows for updating and keeping content relevant.

Content

The next important element is content, because content is the vehicle that carries the objectives to fruition. In the program definition, the study was used to define a content strategy. This content strategy will provide direction on key elements such as the following.

Relevance

Content must be relevant to the viewer regardless of the format. The objective of the content is to keep the viewer engaged so they will receive and retain the intended message.

Placement

Signage should be placed in a location and position that is natural for the viewer to gravitate to. A webpage must have a natural flow in order to keep the viewer engaged.

A large part of the content strategy is a graphical design element. The ergonomics study will provide the information needed to determine the size of the content development effort, though more often than not the ROO determined by the stakeholders will require a content refresh. The content strategy requires a holistic approach to enable seamless coordination between all media platforms involved. Designing one platform that will work with the digital signage, the interactivity of mobile, and the challenges of web development will affect the graphic development component. No software platforms work alike; there is no one-size-fits-all approach to graphic design. An understanding of how content is layered within the software platform will ensure flexibility in the system. A few of the key elements of graphic design for digital signage include the following:

Refresh Rate.

Repetitive content will eventually be ignored and cause the viewer to ignore the program as a whole. Planning the duration and variation of content through scheduling is essential to the program's success. It is also important to ensure that any time-based information, such as weather and news, stays current.

Audio/Visual Stimulation.

Capturing the initial attention of a viewer in a traditional web or digital signage environment can be challenging. In an airport environment, customers are constantly seeking digitally based information. Additionally, displays such as interactive displays should remain stand-alone to reduce the dwell times around information display banks.

Engagement.

Content must be developed with the ability to engage the viewer by providing a reason for the passenger to download the mobile app by using other triggers within the airport.

Software

Though certain software (including digital signage software) may assist the development of websites and mobile applications, the focus lies more heavily in content and layout development than HTML 5 programming. While small deployments can be built this way, what sets digital signage software apart from the latter is the ability to build content ahead of time and schedule it to play via trigger or simply automatically on its own. Prior to deciding how to deploy the content strategy, there should be a decision on the software vendor. The digital signage industry has become so advanced that, depending on the scale of the deployment, many variables must be considered. Software cost is widely dependent on the berth of attributes included in the platform including scalability and the service level agreement (SLA) for maintenance. The major options to consider when making a decision in choosing a software package for the digital signage package include the following.

Commercially Available

Is the software available through a number of resellers, developed by an established, proven software developer with experience in the transportation space, specifically in airports? The software developer should have customer assistance resources such as call-in support and online knowledge bases. Any software add-ons required to supplement the base software package functionality should be supported directly from the core software provider as well as proven in their integrations as software platforms. The end user should not have to interact with multiple software vendors as a result of a product add-on to support additional functionality.

Secure/Remote Access

Is the software, whether being accessed on-site or remotely, securable by standard encryption methods or access credentials? Are the software log on and the user rights associated with the software user-based? The software should be capable of supporting multiple levels of user access based on login credentials. Is the software accessible from multiple locations via secure virtual private network (VPN), secure web interface or other method?

Flexibility, Scalability, Ease of Use, Content Management/Creation

What level of flexibility is required whether creating new sign templates, deploying new sign players, or aggregating new data to be displayed as part of an existing sign? Is it a requirement to have the software back-end accessible via an easy to understand graphical user-interface? Is the deployment of new signs simple in that a new sign can be created by simply applying a sign's location to a standard template or set of metadata to deploy? A new template and sign should not need to be created every time a new sign is deployed. The software should act as either its own content library, via loading content directly into the software database or pull content from existing content libraries. Content management is typically via graphical user-interface and can be as simple as drag-and-drop to move content between libraries.

Support Interactivity, Multiple Data Sources, Multiple Screens

Is the software package required to support touch-screen hardware allowing users to define their own experience? Does it have the ability to allow a user to select a feature, service, concession, etc. at an interactive display or kiosk and have the display present relevant information, such as: a bread crumb route to the selected amenity, on demand additional information about the amenity, walk times, ride times, walk vs. ride times, etc.? Furthermore, is the system capable of making on-the-fly changes with inputs from other systems, such as a building management system or concessions schedule?

Analytics

Can software provide analytics in the form of customizable reports, such as duration of displayed content? Some systems are able to provide user analytics, such as number of times a display was used in the case of interactive, what was most frequently visited, how many times a certain feature was accessed, etc. Some have an add-on feature, which would require additional software, hardware, and integration, to collect demographic data from interactive displays with the use of a 3D camera and integrated programming algorithms. Typically, this technology is available, in use, and optional.

Useable via Multiple Channels, Displays, Mobile, Web

Is there a requirement for the software to be capable of pushing data to a variety of mobile devices? Similarly, is the software able to either push content to the website or pull content from a website in order to maintain continuity between information sources?

Multilingual, Digital Paging

Can the software shell support multilingual text either via automatic data trigger or via user selection? For example, a display in close vicinity to an arriving flight from Nagoya could be set up to display Japanese characters once the flight information changes to "Arrived at Gate." An interactive display should have a language selection tool by which a user can select the desired language.

Hardware and Connectivity

Like software, once the servers are in place and the website/mobile development launched, a physical presence in the airport is not necessary. Hardware and connectivity refers to the physical portion of the public-facing components of digital signage in the airport. Sign hardware is the installation of digital signage hardware, displays, sign hardware, sign frames, video controllers, mounts, and touch overlays to provide a working model by which to conduct focus groups, implement digital/dynamic directory signage, and implement interactive signage. Typically, durable, high availability hardware both for the displays themselves and the back-end video players should be considered when designing digital signage hardware in an airport setting. The displays should be rated and warranted for 24-hour continuous use in a touch environment.

Establishing network or video connectivity to the locations, as along with the structural, architectural, and other engineering disciplines should be considered. If new structures for hanging signage are required, ensure the properly licensed engineers are involved to design the structures. If these are existing locations, ensure the power and environmental conditions allow the proposed equipment to function properly and safely.

Reference

Brawn, Alan. *Demystifying Dynamic Digital Signage and The 7 Key Elements.* International Signage Association. March 3, 2014.

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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