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CROSS-CULTURAL FACTORS IN AVIATION SAFETY

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and published under his authority*

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INTRODUCTION

OBJECTIVE

The objective of this digest is to provide the participants in the decision-making process in the aviation industry — including regulatory authorities and airline personnel — with an awareness of cultural interfaces and the impact of cross-cultural factors on aviation safety. While the digest suggests possible avenues of action, it does not however propose solutions, because these solutions will only emerge as consequences of cross-cultural research in operational settings.

AUDIENCE

The digest is aimed at managers of both civil aviation administrations and the airline industry, including airline operational and training managers. The target audience also includes regulatory bodies, safety and investigation agencies and training establishments, as well as senior and middle non-operational airline management.

WHY THIS DIGEST IS IMPORTANT

Cross-cultural interactions are a daily occurrence in international civil aviation, but their real significance to aviation safety is only marginally understood. In the absence of clear understanding, the safety issues underlying cross-cultural interactions are either ignored or incomplete assumptions about their significance are made. Disturbingly, some of these incomplete assumptions are acted upon.

Therefore, the first step is to define and analyse the safety cases potentially underlying cross-cultural interactions and cultural interfaces in international civil aviation; specifically, to identify those areas with the greatest potential to threaten the safety and efficiency of aviation operations. Decision-makers in international civil aviation will find in this digest the basic information to guide them in defining and analysing these safety cases.

SUMMARY OF THE DIGEST

Chapter 1 provides the background on culture, context and cultural interfaces in aviation.

Chapter 2 presents the safety case for cultural interfaces in aviation safety by using the SHELL model, the Reason's model of latent conditions, and the Threat and Error Management (TEM) model.

Chapter 3 discusses the evolution of a dominant model or way of doing things in aviation and highlights both the positive and negative consequences of that dominance with regard to cultural interfaces.

Chapter 4 proposes a way forward through two solutions: a) raise awareness of cultural interfaces and their threat potential among various aviation personnel, including those who shape the dominant model; and

b) collect systematic data in the operating context of different regions around the world in order to quantify the risks posed by different cultural interfaces and to understand local adaptations to the dominant model.

BACKGROUND

Unlike no other technology before or since, aviation is responsible for creating the “global village”. It is now possible to reach any part of the world by air, and to do so in previously unimaginable time. Whereas international travel had previously been a privilege of the wealthy elite or the adventurer, the world today is accessible to more and more people. Business, leisure, even religious pilgrimages are now achieved with the help of air travel. Aviation has changed the way we think about the world and about what is possible in the world.

Civil aviation is the global success that it is today because of its dedication to improving safety. This pursuit of improved standards has advanced the industry in several directions. First and foremost, brilliant minds have created ever more sophisticated machinery — today’s aircraft are extraordinary marvels achieving speeds and load factors never before imagined. A second avenue of improvement has focused on the human being in the aviation system. By placing the human at the centre of the aviation enterprise, the Hawkins’ SHEL model reminded us that people must still handle even the best machinery. Crew Resource Management (CRM) expanded the Human Factors horizon from individuals to teams, while Reason’s model of organizational accidents went one step further to show how policies and activities at the management level can impact safety-related activities throughout an airline, including in the cockpit. This constant dedication to improving safety has led to the examination of cross-cultural factors in aviation safety.

The prevailing approach to the way activities in global aviation are conducted has been shaped in large part by manufacturers of technology and the largest customers. The standards and practices of the industry have been shaped through competitive deregulation, professional interest groups, and resource-rich investment in technology. The outcome of this influence and investment is an outstanding safety record that civil aviation now enjoys. However, despite this overall success, some regions of the world do not enjoy the same high safety record as others, prompting the question “why?” International standards and practices should be equally relevant, equally applied, equally enforced and equally affordable around the world. However, the ICAO Universal Safety Oversight Audit Programme has demonstrated that this is not the case. Regional accident rates vary around the globe, suggesting that the prevailing model of aviation practice may not be equally applicable around the world. Understanding these variable safety statistics more completely was the impetus for this document, since the broadest understanding of those local or contextual factors affecting specific contexts may be the key to further progress in global aviation.

This digest therefore attempts to present the safety case for the consideration of cross-cultural factors in aviation. It does so by focusing not on cultures as such but on cultural interfaces, i.e. those situations where members of one culture encounter people or artefacts from other cultures. To put it in the simplest terms, as long as we stay within the bounds of our own culture, all of the advantages of cultural membership hold: Fellow members and the environment are predictable, thereby making daily routines easier and quicker. But as soon as we encounter members or artefacts (aircraft, procedures, regulations) from other cultures, these cultural efficiencies are challenged and the opposite occurs: The environment becomes less predictable, more uncertain, and requires more cognitive effort. In time and with sufficient exposure, new habits will emerge to deal with the cultural interface. In civil aviation today, cross-cultural contact is the norm rather than the exception. In such a global context, cultural interfaces are a daily reality.

To illustrate the safety case involving cultural interfaces, the digest builds upon three established industry conceptual models. First, the SHEL model introduces the notion of interfaces and notes their relevance for aviation Human Factors. Second, Reason’s model of organizational accidents broadens the Human Factors horizon to include organizational factors that are distant but influential upon the cockpit. The safety case

involving cultural interfaces in aviation seeks to broaden the horizon even further, showing how members of one culture can incur confusion, misunderstanding and misapplication when encountering members or artefacts of another culture. In this sense, cultural interfaces hold the potential to become latent conditions. Lastly, the Threat and Error Management (TEM) model provides a framework for “seeing” the cultural interface in the operating context. It can determine which types of cultural interfaces are the most problematic for a specific context; it can also study the threat management strategies employed by aviation personnel to manage these interfaces within specific contexts. Successful solutions can be shared with the industry.



Chapter 1

CULTURE, CONTEXT AND CULTURAL INTERFACES IN AVIATION

INTRODUCTION

1.1 In a broad sense, culture can be defined as the ongoing interaction of a group of people with their environment. The environment shapes the responses of the people, and these responses in turn modify the environment. A culture develops and changes due to three processes: technological and physical changes in the environment; changes in the internal dynamics of the social system; and historical circumstances that are fortuitous or serendipitous (see Figure 1-1).

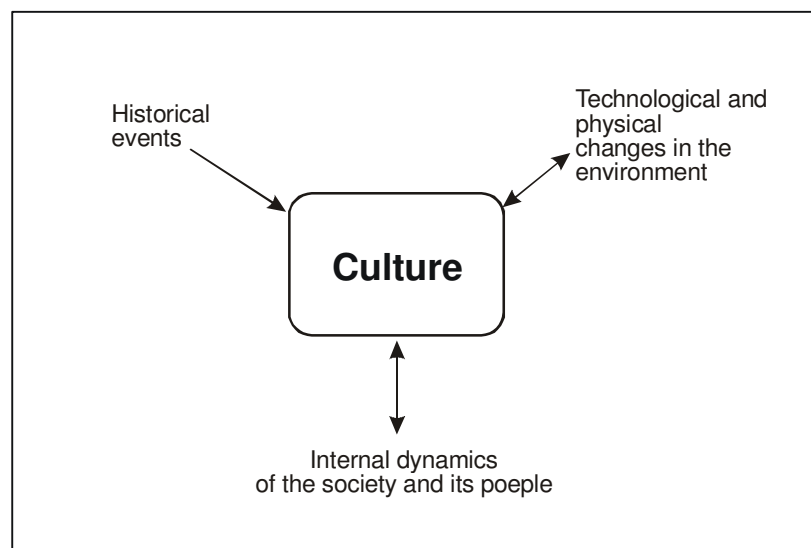


Figure 1-1. How a culture develops and changes

1.2 A simple but significant example of technological change affecting a culture is the invention of the mechanical clock. The first town clock was installed in a town in France in 1314; many public clocks appeared throughout Europe shortly thereafter. Prior to this invention, the concept of time was simple, general and loose. With the widespread use of the mechanical clock, time began to be conceptualized as a succession of measurable units. The “working day” was invented and announced by the bells of the town clock. Similarly, the invention of the aeroplane has been no less profound; it has changed the way people conceptualize the world and their “neighbours”.

Culture

A shared system of beliefs (what is true), values (what is important), expectations, and behaviour meanings (what is implied by engaging in a given action) developed by a group over time in order to meet the requirements of living and operating in a particular (geographical) niche.

It is what one expects of oneself and what one expects of others in the groups in which one lives and works.

It is the man-made part of the environment (i.e. machines, buildings, technology).

It is the way we do things around here and how we talk about the way we do things around here (i.e. customs, procedures).

1.3 The longer a group stays together, works together, or shares common goals together, the more its members will discover and share acceptable solutions to common problems with each other. The more the members share solutions, the more they will start to think and act alike. This ongoing adaptation is the basis of culture. This logic holds whether it is a national culture, an organizational culture (of an airline) or a professional culture (among pilots).

1.4 Because a culture is shaped by its environment and evolves in response to changes in that environment, *culture and context are really inseparable*. This rather broad definition is deliberately adopted here to allow for the greatest scope in understanding culture and cross-cultural influences on aviation safety.¹

CULTURE AND CONTEXT

1.5 There are many layers of context in which a culture is embedded, including the political, the physical, the social and the economic. Figure 1-2 shows the four contexts in which all aviation endeavours occur. Any airline finds itself influenced by these contexts; its daily operations are the solutions to the problems and demands created by these contexts.

Economic and Political Context

1.6 This layer includes several macro-level features, such as:

- national wealth, per capita income, and tax base
- population size and density
- stability of economic and political systems
- laws
- education

1. Anthropologists, psychologists, political scientists and sociologists all differ in their definitions of culture. However, culture is bigger than any one discipline, and much can be learned from accepting all definitions simultaneously.

Together these factors decide the size of the aviation customer base in a country and the general affordability of air travel for people in that country. It also decides the size and stability of government support for the aviation infrastructure. The level of education in a country determines the population's familiarity with technology and their ability to work with it or create their own technology.

Geographic and Physical Context

1.7 Perhaps the easiest to see is the geographic and physical context. The features that define this context include:

- geography and complexity of terrain
- climate and weather
- population dispersion and accessibility

Combined with other factors such as customer demand, these factors decide flight routes and schedules.

Social Context

1.8 The third layer is most closely related to the people and their customs. They include:

- socially agreed upon ways of making sense of the surrounding environment;
- a group's preferred ways of thinking, acting and interacting;
- values or what is considered important; and
- behaviours or what is considered normal.

These features develop over time and are handed down from one generation to the next, evolving into a social system of shared meanings and coordination among members of a culture. These shared understandings make living and working more orderly and predictable.

1.9 The social context is what allows people to manage their daily lives efficiently by providing many short cuts based on familiarity. One needs only to be a tourist in a new land, driving on the opposite side of the road or buying food supplies, to recognize how mentally demanding the unfamiliar can be. Similarly, flying into a new airport or dealing with Air Traffic Control in foreign countries can be very demanding compared with flying in familiar local airspace. Humans function more efficiently within their own social context because generally they know what to expect from others and they know what is expected of them. And usually, as long as we stay within our cultural boundaries, we are correct in our expectations.

1.10 Values — what is important, what is correct — are also shaped within the social context. Values are held so deeply that people may be surprised, shocked, and even offended when they encounter people with values different from their own. Because they are held so deeply and emotionally, values tend to be unquestioned and resistant to change. Some values that drive daily aviation operations throughout the world and which likely differ throughout the world include:

- How fast should be the pace of life and work? How fast is too fast? How slow is too slow? Do we measure a delayed departure in minutes or in hours?

- How important is technology vis-à-vis humans? Who or what has the greater authority, flexibility and “wisdom”? Do we trust the machine or do we trust the person?
- How important are rules and regulations vis-à-vis human discretion? Who or what has the greater authority, the greater “wisdom”?
- What is the acceptable level of safety and related risks? Is one accident per million departures reasonable, given the level of safety in other means of transport and industries? Should it be higher? Should it be lower?
- What is the appropriate way to use and interact with authority? Does everyone have a legitimate voice, or only those with experience and seniority?

1.11 The social context is what people associate most closely with culture because of the customs, norms, values and beliefs. Historically derived and shaped over time in response to environmental demands and changes, the social context is every bit as important as the economic, political and physical contexts in determining how people will act and react.

Airline Operating Context

1.12 The features of the airline operating context are familiar to all aviation personnel. This layer includes:

- the international and local regulations governing aviation traffic;
- the airline’s policies and procedures;
- the aircraft itself;
- manuals and other documentation;
- maintenance and ground equipment;
- Air Traffic Control;
- airports; and
- passengers and their expectations.

1.13 Figure 1-2 shows that this context is impacted by all three other outer layers, namely the economic and political context, the geographic and physical context, and the social context. Yet many of the features in this layer are similar the world over. Airlines tend to fly the same aeroplanes and adhere to the same procedures and regulations despite the fact that they operate in different economic, political, social and physical environments. This is an important point that speaks to the heart of this digest. Why do airlines the world over look at least superficially similar? What are the safety consequences of this apparent similarity? This issue will be discussed at length in Chapter 3.

Conclusion

1.14 To summarize this section, a culture can be considered as the ongoing interaction of a group of people with their environment. It can however be understood more completely by paying attention to the economic, political, geographical and social factors.

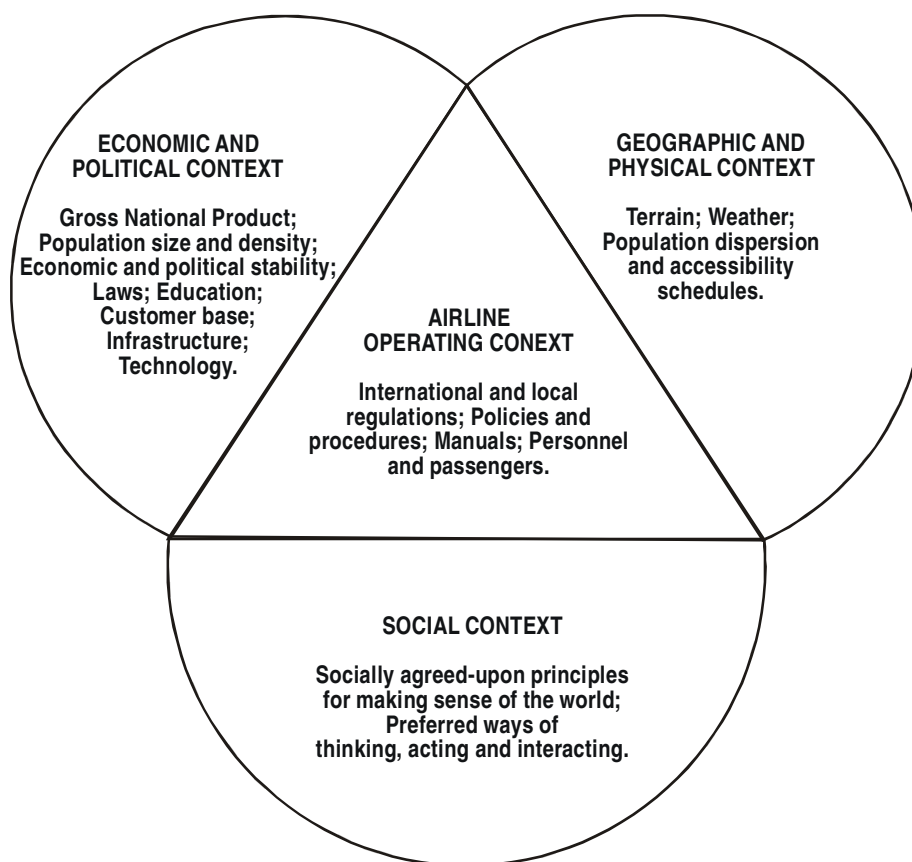


Figure 1-2. Civil aviation in context: A complex system

CULTURAL INTERFACES

1.15 There are many advantages to being a member of a culture. Fellow members and the environment are more predictable, thereby making daily routines easier and quicker. There is security in this knowledge, and this confidence enhances one's efficiency in the culture. But as soon as we encounter members or artefacts from another culture, these cultural efficiencies are challenged and the opposite occurs, i.e. the world becomes less predictable, more uncertain, and requires more mental effort. We need to "think on our feet" to make sense of the surrounding context, rather than taking it effortlessly for granted. In time and with sufficient exposure, new habits emerge to deal with the interface. Understanding new habit formation and its implications in human interactions is at the heart of cross-cultural endeavours.

1.16 By its very nature, aviation is a cross-cultural endeavour. Pilots fly in foreign airspace, transporting passengers and cargos around the world. Even when working within their country of origin, air traffic controllers, aircraft maintenance engineers and other operational personnel utilize technology designed and built in another part of the world. The cultural interfaces in aviation are many and diverse. Table 1-1 provides a non-exhaustive list of these cultural interfaces, highlighting the fact that it is not only when people interact with people, but also when people interact with products of other cultures that uncertainty can be introduced.

Cultural interface

Members of one culture come into contact with members or artefacts of another culture.

Artefact

Any man-made object, e.g. aeroplanes, navigation aids, Standard Operating Procedures (SOPs), training manuals, regulations, others.

Moderating Factors

1.17 There are several factors that foster matches or mismatches at the cultural interface, specifically during daily cross-cultural interactions in aviation. These factors include cultural distance between the interacting cultures, similarities and differences in the resources available to each culture, and the experience of the respective members at the interface.

1.18 Cultural distance explains how some countries can be culturally similar, despite the geographic distance, because of a common language, shared history, similar religion, or political systems, while other geographically close countries remain culturally distant. For example, Australia and the United States are culturally closer than the United States and Mexico. *The greater the cultural distance between two countries, the greater the uncertainty there will be at the cultural interface.* Hence a Chinese regulator trying to understand a (translated) Australian accident report might perhaps experience more uncertainty about its meaning than a Canadian reading the same document.

1.19 A second factor relates to resource similarities in the operating context. To the extent that the social and economic context differs between two cultures, the mismatch at the interface will also be greater. For example, the latest safety advances made possible by technology from the aircraft manufacturer may bemuse a pilot from a developing country, given that the local infrastructure is in no position to support such measures.

1.20 The third factor relates to the social and operational experience of the members of each culture with the interfacing culture. The great talent of humans is their ability to adapt. The more experience there is at the interface, the less challenging the interface will appear to be. *Experience at the interface builds familiarity and reduces uncertainty.* A pilot flying for the first time into a new airport in a distant country experiences the interface more acutely than a pilot who regularly travels in and out of that airport. Pilots flying internationally for multicultural airlines need to develop the necessary familiarity while maintaining a heightened awareness of cultural differences. In operational terms, it is suggested that some established operational practices (e.g. line indoctrination and special airport qualification) may be considered as examples of developing experience at the technical/operational interface. Building experience at the cultural interface is an extension of these successful, established practices.

1.21 With experience and exposure comes adaptation. However, adaptation is mostly based on cosmetic behaviours. It is an accepted fact that cosmetic behaviours crumble under stress and a reversion to native behaviours takes place. The safety case about dealing with cross-cultural interfaces through adaptation is obvious; in stressful situations, adaptation may become ineffective.

Table 1-1. Cross-cultural interactions: A daily occurrence for aviation personnel

<i>Members of Culture 1</i>	<i>Members and Artefacts of Culture 2</i>	<i>Interactions at the interface</i>
Pilots Flight attendants Engineers Air Traffic Controllers Airline and airport personnel Accident investigators Local regulatory bodies Others	PEOPLE	
	Pilots	Multicultural cockpits, airline mergers, alliance/contract pilots
	Air Traffic Controllers	Language exchanges in foreign airspace and with foreign crews
	Flight attendants	Different training, goals and expectations
	Ground personnel	Different priorities; confusion around standards
	Passengers	Different expectations of service
	Trainers	Training in another country on new aircraft or as a cadet
	Investigators	International investigation teams; different legal frameworks
	ARTEFACTS	
	Manuals	Manuals written by personnel in one part of the world are translated or interpreted in other parts of the world
	Aircraft	Equipment specifications that make sense in one part of the world may not be so "logical" in other parts of the world. Maintenance and engineering proficiency as defined and schooled in one part of the world may not be possible in other parts of the world.
	Regulations	Regulations created for a specific economic, political, and social context are interpreted and applied in other parts of the world.
	Legal framework	Different paradigms of accident investigation and accountability; different underlying legal frameworks

Behaviour at the Cultural Interface

1.22 Broadly speaking, there are four possible responses when members of one culture encounter members or artefacts of another culture. These are summarized in Table 1-2.

Table 1-2. Four ways to behave cross-culturally

<i>Option 1: ASSIMILATION</i>	<i>Option 3: INTEGRATION</i>
A>B Members of Culture A learn and adopt the ways of Culture B, in whole or in part.	A+B Members of Culture A and Culture B learn each other's ways and compromise.
<i>Option 2: ASSIMILATION</i>	<i>Option 4: SEPARATION</i>
B>A Members of Culture B learn and adopt the ways of Culture A, in whole or in part.	A B Members of Culture A and Culture B ignore each other's ways and do not change.

1.23 The first two options of *Assimilation* are mirror images — either members of Culture A learn and adopt the ways of Culture B, or members of Culture B learn and adopt the ways of Culture A. Both options reflect a willingness or necessity to accept the ways of the other culture. *Even within a single national culture*, as in the case of airline mergers, we see that the smaller airline usually ends up adopting the practices and policies of the larger airline, *even where the smaller airline might have a better way of doing things than the larger airline*.

1.24 A third option for interaction, *Integration*, allows members of Culture A and Culture B to learn something of each other's ways and to find compromises that will be the most effective for that interface. In this approach, two merging airlines might form a pilot's committee to review documentation and procedures and create a new (and improved) set of SOPs suitable for pilots from both airlines.

1.25 The final option, *Separation*, acknowledges that in many cases, members of Culture A and Culture B ignore, by choice or necessity, the ways of the other culture, and maintain their own way of doing business. This model has been observed in some airline mergers, so much so that many years after a merger, some pilots will still identify with their former airline, drawing a distinction between themselves and the pilots of the other “dominant” airline and refusing to fully accept their connection with the other airline.

1.26 Bearing in mind the moderating factors of cultural distance and of resource similarities or differences as well as the motivation arising from the perceived benefits of adopting other cultural practices, the understanding and learning that take place at the interface between two cultures can be of varying quality. The understanding and learning, and subsequent adoption of practices from another culture, can be:

- *Conscious or unconscious.* Members of one culture may not even recognize that they are adopting a different way of doing business, yet they do it nonetheless. Unconscious adaptation can be problematic when the social norms in the two cultures vary because the