3.2 Culture

Introduction

Culture is a very difficult entity to define; in 1952, 164 different definitions of culture were listed together.[i] 70 years later, the term culture still has many uses, but in this article its definition will be based upon collective groups of characteristics. It is dependent on our similarities within a community but is most often visible through our differences. A small community will have many traits and behaviors in common, and these will constitute their culture. Yet it is not until one community is compared with another that we notice the differences, and would therefore, assert that the two communities have different cultures.

> *National Culture:* Differentiates the characteristics of particular nations, including the role of the individual within society, the manner in which authority is distributed, and national priorities with respect to resources, accountabilities, morality, objectives, and legal systems.[ii]

Culture can be viewed at many levels by its impact on sociology, industry, organizations, professions, and teams. ICAO Doc 9859 identifies three levels of culture relevant to aviation environments:[iii]

- National Culture
- Organizational Culture
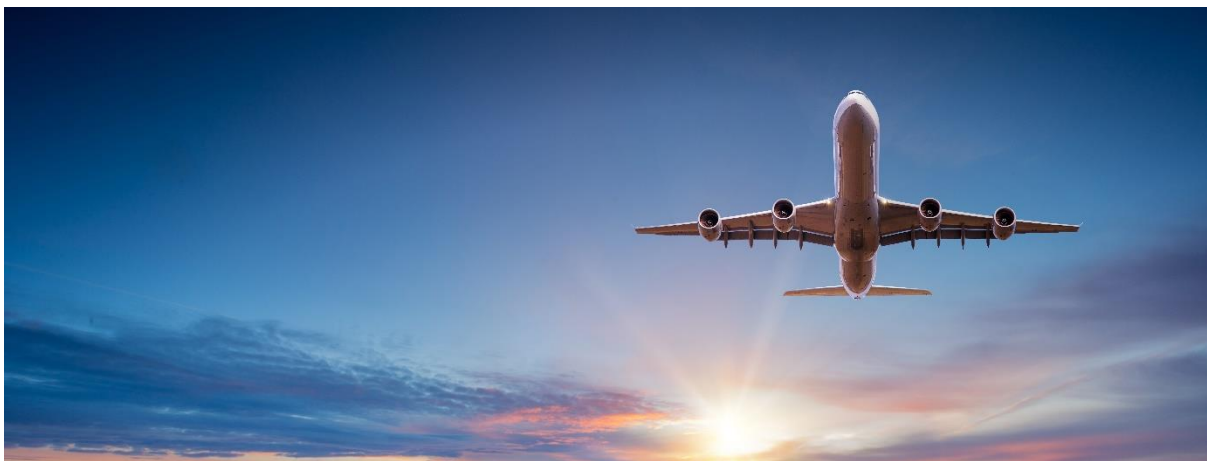- Professional Culture

Organizational Culture

Most organizations today are multi-cultural; that is their employees come from a wide range of cultural backgrounds described by geographic location, age, race, gender, sexuality, and many more. Each individuals' background will give them a unique perspective on the operations of the organization, and their place within it. Therefore, organizational policies, procedures, and norms are developed to align employees to a shared vision and goal for the success of the business. The national culture will play a part in the development of policies and procedures to support all staff to perform their roles in an effective and efficient manner.

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The organizational culture is normally defined by the senior leaders and can have wide reaching effects, such as:[iv]

- How authority, leadership and hierarchy scales are used and viewed,
- Information sharing, reporting and error response
- Use of technology, automation, and systems

Professional Culture

Within any industry, or organization, there will be further sub divided groups of culture. Different teams with distinctive roles will develop smaller groups of culture which can be termed *professional culture*. For example, in aviation, one organization could employ several different professions: Flight crew, cabin crew, operations staff, administrative staff, and ground handlers.

Whilst many elements of the professional culture will overlap with the organizational culture, each of these professions will develop micro cultures dependent on their shared training, experience and working environment. Each profession tends to share a pride of excelling in their role but are at risk of fostering a superhero complex of invulnerability. Potential issues can arise when professional cultures have conflicting or misaligned policies and procedures, or norming behavior has diverted away from standard policy. The way these teams cooperate and collaborate is essential to safety, and therefore mitigations must be put in place to ensure the smooth operation across all professional sectors.

Cultural Dimensions

There have been many attempts to qualify the different aspects of culture, build upon the three basic cultures[v] and use them to compare groups for a deeper understanding of intercultural interactions. A popular framework for this was laid out by Hofstede.[vi]

Cultural Dimension	A high value indicates:
Power Distance (PDI)	Unequal power distribution is accepted by the lower power members.
Individualism vs collectivism (IDV)	Weak ties of loyalty and support between small groups of people, as opposed to tightly integrated groups.
Uncertainty Avoidance (UAI)	An intolerance for ambiguity, the unknown or unexpected, prefer absolute truths and explicit laws.
Masculinity vs Femineity (MAS)	Value achievement and material rewards (masc.), above cooperation and quality of life (fem.).
Long term orientation (LTO)[vii]	Adaptation to change is accepted and necessary.
Indulgence vs Restraint (IND)[viii]	Societal acceptance of free gratification to pursue desires.

Whilst commonly used, this model has received opposition due to its over generalization[ix]. Critics question the study's statistical validity, and therefore assert the dimensions proposed are simply a stereotyping of individual traits across a whole community. However, we must remember that any conclusions drawn from a sample group will always contain outliers and those that go against the norm. Whilst exceptions to the rule will not be ignored, the comparison of cultures via Hofstede's dimensions can be a useful conversation point to address cultural differences.

Conflicting Cultures

It has been suggested that the combination of national, organizational, and professional cultures could form internal conflicts for individuals, when ideals and instinctive reactions do not align. For example, consider a national culture where Hofstede's cultural dimension of individualism is high. This may appear to clash with modern elements of CRM such as teamwork. However, it has been found that individuals trained within a safety culture will generally revert to that safety culture, and not to a previous team culture, or even their national culture. [x] Safety culture exceeds other cultures.

The 'Three Cultures' Model

The way in which organizations and groups manage certain aspects of the business will set the tone for the culture engendered. Ron Westrum identifies the three cultures as:[xi]

	Pathological	Bureaucratic	Generative
Oriented to	Power	Rules	Performance
Cooperation	Low	Modest	High
Messengers	Shot	Neglected	Trained
Responsibilities	Shirked	Narrowed	Shared
Bridging	Discouraged	Tolerated	Encouraged
Failures	Scapegoat	Justice	Inquiry
New ideas	Crushed	Problematic	Implemented

Using these differentiations, it is normally easy to identify when a group is power oriented and has a pathological culture. In these cases, especially in emergency situations, negative traits tend to become more overt. However, distinguishing between bureaucratic and generative can be more difficult. It is important to note that these cultural categories may all be present in different teams within an organization, and they can change remarkably rapidly, with seemingly little change.

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Case Studies

Let us look at two NASA case studies; those of Apollo 13 and the Columbia Shuttle disaster.

Apollo 13[xii]

On 14 April 1970, Apollo 13 crew were en route to the Moon, but during a routine stir of the oxygen tanks, issues began to arise. Damaged insulation in the number 2 oxygen tank of the service module allowed wires to short circuit and ignite. The combustion pressure blew out a panel to space, extinguishing the fire, but causing many further issues across electrical and life support systems.

The incident forced all 3-crew members to take refuge in the lunar model, but this was only designed to support 2 crew for 2 days. But to return to Earth it would need to support 3 crew for 3 days. The issue was not lack of oxygen, but lack of ability to remove carbon dioxide from the air. The cannisters to remove the CO_2 from the service module did not fit the connector to the lunar module

Through exceptional teamwork, across multiple disciplines; the space crew, ground engineers, operations and control staff, NASA were able to find solutions. Using duct tape, covers ripped from procedure manuals and other pieces of plastic, the crew engineered a device to join the unmatched cannisters.

Apollo 13 commander Jim Lovell later stated it was "a fine example of cooperation between ground and space"

We can look at this incident and response in terms of the Westrum three cultures model.

- Cooperation between professional disciplines was high;
- Messengers were trained and understood the importance of the information they carried;
- Everyone held a shared responsibility for the safe return of the space crew;
- Bridging (collaboration) between departments was encouraged and wholly necessary to the success of the mission;
- A fully inquiry to the failures was carried out;
- New ideas were implemented at the time and continued to make significant changes in the years after Apollo 13.

At his time NASA had a performance driven generative culture that played a vital role in saving the lives of the Apollo 13 crew.

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Space Shuttle Columbia [xiii]

Columbia was the first of five space shuttle orbiters built by Rockwell International and flown by NASA. Shuttle Columbia flew 28 missions over a 22-year period but was lost on reentry in February 2003.

At launch on 16th January 2003, video footage picked up a piece of insulating material from the external tank impacting the left wing of Columbia. The external tanks had been designed to not release debris that could damage the thermal protection system (TPS) as it was essential for survival on re-entry. However, on three launches prior to the disaster (one on Challenger, two on Columbia), insulation was known to have impacted the shuttle TPS. Whilst investigations were undertaken, the conclusion was that this was an 'acceptable flight risk'. Additionally, the October 2002 flight of Atlantis also suffered 10 cm wide and 8 cm deep damage to the solid rocket booster due to insulation debris.

There were several opportunities for the NASA teams to act upon the potential damage to Columbia at the Jan 03 launch:

- Video of the launch was reviewed, but the debris strike was not noticed until day 2 of the mission. Even so, there was no clear view to ascertain the level of damage.
- A Debris Assessment Team was formed, but there was a difference in views; the photo team were more concerned over the possible damage than the program managers.
- Some predictions showed the TPS would have been damaged to the extent of leaving the shuttle skin unprotected, but previous assessments had been over cautious, and this was deemed as 'inaccurate'.
- The Department of Defence were asked for orbital imagery to assess damage, but due to miscommunication between flight directors and the Debris Assessment Team, the request was cancelled. They did not want to interrupt science operations to reposition Columbia for the imagery to be taken.
- Concerns over damage were downplayed throughout the mission, as there were concerns of future program delays that may have resulted.
- The crew were told of the strike but assured there were no safety concerns.

Columbia began their reentry at 13:15 UTC on 1st February 2003. Strain on the left wing was noticeably high. At 13:53, several pieces of debris were shed over Californian airspace, and the left-wing hydraulic sensors were indicating low. Ground observers reported falling debris in Utah, Arizona, New Mexico, and Texas. Crew were alerted to a problem with multiple conflicting warnings from the left wing and left undercarriage at 13:58, but the shuttle's signal was lost at 13:59. Several second later, Columbia was in uncontrolled flight and catastrophic break up occurred at 14:00.

In stark contrast to the incident response, and outcome of the Apollo 13 case study, Westrum's three culture model demonstrates the bureaucratic and pathological culture that led to the death of the Columbia crew:

- Cooperation between departments was low;
- Messages were incomplete, misunderstood or ignored;
- Responsibility for the lives of the crew was shirked;
- Bridging may have been tolerated, but considerations were not acted upon;
- Failures and damage from multiple previous incidents were poorly justified;
- New ideas were crushed – DoD satellite cancelled.

So, what can we learn from these case studies? How can we build the generative culture for safety?

Safety Culture

The first amendment to ICAO Annex 19 highlights the importance of a positive safety culture[xiv]. The ICAO definition of safety culture is:

> *Safety Culture*: the set of enduring values and attitudes regarding safety, shared by every member of every level of an organization.

Implementing a safety culture as a whole can be a daunting prospect, so a common method splits it down into easier to manage chunks[xv].

Most of these models can be surmised by James reason's 5 elements of safety:

Safety Culture [xvi]	**Reporting**- people are willing to report errors and near misses
	Informed- those who manage and operate the system have current knowledge about the human, technical, organizational, and environmental factors underpinning the safety of the system.
	Just Culture- there is an atmosphere of trust, and people are encouraged or even rewarded for providing essential safety related information, but there is also a clear line between acceptable and unacceptable behavior.
	Learning Culture- has the willingness and the competence to draw the right conclusions from its safety information system, and the will to implement major reforms when necessary.
	Flexible- this can take different forms but is characterized as shifting from the conventional hierarchical mode to a fatter professional structure.

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Furthermore, CASA[xvii] divides Safety culture into the same 5 elements as James Reason, and gives these actions as suggested building steps to create the desired culture:

1. Standardize reporting
2. Simplify reporting
3. Use KPIs
4. Communicate values
5. Demonstrate values
6. Create a formal review process
7. Create a formal reward process
8. Use internal social media
9. Find better ways
10. Train incident investigation
11. Share investigation findings
12. Quarterly check-ins
13. Create a skills matrix
14. Train for emergencies

The key to all of the steps above is Psychological safety which is discussed further in the next chapter

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Summary

- Culture can be viewed in 3 levels:
    - National
    - Organizational
    - Professional
- Hofstede's cultural dimensions can make wide generalizations, but do not work for all cases:
    - Power Distance (PDI)
    - Individualism vs collectivism (IDV)
    - Uncertainty Avoidance (UAI)
    - Masculinity vs Femineity (MAS)
    - Long term orientation (LTO)
    - Indulgence vs Restraint (IND)
- Safety Culture training is what is needed to bring into alignment individuals from diverse backgrounds to give an integrated team response for enhanced safety. This includes:
    - Reporting Culture
    - Informed Culture
    - Just Culture
    - Learning Culture
    - Flexible Culture

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