NALSAR UNIVERSITY OF LAW

HYDERABAD

Presentation on:

Global Air Safety Regulations: An Overview

by:

Dr. Shaik Nazim Ahmed Shafi

B.Com., P.G.D.I.R.P.M.,B.L.,LL.M. (Alig.) L.I.I.I., CCITM (Exports & Imports), Ph.D.

Introduction

- **Aviation refers** to flying or using an aircraft for commercial or non-commercial purposes.
- **Aviation includes** all the support systems that keep airlines running in a safe, efficient and orderly fashion, including air traffic control, airport operations, airline management, maintenance and piloting an aircraft.
- **Hence, air transport plays a major role in world economic activities.** Airports and Airlines are the economic engines and are the gateway for the economic prosperity of any country.

- **What is Aviation Safety for us?:**
- **Aviation Safety** is the condition that, affected elements are protected from hazards and risks arising in the operating environment. These affected elements may include:

  - Operations Personnel;
  - Customers;
  - Equipment;
  - Environment etc.

What does the Aviation Safety focuses:

- Hazard Identification
- Risk Assessment
- Mitigation Strategies to reduce risk to as low as reasonably practical

- Hence, aviation service providers' safety cultures mature, they move from a reactive risk management strategy to proactive risk management.
- The ultimate goal of aviation safety is for all aviation service providers to achieve the ability to predict events and be prepared to mitigate risk scenarios whenever hazards manifest themselves.

- **This predictive ability hinges on many factors, including:**
  - Top Management Support
  - Data Collection
  - Organizing Data properly and
  - Ability to decipher data on a routine basis.

Who is Responsible for Aviation Safety?

- Governmental Organizations providing Oversight (Civil Aviation Authorities)
- ICAO
- Aircraft and Parts Manufacturers
- Employees
- Maintenance Organizations;
- Fuel Providers
- Customers
- Related Service Providers

Safety and Sovereignty

Article 1
Sovereignty

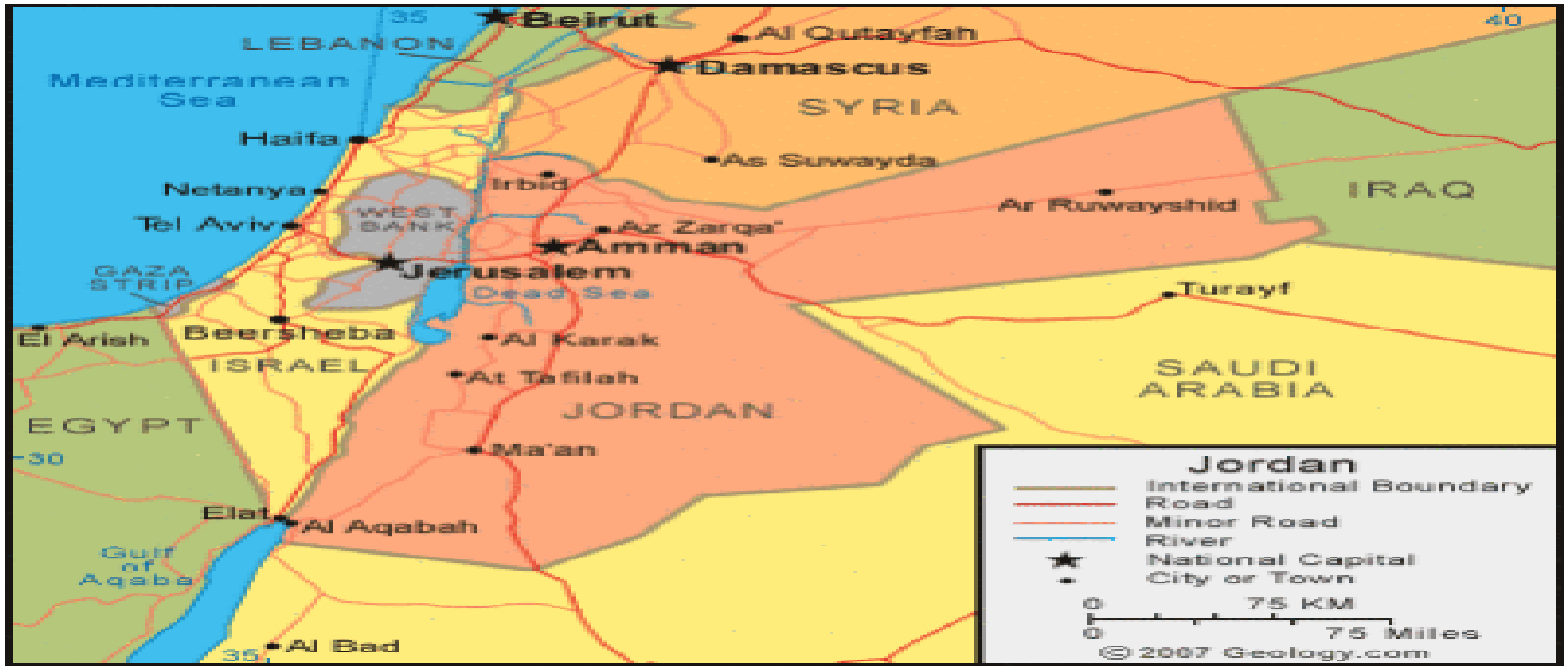
"The contracting States recognize that every State has complete and exclusive sovereignty over the air space above its territory".

Sovereignty

- The Montevideo Convention of 1933 in its Article 1 provides that a State as a legal person of international law should possess:

  (a) permanent population; (a stable community)
  (b) a defined territory; (politically controlled stable community)
  (c) government; and (a defined legal order having 3 separately identifiable factors)
  (d) capacity to enter into relations with the other States.

ICAO's Middle East Air Navigation Plan



- **Practical Aspects:** From an aviation perspective, the first official instance of sovereignty of airspace under Article 1 of the Chicago Convention being recognized at ICAO was at its 21st Assembly **(held in Montreal from 24 September to 15 October 1974)** where the **Assembly adopted Resolution A21-7**(the Airport of Jerusalem) where the Assembly recognized that Jerusalem airport lay in the Arab occupied territories and was registered under the jurisdiction of Jordan in **ICAO's Middle East Air Navigation Plan.**

- The Assembly, in the context of Article 1 of the Chicago Convention, resolved that all Contracting States to the Convention should take all necessary measures to refrain from operating, or giving permission to any airline to operate any air service, whether scheduled or non-scheduled, to or from Jerusalem airport, unless prior permission is granted pursuant to the relevant article.

- At the same session, the Assembly adopted Resolution A 21-21 (Consolidated Statement of Continuing Policies and Associated Practices Related Specifically to Air Navigation) Appendix N of which declared that *any Contracting State which delegated to another State the Responsibility for providing air traffic services over its territory to another State by mutual agreement did so without delegation of its sovereignty.*

US-CUBA Case

- **Encroachment on the sovereignty over the territory of one State by another has been subject to consideration by the ICAO Council on several occasions.**
- ***US-Cuba Case:*** (Two Civilian aircrafts shot down by Cuban Air Force) On 24 February, **1996**, the United States registered (general aviation) civil aircraft were shot down by Cuban military aircraft, which resulted in the loss of four lives. (Refer: Article 54 (n); Article 3 *bis* and *Montreal Protocol of 1984); Article 4).* The Council called on Cuba to comply with international obligations relating to aviation, particularly the Convention on International Civil Aviation.

- **The Final Resolution of the ICAO Council,** adopted on 27 June **1996** following the Report of the Secretary General, **embodies two critical principles**. These were that the Council recalled and recognized the principle that every State has complete and exclusive sovereignty over the airspace above its territory and that the territory of a State shall be deemed to be the land areas and territorial waters adjacent thereto; and that States must refrain from the use of weapons against civil aircraft, the lives of persons on board and the safety of the aircraft must not be endangered.

- **Integral to the Resolution was also the principle that each Contracting State** should ensure that appropriate measures are taken to prohibit the deliberate use of any civil aircraft registered in that State or operated by an operator who

US - IRAN Case

has his principal place of business or permanent residence in that State for any purpose inconsistent with the Chicago Convention.

- The Council's condemnation of the use of weapons against civil aircraft involved the explicit mention of Article 3 (Civil and State Aircraft) *bis* at this advanced stage of the resolution making process, which, when examined from a diplomatic perspective, is seemingly appropriate and purposeful.
- **3rd July, 1988: US and Iran:** Shooting down of an Iran Airbus A300 (IR655) carrying commercial passengers on a scheduled flight from Bandar-Abbas (Iran) to Dubai by *U.S.S. Vincennes resulting death of 290 persons on board the aircraft.* The Council decision, while recalling the event of 3 July, 1988, acknowledged the fact finding investigation report of the Secretary General of

ICAO, and urged all States to take all necessary action for the safety of navigation of civil aircraft, particularly by assuring effective Co-ordination of civil and military activities.

- **ICAO's Response 1973:** Taking concerted action towards suppressing all acts which jeopardized the sage and orderly development of international air transport. In this context, the most forceful example of ICAO's role can be seen in Resolution A20-2 – *Acts of Unlawful Interference with Civil Aviation*, adopted in **March 1973** by the Assembly, which reaffirmed ICAO's role as facilitating the resolution of questions which may arise between Contracting States in matters affecting the safe and orderly operation of civil aviation throughout the world.

LIBYA-ISRAEL Case

- **Libya-Israel Dispute in 1973:** Shooting down of a Libyan Airlines Boeing 727 aircraft by Israeli fighter aircraft on 21 February 1973 over Israeli occupied Sinai territory. 110 persons killed and 13 commercial and civil aircraft were completely destroyed.

  The Council held that Israel's act constitute a serious danger against the safety of international civil aviation, and recognized that such an attitude is a flagrant violation of the principles enshrined in the Chicago Convention.

RUSSIA-KOREAN AIRLINES Case

- **Korean Airlines destroyed by Soviet Military on September 1, 1983:** KE 007-Republic of Korea – Korean Airlines Boeing 747 passenger (269 passengers) airliner had disappeared off the radar screens after it took off from Anchorage, Alaska on 31 August 1983 bound for Seoul. The Council held that the world while reaffirming the principle of prohibition of the use of arms against civil aircraft, it unreservedly condemns the destruction of a civilian aircraft simply because it strayed into the airspace of another country.

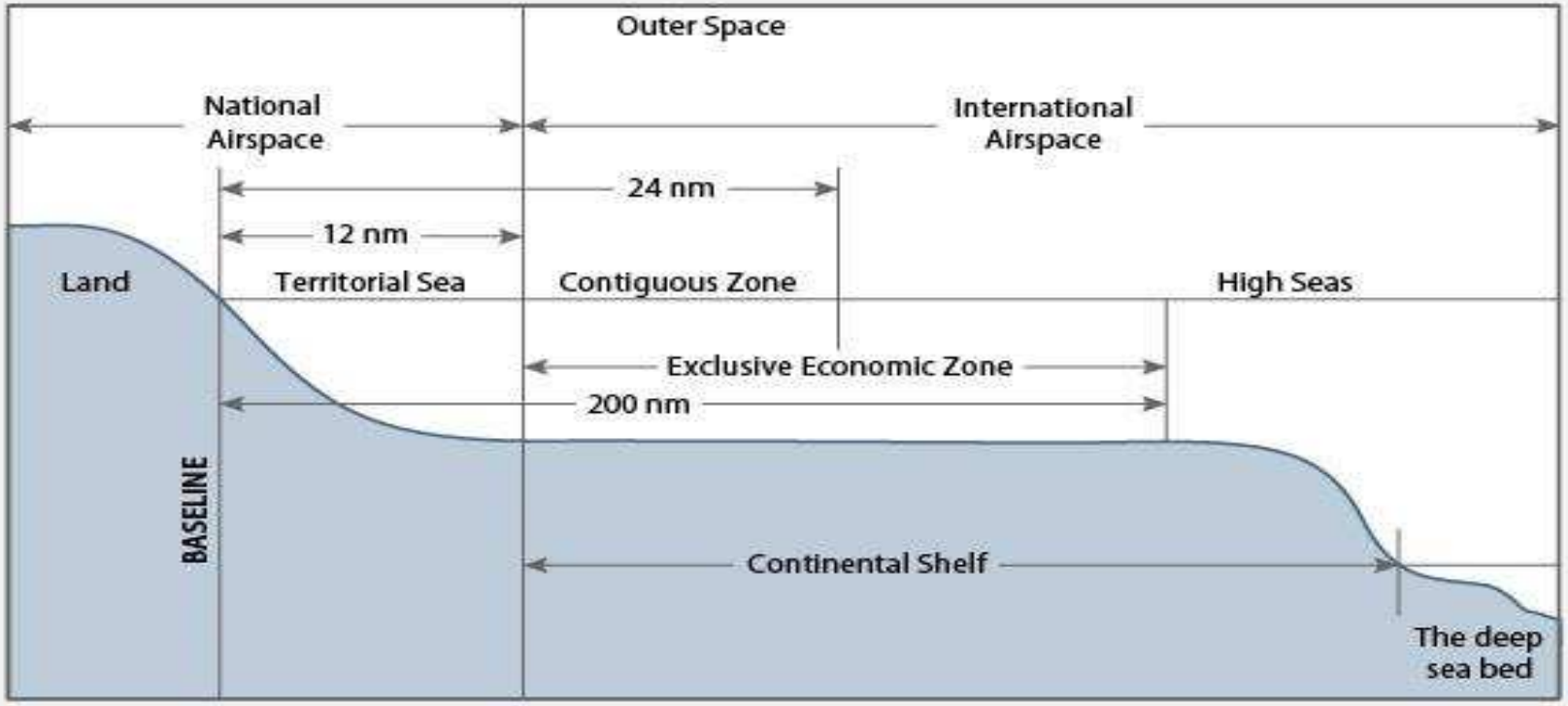
Safety & Territory

Territory

- The Chicago Convention **does not mention aviation and environmental protection** (which was not a subject of concern at all in 1944) the Convention has been dragged into spat that has developed with the enforcement by the European Union of its extension to aviation of the **European Emission Trading Scheme.**

FIGURE 1

Maritime definitions in the U.N. Law of the Sea Convention



Note: nm = nautical mile
Source: U.S. Navy, *The Commander's Handbook on the Law of Naval Operations* (2007).

- In 2003, The European Union, by Directive 2003/87/EC amended the European Union's Emissions Trading Scheme to include the aviation sector in the scheme. Initially, in 2011, only flights between EU airports were to be included in the Scheme. **From 2012** this was extended to all flights arriving at or departing from an EU airport. **This means that the EU-ETS is applicable to any airline and its flight from anywhere in the world that is destined to Europe and vice versa.** *This would mean that the Scheme would be applicable, for example, to an American carrier's flight from New York to London* ***all the way covering inter alia emissions released over American airspace right through the flight over other territorial airspace before entering European airspace.***

- **Issues:** Held, in every instance of extra territorial jurisdiction, there are ***two issues*** to be considered; **the first** is **whether the State or group of States has the authority to exercise extra territorial jurisdiction**; and **the second is** whether the exercise of that authority reasonable (taking into consideration the law concerned and the potential foreign policy conflicts).

SAFETY, SOVEREIGNTY AND DRONES

Drones and Sovereignty

- Drones are essentially pilotless aircraft which are usually called unmanned aircraft systems. **Remotely piloted aircraft system** (RPAS) operations are spreading beyond the original military applications, towards other State non-military operations (e.g. police, coast guard and similar), but also into civil aviation.
- However, these aircrafts are mostly, at present, used in military attacks **and therefore do not strictly form part of the civil aviation.**

- However, they are not without their influence on civil aviation as seen in Article 3 (c) which provides that no State military aircraft of a Contracting State shall fly over the territory of another State or land thereon without authorization by special agreement or otherwise, and in accordance with the terms thereof.

Laden with sophisticated sensors and carrying Hellfire missiles and laser-guided bombs, they patrol the skies above Afghanistan, launch lethally accurate strikes against terrorists in the tribal areas of Pakistan, Yemen and Somalia and have helped NATO turn the tide against Muammar Qaddafi's forces in Libya. Even calling them Unmanned Aerial Vehicles (RPASs) or Unmanned Aerial Systems (RPAS) is slightly misleading. There may not be a man in the cockpit, but each Reaper, a bigger, deadlier version of the Predator, requires more than 180 people to keep it flying. A pilot is always at the controls (albeit from a base that might be 7500 miles, or 12000 km, away); and another officer operates its sensors and cameras.

- But under **Article 2.4** of the **United Nations Charter** states unequivocally; *All member States refrain from in their international relations from the threat to use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations . (**Art. 51** further qualifies stating that member States can exercise the right of self-defence, but must be reported to the Security Council).*

SAFETY & AIR DEFENCE IDENTIFICATION ZONE (ADIZ)

- **The concept of Sovereignty took a new twist with the invasions of Afghanistan and Iraq**. Following the events of 11 September 2001, where civilian commercial aircraft were used as weapons of mass destruction.
- **Air Defence Identification Zones (ADIZ)** gained prominence as a tool with which a State could control and be prepared for aircraft approaching their territory. An ADIZ is an area in airspace over land or water which may not be over the sovereign territory of a State in which ready identification, location and control of all aircraft is required in the interest of national security.

- **ADIZ** must not be confused with **Flight Information Regions (FIRs)** which are areas established for the facilitation of airspace and air traffic management. FIRs generally involve a subjacent State which has undertaken responsibility for providing air traffic control services. **The main purpose of establishing an ADIZ is to properly identify all approaching aircraft for security purposes so that they could, prior to entry into national airspace, satisfy certain local entry requirements.** Although there is no overwhelming evidence, either from a scholastic or legislative perspective that lends legal legitimacy to the establishment of **ADIZ, such a concept has never been challenged as being inconsistent with existing law**.

- It has been argued that ADIZs came into prominence as a security tool in air navigation as a corollary to the events of 11 September 2001 where aircraft were used as weapons of mass destruction.

- Norway, UK, India, Pakistan and Canada (CADIZ) are some countries which maintain ADIZs as well as the United States.

- If an analogy from maritime law and practice were to be applied to ADIZ, one could cite the ***United States Convention on the Law of the Sea*** **(UNCLOS) 1983** and entered into force on November 16, 1994 after receiving 60 ratifications.

- ***Vorsorgeprinzip – Precaution Principle:*** Broadly speaking, ADIZ requirements are those that sovereign States require aircraft to comply with if they are to be permitted to enter sovereign airspace. Therefore ADIZs requirements act as condition precedent that are calculated to ensure the protection of that State. Today, this principle enjoys a wide, unprecedented recognition.

- ***The Precautionary Principle*** is usually applied through a structured approach to the analysis of risk, which comprises three elements: ***risk assessment; risk management;*** and ***risk communication.***

- ***Preemption*** *and* ***Prevention*** are necessary elements in today's political and military fabric, where legal legitimacy is ascribed to actions of States which act swiftly to avoid harm and protect its citizenry. This is often accomplished bypassing rigid dogma and entrenched rules based on the precautionary principle and on the maxim ***necessitat non habet legem*** (necessity has no law or rules). Another is ***Inter arma enim silent leges*** is a maxim attributed to Cicero, which translates as **"In times of war, the laws are silent.**

Preemption; *- A sword that Cuts Both Ways,*

Preemption; - is when an act, which is potentially harmful to a State and is imminent, is effectively precluded by military or other action.

Prevention; *is when an act, which is potentially harmful to a State and is inevitable, is effectively precluded by military or other action.*

BUSH DOCTRINE

- ***Bush Doctrine:*** Another issue is the judicial interpretation of the extent to which a State is justified in suspending an existing legal order to protect its citizens. Against the backdrop of the *Bush Doctrine** which followed the events of 11 September 2001 and the justification of the invasion of Afghanistan, in spite of Article 2.4 of the Charter of the United Nations. Of special relevance in this regard is the judicial examination by the United States Supreme Court of the imprisonment of an Arab-American immigrant, 3 months after the terrorist attacks of 9/11.

***Bush Doctrine:** The Bush Doctrine is attributed to the modern notion of preventive war and the justification that the United States had the right to secure itself against countries that harbor or give aid to terrorist groups, which was used to justify the 2001 invasion of Afghanistan.*

- The attacks of 11 September 2001 inevitably highlighted the strategic position of civil aviation both as an industry vulnerable to attack and as an integral tool in ensuring peace and security in the world.

CONCEPT OF ‘SAFETY’

Concept of "Safety"

- Within the context of aviation, **safety is — the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.**
- While the elimination of aircraft accidents and/or serious incidents remains **the ultimate goal, it is recognized** that the aviation system cannot be completely free of hazards and associated risks.

- **Human activities or human-built systems cannot be guaranteed to be absolutely free from operational errors** and their consequences. Therefore, safety is a dynamic characteristic of the aviation system, whereby safety risks must be continuously mitigated.

- **It is important to note that the acceptability of safety performance is often influenced by domestic and international norms and culture.** As long as safety risks are kept under an appropriate level of control, a system as open and dynamic as aviation can still be managed to maintain the appropriate balance between production and protection.

The Evolution of "Safety"

- The history of the progress in aviation safety can be divided into ***three eras.***

a) The technical era — from the early 1900s until the late 1960s. Aviation emerged as a form of mass transportation in which identified safety deficiencies were initially related to technical factors and technological failures. The focus of safety endeavors was therefore placed on the investigation and improvement of technical factors. **By the 1950s, technological improvements led to a gradual decline in the frequency of accidents, and safety processes were broadened to encompass regulatory compliance and oversight.**

b) The human factors era — from the early 1970s until the mid-1990s.

In the early 1970s, the frequency of aviation accidents was significantly reduced due to major technological advances and enhancements to safety regulations. Aviation became a safer mode of transportation, and the focus of safety endeavors was extended to include human factors issues including the man/machine interface.

- This led to a search for safety information beyond that which was generated by the earlier accident investigation process. Despite the investment of resources in error mitigation, human performance continued to be cited as a recurring factor in accidents. **The application of human factors science tended to focus on the individual, without fully considering the operational and organizational context.** It was not until the early 1990s that it was first acknowledged that individuals operate in a complex environment, **which includes multiple factors having the potential to affect behaviour.**

c) The organizational era — from the mid-1990s to the present day. During the organizational era safety began to be viewed from a systemic perspective, which was to encompass organizational factors in addition to human and technical factors. As a result, **the notion of the —organizational accident was introduced**, considering the impact of organizational culture and policies on the effectiveness of safety risk controls.

- Additionally, traditional data collection and analysis efforts, which had been limited to the use of data collected through investigation of accidents and serious incidents, **were supplemented with a new proactive approach to safety**. **This new approach is based on routine collection and analysis of data using proactive as well as reactive methodologies** to monitor known safety risks and detect emerging safety issues. These enhancements formulated the rationale for moving towards a **safety management approach.**

Accident Causation

- The —**Swiss-Cheese Model**, developed by Professor James Reason, illustrates that accidents **involve successive breaches of multiple system defences.** These breaches can be triggered by a number of enabling factors such as **equipment failures or operational errors**. Since the Swiss-Cheese Model contends that complex systems such as aviation are extremely well defended by layers of defences, **single-point failures are rarely consequential in such systems.**

- Breaches in safety defences **can be a delayed consequence of decisions made at the highest levels of the system**, which may remain dormant until their effects or damaging potential are activated by specific operational circumstances. Under such specific circumstances, human failures or active failures at the operational level act to breach the system's inherent safety defences. **The James Reason Model proposes that all accidents include a combination of both active and latent conditions.**

- **Active failures are actions or inactions**, **including errors and violations**, which have an immediate adverse effect. They are generally viewed, with the benefit of hindsight (observation), as unsafe acts**. Active failures are generally associated with front-line personnel (pilots, air traffic controllers, aircraft mechanical engineers, etc.) and may result in a harmful outcome.**

- **Latent conditions** are those that exist in the aviation system well before a damaging outcome is experienced. The consequences of latent conditions may remain dormant for a long time. **Latent conditions in the system may include those created by a lack of safety culture; poor equipment or procedural design; conflicting organizational goals; defective organizational systems or management decisions.**

- **Workplace conditions -** The other pathway originating from organizational processes is the workplace conditions pathway. **Workplace conditions are factors that directly influence the efficiency of people in aviation workplaces**. Workplace conditions are largely intuitive (spontaneous) in that all those with operational experience have experienced them to varying degrees, and include workforce stability, qualifications and experience morale, management credibility, and traditional ergonomics factors such **as lighting, heating and cooling.**

- **Errors and Violations:** Active failures can be considered as either errors or violations. The difference between errors and violations is the motivational component.

- A person trying to do the best possible to accomplish a task, following the rules and procedures as per the training received**, but failing to meet the objective of the task at hand**, **commits an error.**

- A person who, while accomplishing a task, **willingly deviates from rules,** procedures or training received **commits a violation**. Thus, the basic difference between errors and violation is intent.

People, Context and Safety

- The aviation system includes **product and service providers and State organizations**. It is a complex system that requires an assessment of the human contribution to safety and an understanding of how human performance may be affected by its multiple and interrelated components.
- **The SHELL Model** is a conceptual tool used to analyse the interaction of multiple system components. Figure 2-5 provides a basic depiction of the relationship between humans and other workplace components. The SHELL Model contains the following four components:

a) ***Software (****S):* procedures, training, support, etc.;

b) ***Hardware*** *(H):* machines and equipment;

c) ***Environment*** *(E):* the working environment in which the rest of the L-H-S system must function; and

d) ***Liveware*** *(L):* humans in the workplace.

Errors and Violations

- Effective SMS implementation by the product or service provider as well as effective SMS oversight by the State are both dependent upon a clear, mutual understanding of errors and violations and the differentiation between the two. **The difference between errors and violations lies in intent.**

Errors

- **To effectively accomplish this task, errors must be identified,** reported and analyzed so that appropriate remedial action can be taken. Errors can be divided into the two following categories:
- **a) *Slips and lapses* are failures in the execution of the intended action**. Slips are actions that do not go as planned, while lapses are memory failures. **For example**, operating the flap lever instead of the (intended) gear lever is a slip. Forgetting a checklist item is a lapse.
- **b) *Mistakes* are failures in the plan of action**. Even if execution of the plan were correct, it would not have been possible to achieve the intended outcome.

Violations

- A violation is defined as **“**a deliberate act of willful misconduct or omission resulting in a deviation from established regulations, procedures, norms or practices.

- Violations can be categorized as follows:

a) ***Situational violations*** are committed in response to factors experienced in a specific context, such as time pressure or high workload. *2-10 Safety Management Manual (SMM)*

b) ***Routine violations*** become the normal way of doing business within a work group. Such violations are committed in response to situations in which compliance with established procedures makes task completion difficult. This may be due to practicality/workability issues, deficiencies in human-technology interface design and other issues that cause persons to adopt —workaround procedures, which eventually become routine.

c) ***Organizationally induced violations*** may be considered as an extension of routine violations. This type of violation tends to occur when an organization attempts to meet increased output demands by ignoring or stretching its safety defences.

Effective Safety Reporting

- **Accurate and timely reporting of relevant information related to hazards, incidents or accidents is a fundamental activity of safety management**. The data used to support safety analyses are reported by multiple sources. One of the best sources of data is direct reporting by front-line personnel since they observe hazards as part of their daily activities. A workplace in which personnel have been trained and are constantly encouraged to report their errors and experiences is a prerequisite for effective safety reporting.

- There are **five basic characteristics** that are universally associated with effective safety reporting systems:

- **Information:** People are knowledgeable about the human, technical and organizational factors that determine the safety of the system as a whole.

- **Flexibility:** People can adapt their reporting mode when facing unusual circumstances, shifting from the established mode to a direct mode thus allowing information to quickly reach the appropriate decision-making level.

- **Willingness:** People are willing to report their errors and experiences.

- **Learning:** People have the competence to draw conclusions from safety information systems and the will to implement major reforms.

- **Accountability:** People are encouraged (and rewarded) for providing essential safety-related information. However, there is a clear line that differentiates between acceptable and unacceptable behaviour.

Investigation of accidents and incidents

- When an accident or serious incident occurs, the accident investigation process is set in motion to find out any possible failure within the aviation system, the reasons therefor and to generate the necessary countermeasures to prevent recurrence. Thus, in a safety management environment, the accident investigation process has a distinct role, being an essential process that deploys when safety defences, barriers, checks and counterbalances in the system have failed.

Hazards

- **Hazard identification** is a prerequisite to the safety risk management process. Any incorrect differentiation between hazards and safety risks can be a source of confusion. A clear understanding of hazards and their related consequences is essential to the implementation of sound safety risk management.
- A hazard is generically defined by safety practitioners as a condition or an object with the potential to cause death, injuries to personnel, damage to equipment or structures, loss of material, or reduction of the ability to perform a prescribed function

- For example, **a runway excursion** (overrun) is a projected consequence in relation to the hazard of a contaminated runway.

- For example, **a fifteen-knot wind**, which is not necessarily a hazardous condition. In fact, a fifteen-knot wind **blowing directly down the runway improves aircraft take-off and landing performance**. However, a fifteen-knot wind blowing in a direction **ninety degrees** across a runway of intended take-off or landing creates a crosswind condition that may be hazardous due to its potential to contribute to an aircraft operational occurrence, such as a lateral runway excursion.

ICAO SAFETY MANAGEMENT SARPS

- This topic provides an overview of the Standards and Recommended Practices (SARPs) relating to safety management, initially adopted in

- Annex 1: *Personnel Licensing*,
- Annex 6: *Operation of Aircraft*,
- Annex 8: *Airworthiness of Aircraft*,
- Annex 11: *Air Traffic Services,*
- Annex 13: *Aircraft Accident and Incident Investigation* and
- Annex 14: *Aerodromes*.
- Annex 19: *Safety Management* that deals with safety management responsibilities and processes and consolidates overarching safety management provisions.

Personnel Licensing (Annex-1)

- As long as air travel cannot do without pilots and other air and ground personnel, their competence, skills and training will remain the essential guarantee for efficient and safe operations. Adequate personnel training and licensing also instill confidence between States, leading to international recognition and acceptance of personnel qualifications and licences and greater trust in aviation on the part of the traveller.

- Standards and Recommended Practices for the licensing of flight crew members (pilots, flight engineers and flight navigators), air traffic controllers, aeronautical station operators, maintenance technicians and flight dispatchers , are provided by Annex 1 to the Convention on International Civil Aviation.
- The ICAO safety management SARPs provide the high-level requirements States must implement to fulfill their safety management responsibilities related to, or in direct support of, the safe operation of aircraft. These provisions are targeted to two audience groups: **States and service providers**.

- In the context of safety management, the term —service providerll refers to any organization required to implement a safety management system (SMS) according to the ICAO SMS framework. **Therefore, safety providers in this context include:**

- **approved training organizations** that are exposed to safety risks during the provision of their services;
- **aircraft and helicopter operators** authorized to conduct international commercial air transport;
- **approved maintenance organizations** providing services to operators of aero planes or helicopters engaged in international commercial air transport;
- **organizations responsible** for type design and/or manufacture of aircraft;
- **air traffic service providers**; and
- **operators of certified aerodromes**.

Operation of Aircraft (Annex-6)

- The essence of Annex 6, simply put, is that the operation of aircraft engaged in international air transport must be as standardized as possible **to ensure the highest levels of safety and efficiency.**

- The purpose of Annex 6 **is to contribute to the safety of international air navigation** by providing criteria for safe operating practices, and to contribute to the efficiency and regularity of international air navigation by encouraging ICAO's Contracting States to facilitate the passage over their territories of commercial aircraft belonging to other countries that operate in conformity with these criteria.

- The Standards accepted by all Contracting States **cover such areas as** aircraft operations, performance, communications and navigation equipment, maintenance, flight documents, responsibilities of flight personnel and the security of the aircraft.

- The introduction of high-speed, long- and short-range aircraft, for example, created problems associated with endurance at relatively low altitudes, where **fuel consumption** becomes a major factor. The fuel policies of many of the international civil aviation carriers are required to take into account the need for possible diversions to an alternate aerodrome when adverse weather is forecast at the intended destination.

- The pilot-in-command has the final responsibility to make sure that flight preparation is complete and conforms to all requirements, and is required to certify flight preparation forms when satisfied that the aircraft is airworthy, and that other criteria are met in respect to instruments, maintenance, mass and load distribution (and the securing of the loads), and operating limitations of the aircraft.

- Part II of the Annex, however, was designed specifically to ensure an acceptable level of safety to third parties (persons on the ground and persons in the air in other aircraft). Thus, operations involving commercial and general aviation aircraft in a common environment are required to adhere to the minimum safety standards.

Airworthiness of Aircraft (Annex-8)

- In the interest of safety, an aircraft must be designed, constructed and operated in compliance with the appropriate airworthiness requirements of the State of Registry of the aircraft. Consequently, the aircraft is issued with a Certificate of Airworthiness declaring that the aircraft is fit to fly.

- Following the recent events of high-jacking and terrorist acts on board aircraft, special security features have been included in aircraft design to improve the protection of the aircraft. These include special features in aircraft systems, identification of a least-risk bomb location, and strengthening of the cockpit door, ceilings and floors of the cabin crew compartment.

Air Traffic Services (Annex-11)

- Control of air traffic was almost unknown in 1944. Today, air traffic control, flight information and alerting services, which together comprise air traffic services, rank high among the indispensable ground support facilities which ensure the safety and efficient operation of air traffic throughout the world.

- The world's **airspace is divided into a series of contiguous flight information** regions (FIRs) within which air traffic services are provided. In some cases, the flight information regions cover large oceanic areas with relatively low air traffic density, within which only flight information service and alerting service are provided.

- The prime objective of air traffic services, as defined in the Annex, is to prevent collisions between aircraft, whether taxiing on the manoeuvring area, taking off, landing, en route or in the holding pattern at the destination aerodrome.

- All aircraft fly in accordance with either instrument flight rules (IFR) or visual flight rules (VFR). Under IFR, the aircraft fly from one radio aid to the next or by reference to self-contained airborne navigation equipment from which the pilot can determine the aircraft's position at all times. IFR flights are conducted through all but the severest of weather conditions, while aircraft flying under VFR must remain clear of cloud and operate in visibility conditions which will permit the pilot to see and avoid other aircraft.

- **Contingency planning is an important responsibility of all States** that provide air navigation services. An Attachment to Annex 11 contains concise guidance to assist States in providing for the safe and orderly flow of international air traffic in the event of disruptions of air traffic services and related supporting services and in preserving the availability of major world air routes in the event of disruptions.

Aircraft Accident and Incident Investigation (Annex-13)

- The causes of an aircraft accident or serious incident **must be identified in order to prevent repeated occurrences.**

- The identification of **causal factors** is best accomplished through a properly conducted investigation.

- To emphasise this point, Annex 13 states that the **objective** of the investigation of an accident or incident **is prevention**.

- As an example, the Annex spells out which States may participate in an investigation, **such as the States of Occurrence, Registry, Operator, Design and Manufacture. It also defines the rights and responsibilities of such States.**

- The processes outlined in this chapter form part of a safety management system aimed at reducing the number of accidents and serious incidents worldwide.

- Chapter 8 of Annex 13 deals with accident prevention measures. The provisions in this chapter cover incident reporting systems, both mandatory and voluntary, and the necessity for a non-punitive environment for the voluntary reporting of safety hazards.

Aerodromes (Annex-14)

- A distinction of Annex 14 is the broad range of subjects it contains. It extends from the **planning of airports and heliports** to such details as switch-over times for secondary power supply; from civil engineering to illumination engineering; from provision of sophisticated rescue and fire fighting equipment to simple requirements for keeping airports clear of birds.
- The impact of these numerous subjects on the Annex is compounded by the rapidly changing industry which airports must support. New aircraft models, increased aircraft operations, operations in lower visibilities and technological advances in airport equipment combine to make Annex 14 one of the most rapidly changing Annexes.

- **The heart of the airport is the vast movement area** extending from the runway, along the taxiways and onto the apron. Today's large modern aircraft require a more exacting design of these facilities. Specifications on their physical characteristics, i.e. width, surface slope and separation distances from other facilities, form a principal part of this Annex.
- Along with defining the ground environment of an airport, specifications are also required **to define its airspace requirements**. Airports must have airspace free from obstacles in order for aircraft to approach and depart safely from the airport

- A striking feature of airports at night are the hundreds, sometimes thousands of lights **used to guide and control aircraft movements**. In contrast to flight, where guidance and control are done through radio aids, movements on the ground are primarily guided and controlled through visual aids.

- To take off and land safely and routinely today's aircraft require accurate information on the condition of facilities at airports.

- Elevation of the four components of the SSP framework to a Standard State safety oversight provisions broadened to all service providers Safety data collection, analysis and exchange provisions transferred from Annex 13.

- SMS framework now applies to the design and manufacture of aircraft

- APPENDIX 1 - State safety oversight system–provisions developed from Appendix 5 to Annex 6 (Safety oversight of air operators) and Doc 9734 (Safety Oversight Manual).

- APPENDIX 2 - SMS Framework–provisions were reformatted to improve readability

- ATTACHMENT A - SSP Framework–components elevated to Standards (Chapter 3) with elements unchanged.

- ATTACHMENT B – Legal Guidance for the Protection of Information from Safety Data Collection and Processing Systems – Currently duplicate of Attachment E to Annex 13

Issues

- Operational Issues
- Human Performances
- Enhancing Safety
- Safety Regulations

Operational Issues

- Air Ground Communication
- Air Space Infringement
- Bird Strike
- Controlled Flight into Terrain
- Fire, Smoke and Fumes
- Ground Operations
- Airworthiness
- Level Bust

- Loss of Control
- Loss of Separation
- Runway Excursion
- Runway Incursion
- Wake Vortex Turbulence
- Weather
- Emergency and Contingency

Human Performances

- Human Behaviour
- Design Philosophy
- High Performance Modelling
- Organization and Human Performances
- Human Factors Training
- Aeromedical

Enhancing Safety

- Cabin Safety
- Flight Technical
- Safety Management
- Safety Nets
- Theory of Flight
- Safety Culture
- Just Culture
- General
- ICAO ADREP
- CAST SE Plan

Safety Regulations

- Rules
- Certification
- Personnel Licensing
- Monitoring and Oversight
- Single European Sky
- Human Error and Legal Process

NOTE: Also please refer to the Material supplied.

END SLIDE