Part 2 - Hazard Identification and Risk Management
Practical Examples

Matthias Klein, Manager General Affairs Fleet Safety
Matthias.Klein@Eurocopter.com

thinking without limits
Agenda

1. Concept
2. Hazard identification
3. Risk management
4. Preflight Risk assessment
5. Additional links
1. Concept

ICAO SMS framework

1 Safety policy and objectives
   1.1 –Management commitment and responsibility
   1.2 –Safety accountabilities of managers
   1.3 –Appointment of key safety personnel
   1.4 –SMS implementation plan
   1.5 –Coordination of emergency response planning
   1.6 –Documentation

2 Safety risk management
   2.1 –Hazard identification process
   2.2 –Risk assessment and mitigation process

3 Safety assurance
   3.1 –Safety performance monitoring and measurement
   3.2 –The management of change
   3.3 –Continuous improvement of the SMS

4 Safety promotion
   4.1 –Training and education
   4.2 –Safety communication

Source: ICAO
Hazard: *any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work.*
1. Concept
### Examples of Hazards and Their Effects

<table>
<thead>
<tr>
<th>Workplace Hazard</th>
<th>Example of Hazard</th>
<th>Example of Harm Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thing</td>
<td>Knife</td>
<td>Cut</td>
</tr>
<tr>
<td>Substance</td>
<td>Benzene</td>
<td>Leukaemia</td>
</tr>
<tr>
<td>Material</td>
<td>Asbestos</td>
<td>Mesothelioma</td>
</tr>
<tr>
<td>Source of Energy</td>
<td>Electricity</td>
<td>Shock, electrocution</td>
</tr>
<tr>
<td>Condition</td>
<td>Wet floor</td>
<td>Slips, falls</td>
</tr>
</tbody>
</table>
There is a natural tendency to describe hazards as their consequence(s),
• i.e, a strong cross wind can cause runway excursions.

Stating a hazard as consequence(s) :
• hides the nature of the hazard (i.e aircraft damage due to runway excursion)
• interferes with the identification of other important consequences.

Well-named hazards :
• allow to identify the sources or mechanisms of the hazard
• allow to evaluate their consequence(s)
1. Concept

Undesirable Event
Loss of control on the situation

UE = all event phases which can lead to an accident without efficient barriers

Safety principles:
- Remain within safety-controlled area
- If an UE occurs, react to recover and to return into controlled area
- Mitigation to reduce the consequences of an accident

Safety model: An accident is assimilated as a loss of control of the situation

Source: DEDALE
1. Concept

- Prevention
- Control
- Recovery
- Training
- Ergonomy
- Procedure to open the Windows
- Protection from outcomes
- Reduction of consequences

Source: DEDALE
2. Hazard identification

How to start?
2. Hazard identification

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?
2. How could this event happen?
3. What can the consequences be (for the company, for others, for the environment, etc.)?
4. How can I reduce the probability of this event occurring (prevention)?
5. How can I reduce the consequences of this event (mitigation)?
6. What protective measures must be adopted and how can I implement them to prevent this event?
2. Hazard identification

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?

2. How could this event happen?

3. What can the consequences be (for the company, for others, for the environment, etc.)?

4. How can I reduce the probability of this event occurring (prevention)?

5. How can I reduce the consequences of this event (mitigation)?

6. What protective measures shall be adopted and how can I implement them to prevent this event?
2. Hazard identification

- CFIT, CFIW, antenna/wire strikes, main or tail rotor obstacle strike…?
- Non-stabilized approach?
- Loss of control, inadvertent entry in IMC?
- Ground collision?
- Mid-air collision?
2. Hazard identification

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?

2. How could this event happen?

3. What can the consequences be (for the company, for others, for the environment, etc.)?

4. How can I reduce the probability of this event occurring (prevention)?

5. How can I reduce the consequences of this event (mitigation)?

6. What protective measures shall be adopted and how can I implement them to prevent this event?
2. Hazard identification
Advantages to use Bow Tie:

- Global display of the causal tree and the effects tree of the scenario of accident
- Identification of the actions to be handled first and foremost
  - The shortest "Branches" to be handled first because the closest to the accident
- Visualization of the number of defenses before every danger
  - It is recommended to put 3 defenses of different type
- Check that the same defense does not appear on another branch
  - Cause of a second unsafe condition in case of failure
2. Hazard identification

- Loss of control on situation
- Un-stabilised flight path
- Action beyond the competence of the Pilot In Command or beyond aircraft flight envelope
- Reduced external visibility
- Spatial disorientation of the flight crew
- Un-safe conditions of the aircraft resulting in an emergency situation in flight

- Exceeded Weight and Balance limits affecting aircraft controllability
- Action beyond the competence of the Pilot In Command or beyond aircraft flight envelope
- Reduced external visibility
- Spatial disorientation of the flight crew
- Un-safe conditions of the aircraft resulting in an emergency situation in flight

- Erroneous Weight and Balance determination
- Payload incorrectly lashed or positioned
- Indiscipline, overconfidence...
- Conditions likely to cause deviations
- Physiological phenomena
- Disturbed awareness
- Worsening weather conditions
- Night flight, dusk, dawn
- Hazardous weather conditions
- Critical damage, undetected before the flight
- Bird strike
- Collision with obstacles during take-off or landing
- Cargo slings/external load contacts with the rotors
- Failure caused by improper maintenance operation
- Engine power anomaly on single-engine aircraft
- Engine power anomaly on twin-engine aircraft
- Erroneous or missing information (IAS, attitudes, positions, etc.)
- Loss of engine power (taking into account the type of operation and flight phase)
- Anomaly on flying controls, airframe, loss of components in flight, alteration of flight crew’s field of vision
- Unsafe conditions of the aircraft resulting in an emergency situation in flight
2. Hazard identification

- Erroneous Weight and Balance determination
- Payload incorrectly lashed or positioned
- Indiscipline, overconfidence...
- Conditions likely to cause deviations
- Physiological phenomena
- Disturbed awareness
- Worsening weather conditions
- Night flight, dusk, dawn
- Hazardous weather conditions
- Critical damage, undetected before the flight
- Bird strike
- Collision with obstacles during take-off or landing
- Cargo slings/external load impacts with the rotors
- Failure caused by improper maintenance operation
- Engine power anomaly on single-engine aircraft
- Engine power anomaly on twin-engine aircraft
- Exceeded Weight and Balance limits affecting aircraft controllability
- Action beyond the competence of the Pilot In Command or beyond aircraft flight envelope
- Un-stabilised flight path
- Spatial disorientation of the flight crew
- Reduced external visibility
- Anomaly on flying controls, airframe, loss of components in flight, alteration of flight crew’s, field of vision
- Unsafe conditions of the aircraft resulting in an emergency situation in flight
- Worsening weather conditions
- Hazardous weather conditions
- Physiological phenomena
- Night flight, dusk, dawn
- Conditions likely to cause deviations
- Indiscipline, overconfidence...
- Erroneous or missing information (IAS, attitudes, positions, etc.)
- Loss of engine power (taking into account the type of operation and flight phase)
2. Hazard identification

What can lead to engine failure?

- Engine system failure
  - Fuel system failure
    - Fuel pollution or inadequate fuel
      - No more fuel available!!!
      - Wrong management of fuel system
    - Wrong management of engine system
  - Loss of engine power
2. Hazard identification

- Loss of engine power
  - Engine system failure
  - Failure of fuel system
  - Fuel pollution or inadequate fuel
  - No more fuel available!!
  - Improper use of fuel system
  - Improper use of engine system
2. Hazard identification

- Foreign Object Damage
- Failure of a component (design)
- Lack of maintenance check
- Errors, violations during maintenance task
- No anti-pollution test before refuelling
- No formal refuelling procedures
- Errors, violations during refuelling
- No cross check of fuel quantity delivered after refuelling
- Wrong calculation of Minimum Fuel Quantity before flight
- Unplanned diversion in flight
- Lack of knowledge
- Improper action of the crew

- Engine system failure
- Failure of fuel system
- Fuel pollution or inadequate fuel
- No more fuel available!!!
- Improper use of fuel system
- Improper use of engine system

Loss of engine power
3. Risk management

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?
2. How could this event happen?

3. What could the consequences be (for the company, for others, for the environment, etc.)?

4. How can I reduce the probability of this event occurring (prevention)?
5. How can I reduce the consequences of this event (mitigation)?
6. What protective measures must be adopted and how can I implement them to prevent this event?
3. Risk management

Questions for assessing the severity of an occurrence:

- How many *lives may be lost*?
  - Employees
  - Passengers
  - General public

- What is the *environmental impact*?
  - Spill of fuel or other hazardous product
  - Physical disruption of natural habitat
3. Risk management

- What is the severity of the **property or financial damage**?
  - Direct operator property loss
  - Damage to aviation infrastructure
  - Third party damage
  - Financial impact and economic impact for the company
- What is the likely **media interest**?
3. Risk management

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?
2. How could this event happen?
3. What could the consequences be (for the company, for others, for the environment, etc.)?
4. How can I reduce the probability of this event occurring (prevention)?
5. How can I reduce the consequences of this event (mitigation)?
6. What protective measures must be adopted and how can I implement them to prevent this event?
3. Risk management

**Safety risk:** safety risk is defined as the assessment, expressed in terms of predicted probability and severity, of the consequences of a hazard, taking as reference the worst foreseeable situation. Typically, safety risks are designated through an alphanumeric convention that allows for their measurement (Doc 9859 ICAO).

**Criticality = Probability x Severity**
**Determination of initial Safety Risk:**

**Loss of engine power on multi-engine helicopters**

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPROBABLE</td>
<td>Never occurred in aviation world</td>
</tr>
<tr>
<td>RARE</td>
<td>Already occurred in aviation world</td>
</tr>
<tr>
<td>REMOTE</td>
<td>Already occurred one time in the company</td>
</tr>
<tr>
<td>PROBABLE</td>
<td>Occurs in the company less than 3 times by year</td>
</tr>
<tr>
<td>FREQUENT</td>
<td>Frequently occurs in the company (more than 3 times by year)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEVERITY</th>
<th>Peoples</th>
<th>Environment</th>
<th>Assets</th>
<th>Brand image</th>
</tr>
</thead>
<tbody>
<tr>
<td>No consequences</td>
<td>No injury</td>
<td>No effect</td>
<td>No damage</td>
<td>No impact</td>
</tr>
<tr>
<td>NEGLIGEABLE</td>
<td>Superficial injuries</td>
<td>Negligible effects</td>
<td>Damage &lt; 10K€</td>
<td>Light impact</td>
</tr>
<tr>
<td>MINOR</td>
<td>Slight injuries</td>
<td>Light impact</td>
<td>Damage &lt; 50K€</td>
<td>Limited impact</td>
</tr>
<tr>
<td>MAJOR</td>
<td>Major injuries</td>
<td>Important local effects</td>
<td>Damage &lt; 250K€</td>
<td>Important impact</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>One dead</td>
<td>No remediable effect</td>
<td>Damage &lt; 1 M€</td>
<td>National impact</td>
</tr>
<tr>
<td>CATASTROPHIC</td>
<td>Multiples deaths</td>
<td>Massive effects</td>
<td>Damage &gt; 1 M€</td>
<td>International Impact</td>
</tr>
</tbody>
</table>
Role of defenses against the accident (safety barriers):
- Eliminate, counter the external and internal danger
- Control its effects
- Mitigate the consequences

Types of defense against the accident:
- Technical (static or dynamic)
- Organizational
- Procedural
- Human (training, experience, etc.), less reliable
3. Risk management

“In-depth” defenses:

- Adapted to the threat
- A series of at least 3 defenses
- Independent from each other
- Adaptable according to the evolution of the situation (intelligence)
- Maintained (maintenance)
3. Risk management

- Loss of engine power
  - Engine system failure
    - Failure of fuel system
      - No anti-pollution test before refuelling
      - No formal refuelling procedures
      - Errors, infringements during refuelling
      - No cross-check of fuel quantity delivered after refuelling
      - Wrong calculation of Minimum Fuel Quantity before flight
      - Unplanned diversion in flight
      - Lack of knowledge
      - Improper action of the crew
    - Fuel pollution or inadequate fuel
      - No more fuel available!!!
      - Improper use of fuel system
      - Improper use of engine system
  - Foreign Object Damage
    - Failure of a component (design)
    - Lack of maintenance checks
    - Errors, infringements during maintenance task
    - No anti-pollution test before refuelling
    - No formal refuelling procedures
    - Errors, infringements during refuelling
    - No cross-check of fuel quantity delivered after refuelling
    - Wrong calculation of Minimum Fuel Quantity before flight
    - Unplanned diversion in flight
    - Lack of knowledge
    - Improper action of the crew
3. Risk management

- Foreign Object Damage
- Failure of a component (design)
- Lack of maintenance check
- Loss of engine power
- Engine system failure
- Failure of fuel system
- Errors, violations during maintenance task
3. Risk management

Foreign Object Damage

Failure of a component (design)

Continuing Airworthiness

Engine health program

Seeking « bogus parts »

Lack of maintenance check

Safety and Quality policy visibly endorsed by CEO

Adequate supervision

Updated and cleared work documentation

Technicians trained and rated

Adequate tools, workshop, environment

No mission/time pressure « hurry up syndrom »

« just culture »

Errors, violations during maintenance task

Loss of engine power

Failure of fuel system

Engine system failure

Safety barriers

FOD policy

Air intake protection

Thinking without limits
3. Risk management

- Engine system failure
- Failure of fuel system
- Loss of engine power
- Loss of control
3. Risk management

- Engine system failure
  - Pilot is trained and applies the appropriate procedure

- Failure of fuel system
  - Pilot is trained and applies the appropriate procedure

- Loss of engine power
  - Existing weight allows clearance from obstacles

- In flight diversion to alternate or emergency airfield
  - Pilot recalculates new flight endurance

- Safety barriers
  - Pilot fights to keep the control on situation

- Loss of control on situation
Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?
2. How could this event happen?
3. What could the consequences be (for the company, for others, for the environment, etc.)?
4. How can I reduce the probability of this event occurring (prevention)?
5. How can I reduce the consequences of this event (mitigation)?
6. What protective measures must be adopted and how can I implement them to prevent this event?
3. Risk management

Pilot fights to keep the control on situation

Loss of control on situation → IMPACT!

Impacts:
- Passenger injuries
- Aircraft damage

Accident avoided by chance
3. Risk management

Loss of control on situation

- Pilot fights to keep the control on situation
- IMPACT!
- Crash absorber seats for crew and pax
- Additional individual ELT for crew
- GPS fleet tracking service
- Oversea flight: emergency floatation system

Mitigation

- Pax: mandatory preflight safety briefing
- Lifevests, liferafts, survival kits, first aid kits...
- Pilot: wear of helmets and all suitable protective suits (gloves, fireproof suits...)
- Passenger injuries
- Aircraft damage
- Additional cabin extinguisher

IMPACT!

- Passenger injuries
- Aircraft damage

Pax: mandatory preflight safety briefing
- Lifevests, liferafts, survival kits, first aid kits...
- Pilot: wear of helmets and all suitable protective suits (gloves, fireproof suits...)

thinking without limits
### Determination of resulting Safety Risk:

**Loss of engine power on multi-engine helicopters**

**Safety Risk Matrix:**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
<th>Severity</th>
<th>People</th>
<th>Environment</th>
<th>Assets</th>
<th>Brand Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improbably</td>
<td>Never occurred in aviation world</td>
<td>Minor</td>
<td>Slight injuries</td>
<td>Light impact</td>
<td>Damage &lt; 50K€</td>
<td>Limited impact</td>
</tr>
<tr>
<td>Rare</td>
<td>Already occurred in aviation world</td>
<td>Major</td>
<td>Major injuries</td>
<td>Important local effects</td>
<td>Damage &lt; 250K€</td>
<td>Important impact</td>
</tr>
<tr>
<td>Remote</td>
<td>Already occurred one time in the company</td>
<td>Critical</td>
<td>One dead</td>
<td>No remediable effect</td>
<td>Damage &lt; 1 M€</td>
<td>National impact</td>
</tr>
<tr>
<td>Probable</td>
<td>Occurs in the company less than 3 times by year</td>
<td>Catastrophic</td>
<td>Multiples deaths</td>
<td>Massive effects</td>
<td>Damage &gt; 1 M€</td>
<td>International Impact</td>
</tr>
<tr>
<td>Frequent</td>
<td>Frequently occurs in the company (more than 3 times by year)</td>
<td>None</td>
<td>No injuries</td>
<td>No effect</td>
<td>No damage</td>
<td>No impact</td>
</tr>
</tbody>
</table>

**Legend:**

- **Acceptable**: Now consequences
- **Medium**: No injury
- **Serious**: No effect
- **Unacceptable**: No damage
- **Unacceptable +**: No impact

**Legend for Frequency:**

- **Improbable**
- **Rare**
- **Remote**
- **Probable**
- **Frequent**

**Legend for Severity:**

- **Caustrophic**
- **Critical**
- **Major**
- **Minor**
- **Negligible**
3. Risk management

Hazard identification, risk assessment and mitigation process:

1. What am I the most afraid of in my activity?
2. How could this event happen?
3. What could the consequences be (for the company, for others, for the environment, etc.)?
4. How can I reduce the probability of this event occurring (prevention)?
5. How can I reduce the consequences of this event (mitigation)?
6. What protective measures must be adopted and how can I implement them to prevent this event?
Several solutions are possible

Adopting new procedures is costly

Conduct a cost/benefit analysis (business case)
  - Could be very detailed (exact costs, benefits)
  - Could use relative values (low, medium, high)
3. Risk management

<table>
<thead>
<tr>
<th>COST</th>
<th>Benefit High</th>
<th>Benefit Med</th>
<th>Benefit Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Med</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>High</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Dave Huntzinger
3. Risk management

Key role of continuous risk monitoring:
- Register your hazards and risk analyses in a Database
- Review them periodically (set alarms)
- Conduct risk analysis whenever changes occur in your activity
- Use the adequate risk management form (paper or electronic)
<table>
<thead>
<tr>
<th>UNDESIRABLE EVENT</th>
<th>One engine inoperative on multi-engine aircraft</th>
<th>REF:</th>
<th>Revised: dd/mm/yyyy</th>
</tr>
</thead>
</table>
| ULTIMATE ASSOCIATED EVENTS | - Crash after loss of control in flight  
- Damage/injuries in flight  
- Damage/injuries on the ground | | |
| | **Defences:**  
Control and Recovery Measures | | |
| **Precursors to the Undesirable Event** | Responsible | In place | |
| Mechanical failure, malfunctioning of the fuel system | The engine systems and components are maintained and configured according to an approved program applied by an approved body | | X |
| | The body has a continued airworthiness program | | X |
| | The qualification of flight crews is up-to-date and they follow a regular training program covering normal and emergency procedures | | X |
| | The flight crew is aware of the situation and applies the suitable procedure | | X |
| Ingestion of FOD | The organisation has a FOD prevention program | | X |
| | The traffic areas are regularly maintained and cleaned | | X |
| Unsuitable use of the engine | The qualification of flight crews is up-to-date and they follow a regular training program covering aircraft operating procedures | | X |
| | The company has introduced a Helicopter Flight Data Monitoring (HFDM) program | | X |
| Loaded fuel quantity insufficient for the flight (Flight planning error, error during refuelling operation) | The refuelling company has clear and relevant procedures concerning the refuelling operations | | X |
| | The operators comply with the refuelling procedures | | X |
| | The flight crews cross-check the loaded fuel quantities before every flight | | X |
| | The company has introduced a policy to determine the fuel quantity to be loaded for the flight | | X |
| | The fuel system is maintained and checked in accordance with the approved program | | X |
| Fuel contaminated or unsuitable for this type of engine | The refuelling company has clear and relevant procedures concerning refuelling operations, including anti-contamination tests | | X |
| | The flight crews cross-check the type and quality of the loaded fuel before every flight | | X |
| Unsuitable fuel management | The company has introduced an in-flight fuel management policy | | X |
| | During preparation for flight, the flight crew has taken into account any change in the weather conditions and relevant impact on the flight path | | X |
| | Briefings covering fuel management and aircraft fuel system operation are given at regular intervals | | X |
| | In flight, the flight crews check the fuel consumption and its change at regular intervals | | X |

Risk level:  
- Initial:  
- Present:  
- **SERIOUS**  
- MEDIUM
### 3. Risk management

**Risk management form (cont’d)**

<table>
<thead>
<tr>
<th>Ultimate Events (if defence is insufficient)</th>
<th>Protective measures:</th>
<th>Responsible</th>
<th>Yes</th>
<th>No</th>
<th>Partly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crash after loss of control in flight Damage/injuries in flight Damage/injuries on the ground</td>
<td>Determination of a risk exposure time in performance class 2 (refer to appendix 1, OPS paragraph 3.517)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off-shore flight: emergency floatation gear installation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installation of energy-absorbing seats (flight crews and passengers)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subscription to a service ensuring a real-time follow-up of the aircraft flight path</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carrying and wearing rescue material and equipment (life rafts, life vests, waterproof flight suits, etc.)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carrying survival kits in addition to approved kits for flight over inhospitable areas</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carrying individual emergency locator transmitters (according to the type of mission)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provision of crash helmets, gloves and fireproof flight suits for flight crews according to the type of flight</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency evacuation training (HUET type) performed at regular intervals</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Routine safety briefing for passengers before boarding, reminding them of the danger of rotors, safety routings, aircraft evacuation rules, emergency exit operating procedure, use of rescue equipment, etc.</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Risk management

To summarize:

Identify the hazard and potential outcomes

Control the risk!
4. Preflight risk assessment

Preflight risk assessment:

- FAA Flight risk assessment tool (Info 07015 dated 03 JUL 2007)
- EHSIT preflight risk assessment
- Could be adapted to specific flight operations
- Pre-approved solutions
- All fixes identified before departure
- Could be filed with departure paperwork
- Ops knows what pilots are doing or not
- With FDM, gives a system overview
- Could be adapted for Pre-work risk assessment (maintenance, ramp, etc.)
4. Preflight risk assessment

Preflight risk assessment:

Personnel:
- Physical state
- Qualification
- Team composition

Material:
- Aircraft status (MEL)
- Tools

Environment:
- Weather
- Terrain
- Day/night
- Ambient noises, etc.

Operation:
- Routine/important
- Urgent/not urgent
- Vital
- Easy/complicated

Situation:
- Set situation awareness
- Means for Hazard Identification
- Show the way to assess the risk
### PRE-FLIGHT RISK MANAGEMENT CHECKLIST

<table>
<thead>
<tr>
<th>CREW</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONAL CONDITIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No problems. Physically in shape.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altitude, not completely in shape.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache, cold, fever, foot(swell).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No medication in the last 24 hours.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over the counter medication.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescription medication. Attention and driving impeding medication.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well slept.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate sleep or no sleep in the last 13 hours.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor sleep.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No fatigue. First flight of the day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty day less than 10 hours, more than 2 flights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty day more than 10 hours, more than 4 flights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food &amp; drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequately nourished and hydrated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flight conducted during breakfast, lunch or dinner time. 4 to 6 hours without eating, 2 to 4 hours without drinking.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 6 hours from last meal. More than 4 hours without drinking. Hot weather and no drinking water onboard.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiologically relieved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium mission duration with no rest facilities available.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long mission duration with no rest facilities available.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not emotionally involved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotionally involved, little private problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotionally stressed, Legal, financial or family problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Additional links

Links:

http://www.icao.int/anb/FLS/icaosafety.html
http://www.ihst.org/
http://www.skybrary.aero/index.php/Safety_Culture
http://www.tc.gc.ca/eng/civilaviation/opssvs/aviationsafety-menu.htm
http://www.eventreporting.org/
Ready now!!!
THANK YOU FOR YOUR ATTENTION