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## Crew Coordination

Highlighting the Monitoring Role of the PNF

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# Statistics

# Statistics

Factor	% of Events
Inadequate decision making	74 %
Omission of action or inappropriate action	72 %
Inadequate CRM practice (crew coordination, cross-check and backup)	63 %
Insufficient horizontal or vertical situational awareness	52 %
Inadequate or insufficient understanding of prevailing conditions	48 %
Slow or delayed crew action	45 %
Flight handling difficulties	45 %
Incorrect or incomplete pilot / controller communication	33 %
Interaction with automation	20 %

Source : Flight Safety Foundation - 1999



## Golden Rules

Airmanship – Operations – Crew Coordination

# Airmanship - 1 / 2

- Consider aircraft trajectory as first priority at all times
- Adhere to SOP's and other published procedures
- Maintain situation awareness and situation control
- Stay ahead of the aircraft :
  - ▶ Define and monitor targets / gates throughout the flight
  - ▶ Be alert and prepared for possible flight-phase-related emergencies
- Challenge and validate information

# Airmanship - 2 / 2

- Consult and evaluate before deciding
- Keep all options open and be ready to change initial plans
- Prioritize tasks as a function of prevailing condition
- Check result of actions
- Never leave a situation unresolved
- Share experience and lessons-learned



# Operations Golden Rules - 1 / 2



- In all circumstances :
  - ▶ Fly the aircraft like any other aircraft
  - ▶ Fly, navigate, communicate, manage - in that order
  - ▶ Keep one head up at all times
  - ▶ Cross-check the accuracy of the FMS
  - ▶ Know your guidance ( FMA ) at all times
  - ▶ If aircraft does not respond as expected - take over
  - ▶ Use the proper level of automation for the task
  - ▶ Practice task sharing and back up each other



# Operations Golden Rules - 2 / 2

- In any abnormal or emergency condition :
  - ▶ Understand prevailing condition before acting
  - ▶ Assess risks and time factors
  - ▶ Review and evaluate available options
  - ▶ Consider all implications before deciding
  - ▶ Plan for contingencies
  - ▶ Create a shared problem model with other crew members by communicating
  - ▶ Match response to situation
  - ▶ Manage workload
  - ▶ Apply agreed action-plan and monitor result of actions



# CRM Best Practices

Task Sharing – Decision Making

# CRM Best Practices

- Ensure clear delegation of tasks
- Manage competing activities ( i.e., prioritize )
- Use all system resources
- Use on-board documentation
- Assess time-critical situations
- Verbalize with other crewmembers
- Manage risk of tunnel vision ( narrow-focus )

# Task Sharing – Captain

- Leadership role of Captain :
  - ▶ Manage priorities
  - ▶ Distribute tasks  
( if non-standard task sharing )
  - ▶ Consult
  - ▶ Share situation analysis
  - ▶ Decide
  - ▶ Assure final authority and decision making
  - ▶ Ensure that everyone contributes to communication /  
information and backup / crosscheck



# Task Sharing - PNF

- Support and monitoring roles of PNF :
  - ▶ Relay critical information for PF awareness
  - ▶ Provide timely inquiry statements before deviations develop
  - ▶ Provide standard and excessive deviation callouts (as applicable) and ensure PF response on intended corrective action(s)
  - ▶ Propose precise solutions if PF does not respond
  - ▶ Provide emergency statement if required
  - ▶ Take over control, if conditions warrant such action

# Task Sharing - PNF

Shall we extend gear to reduce speed ?

Don't you think we are high and fast ?

Unexpected tailwind  
Runway condition  
Visibility change

Information Statements

Inquiry Statements

Solution Statements



Taking over  
"Go-around / flaps"



Callouts

Take Over

V DEV, airspeed and  
GS high, Sir

Emergency Statement

500 ft, not stabilized,  
Go-around !



# Decision Making

- Establish a common reference for :
    - ▶ Situation assessment
    - ▶ Action plan
  - Perform balance between :
    - ▶ Procedural guidance ( or absence of procedure )
    - ▶ Technical skills
    - ▶ Non-technical skills ( i.e., CRM best practices )
    - ▶ Operations Golden Rules
- .... as decision-making model

# Decision Making

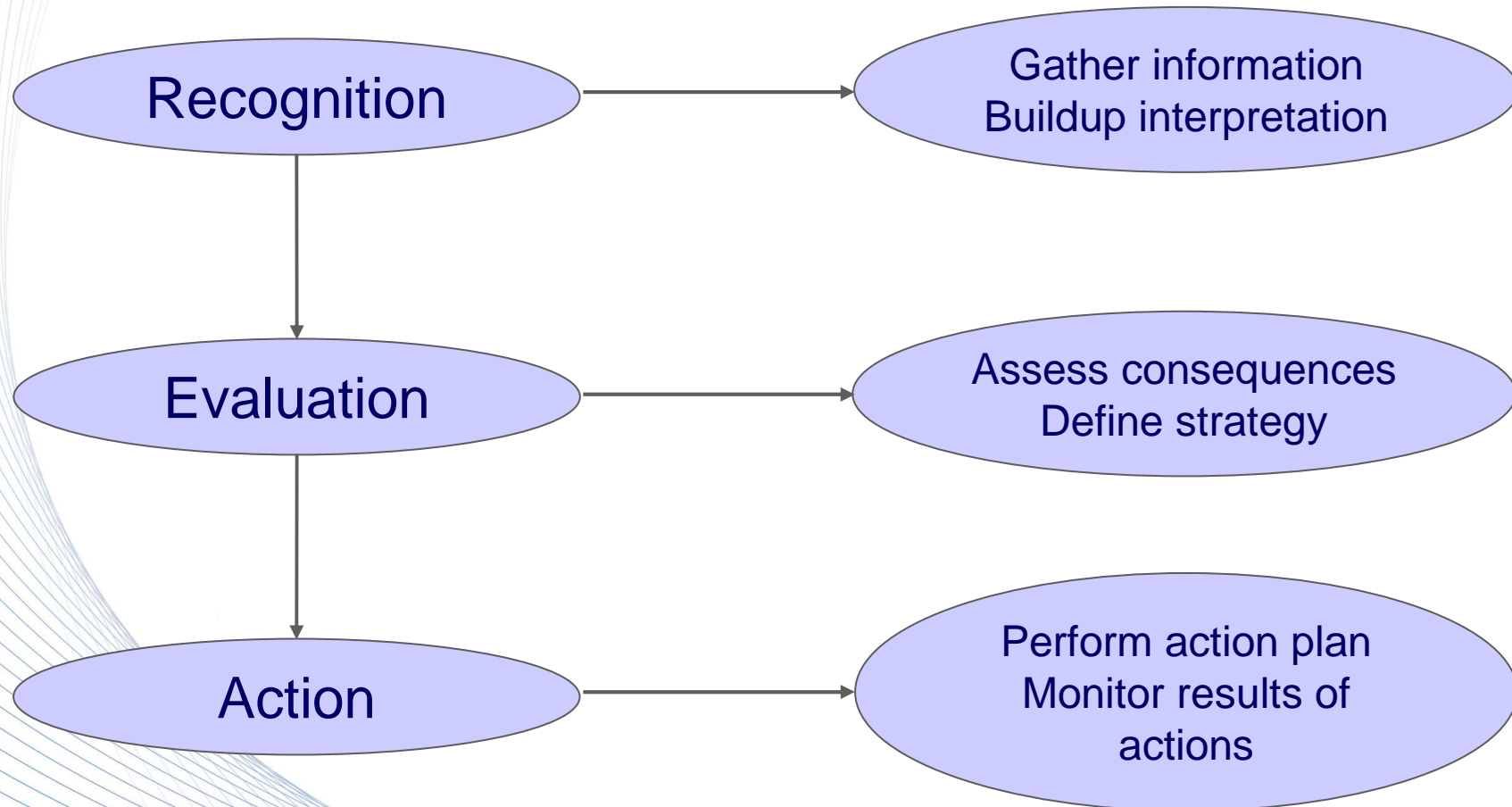
- Define and monitor action plan – 1 / 2:
  - ▶ Control and stabilize trajectory
  - ▶ Identify / understand prevailing condition :
    - consult ( cockpit and cabin crew, operations and maintenance control )
    - reach a structured and agreed representation of situation
  - ▶ Assess time factors ( fuel, smoke, batteries, ... )
  - ▶ Define common sequential action plan :
    - what to do ?
    - how to do ?
    - what to monitor while doing ?



# Decision Making

- Define and monitor action plan – 2 / 2 :
  - ▶ Evaluate effects on systems / consequences :
    - evaluate risks - current and future - associated with decisions : what if ?
  - ▶ Perform synthesis :
    - implications, limitations, restrictions, specific flying techniques, effects on flight continuation
  - ▶ Make final decisions
  - ▶ Inform ( ATC, cabin crew )
  - ▶ Be alert to recognize changing or deteriorating situation and adjust or change initial plan, as required

# Decision Making



Knowledge-based Decision Making  
( Adapted from Rasmussen's model )



Conclusion

# Associated Flight Operations Briefing Notes

- Standard Operating Procedures series :
  - ▶ Operating Philosophy
  - ▶ Operations Golden Rules
  - ▶ Standard Calls
  - ▶ Conducting Effective Briefings
- Human Performance series :
  - ▶ CRM Aspect in Incidents / Accidents
  - ▶ Managing Interruptions and Distractions

# Summary

- Modern operating and training philosophies promote the PF / PNF concept
- Industry recognizes that both the PF and PNF have a “ monitoring role ”
- The PNF has an important “ support role ” during critical and high-workload phases of flight

