The importance of LAHF in Accident Mitigation

- An insight into Aircraft Accident investigation from a linguistic perspective .

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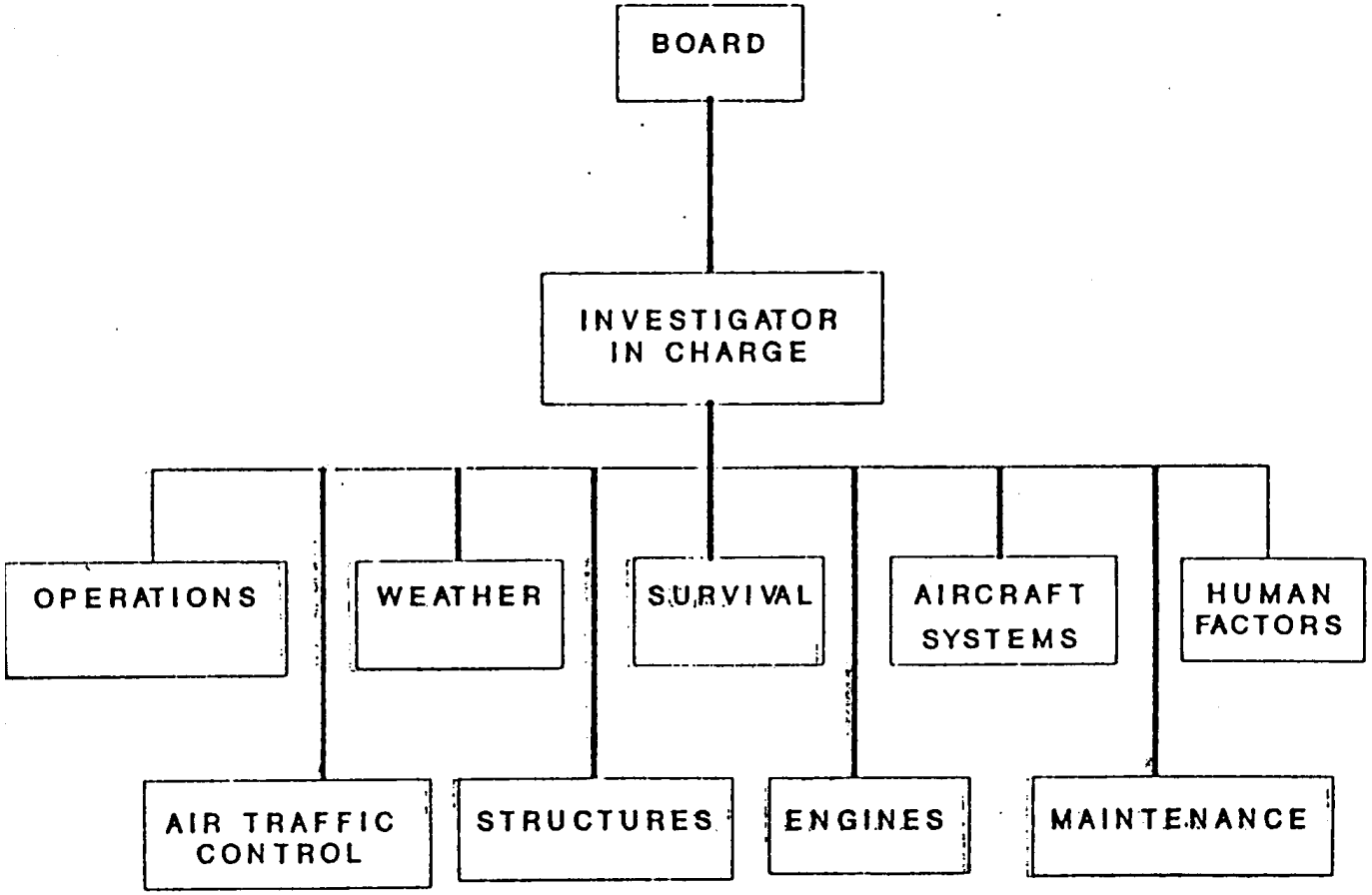
Egyptian Aircraft Accident Investigation

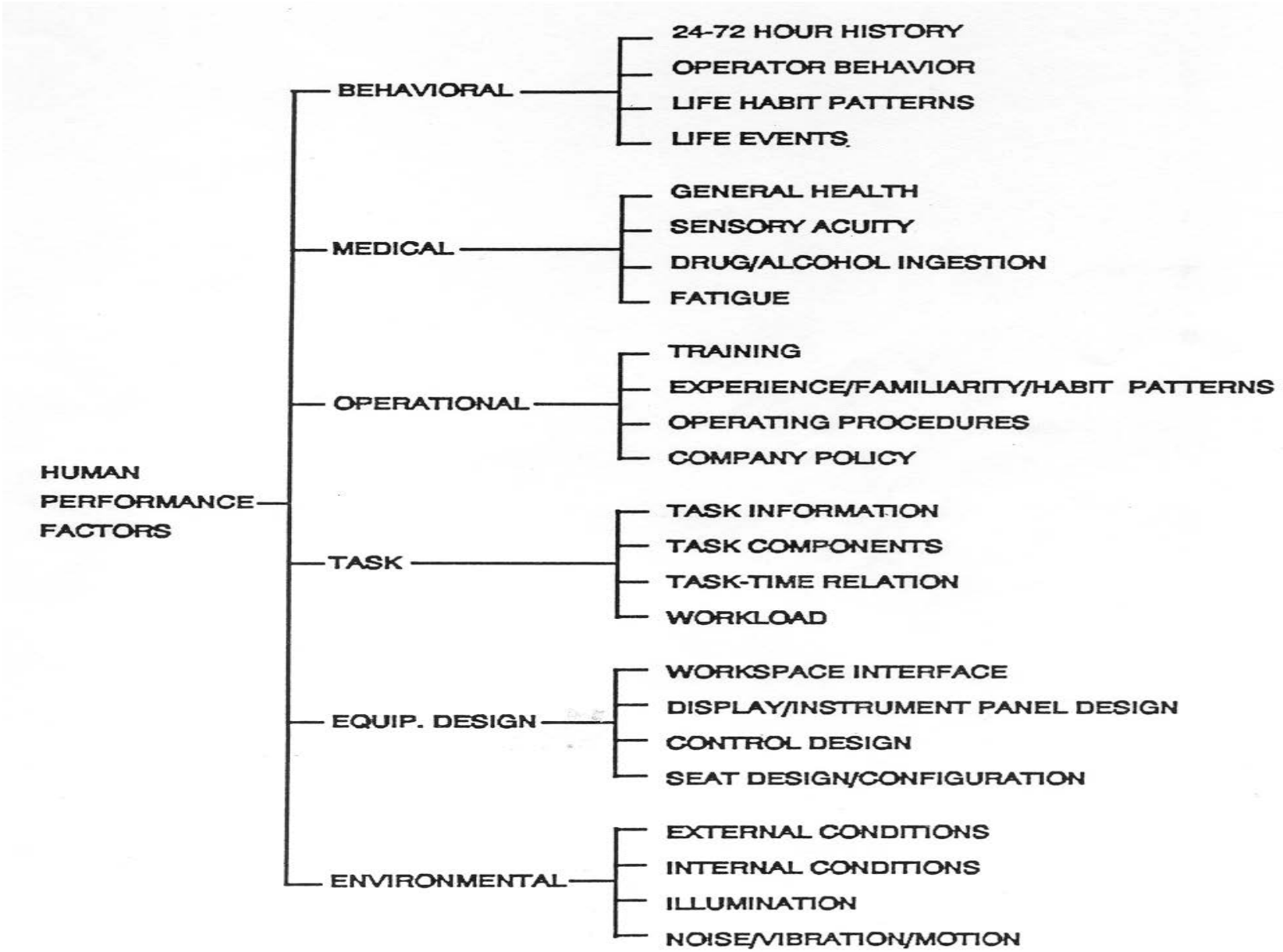
Major Investigation Flow



Accident Investigation Cycle

- Human Error
- Engineering
  - Design
  - Reliability/etc
- Aviation Infrastructure
  - Airports
  - Navigation Aids/etc
- Human Performance

NTSB Model

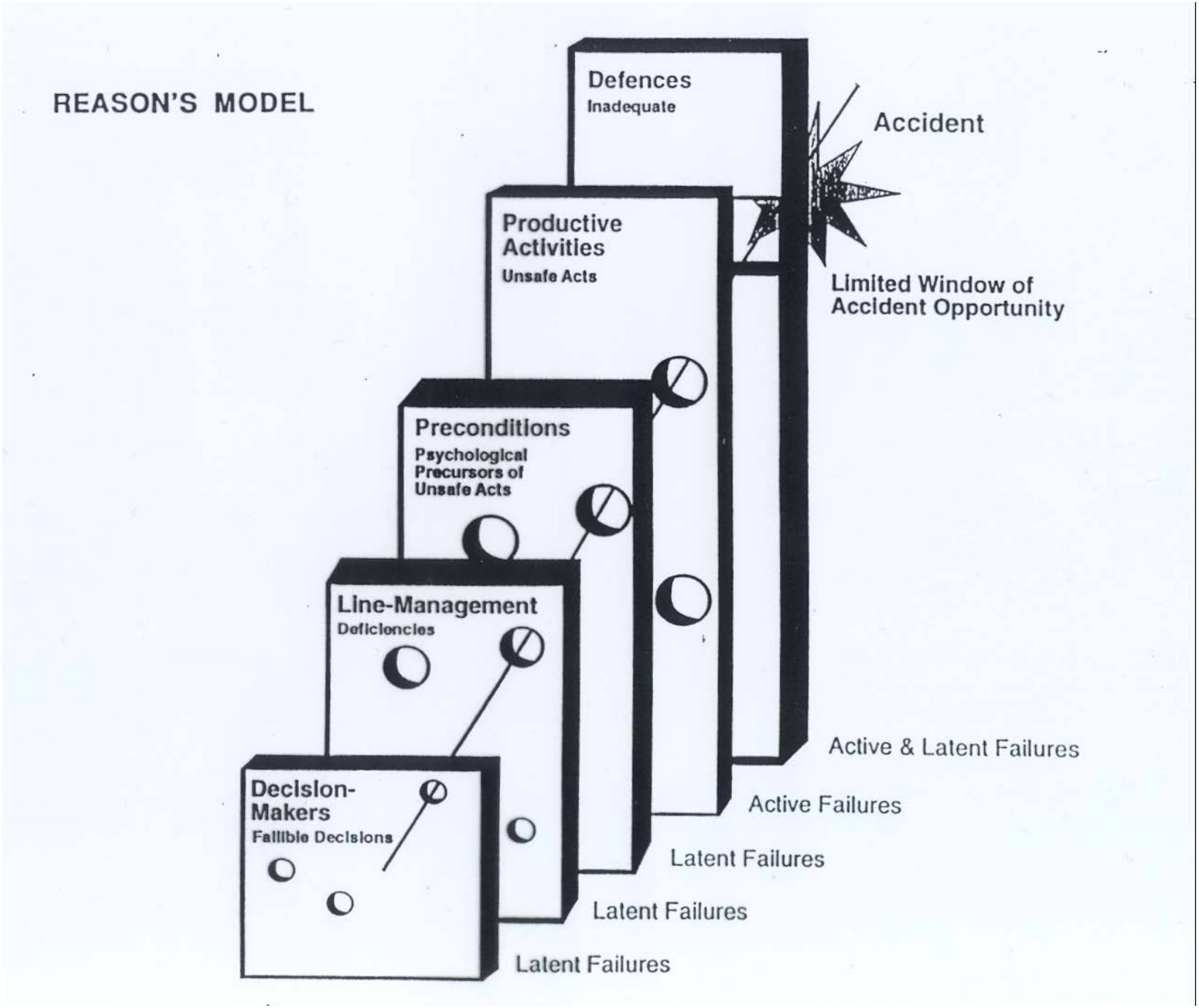

HUMAN PERFORMANCE FACTORS
BEHAVIORAL
24-72 HOUR HISTORY
OPERATOR BEHAVIOR
LIFE HABIT PATTERNS
LIFE EVENTS
MEDICAL
GENERAL HEALTH
SENSORY ACUITY
DRUG/ALCOHOL INGESTION
FATIGUE
OPERATIONAL
TRAINING
EXPERIENCE/FAMILIARITY/HABIT PATTERNS
OPERATING PROCEDURES
COMPANY POLICY
TASK
TASK INFORMATION
TASK COMPONENTS
TASK-TIME RELATION
WORKLOAD
EQUIP. DESIGN
WORKSPACE INTERFACE
DISPLAY/INSTRUMENT PANEL DESIGN
CONTROL DESIGN
SEAT DESIGN/CONFIGURATION
ENVIRONMENTAL
EXTERNAL CONDITIONS
INTERNAL CONDITIONS
ILLUMINATION
NOISE/VIBRATION/MOTION

Human Factors is about:

- Human Factors is about communication.
- Human Factors is about people in their working and living environment.
- Human Factors is about people and their relationship with machines and equipment.
- Human Factors is about people and their relationship with other people.

"Human beings by their very nature make mistakes; therefore, it is unreasonable to expect error-free human performance."
Shappell & Wiegmann, 1997

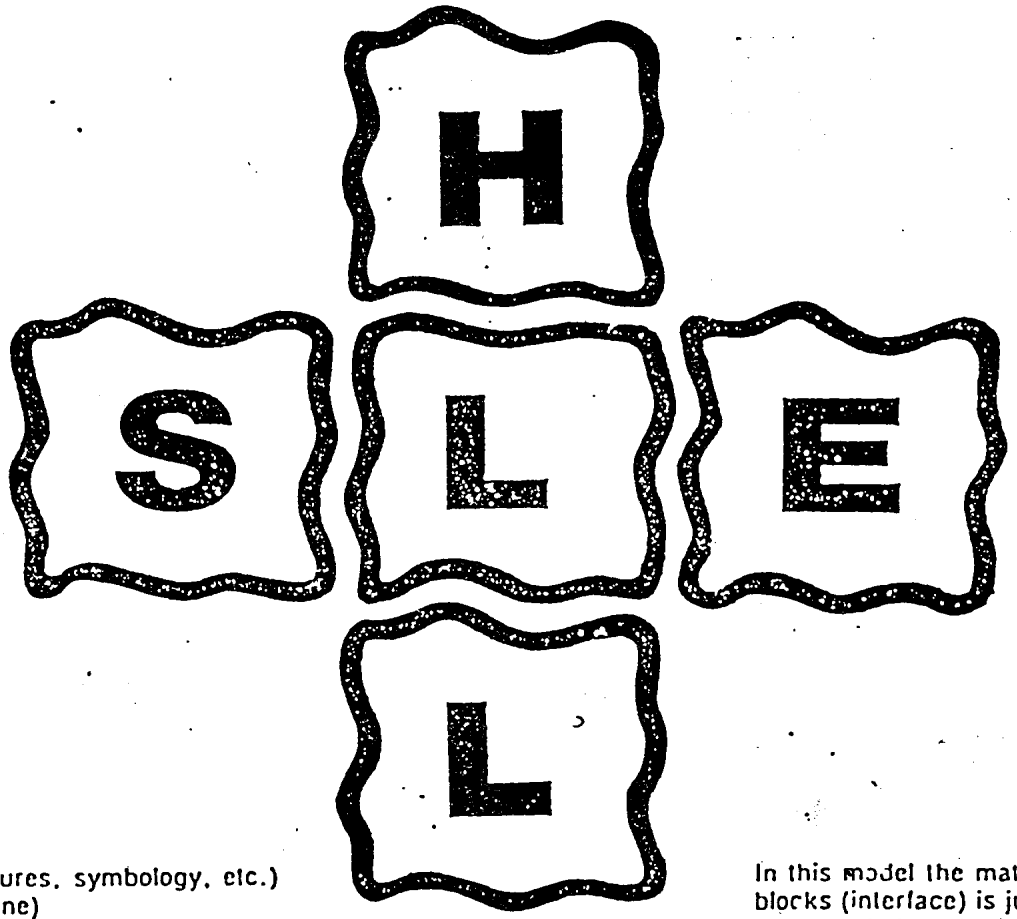
- **It is not surprising then, that human error has been implicated in 60-80% of accidents in aviation and other complex systems.**
- **In fact, while accidents solely attributable to environmental and mechanical factors have been greatly reduced over the last several years, those attributable to human error continue to plague organizations.**


REASON'S MODEL
Defences
Inadequate
Accident
Productive
Activities
Unsafe Acts
Limited Window of
Accident Opportunity
Preconditions
Psychological
Precursors of
Unsafe Acts
Line-Management
Deficiencies
Decision-
Makers
Fallible Decisions
Active & Latent Failures
Active Failures
Latent Failures
Latent Failures
Latent Failures

Reason's Model

- Two ways to look at the Human Error Problem
  - The person approach
    - Focusing on errors of individuals, blaming them for forgetfulness, inattention or moral weakness
  - The system approach
    - Concentrates on conditions under which individuals work and tries to build defenses to avert errors or mitigate their effects.
    - Errors are seen as consequences not causes.
    - Basic premise: humans are fallible and errors are to be expected, even in the best organizations.

SHEL Model

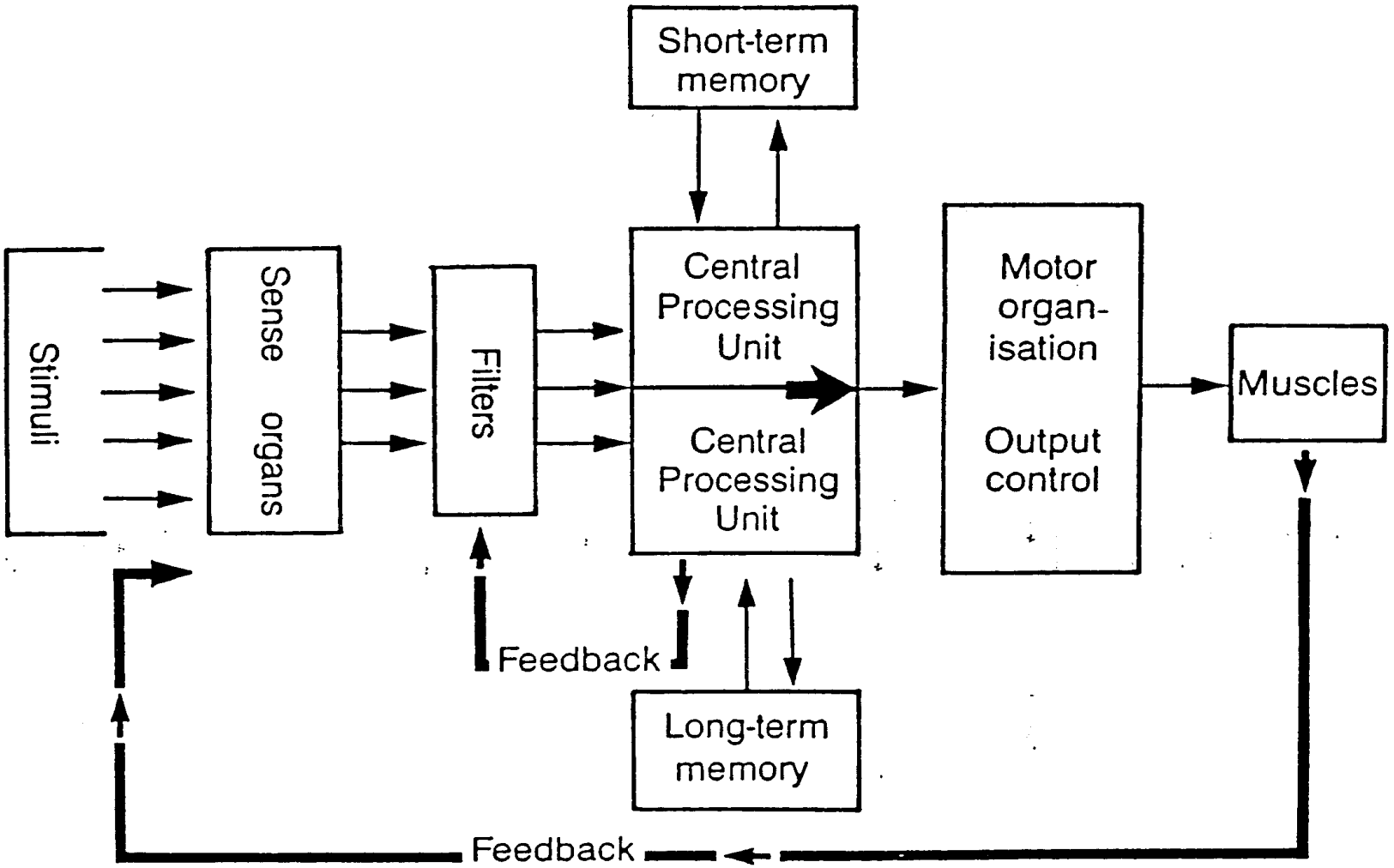


S = Software (procedures, symbology, etc.)
H = Hardware (machine)
E = Environment
L = Liveware (human)

In this model the match or mismatch of the blocks (interface) is just as important as the characteristics of the blocks themselves. A mismatch can be a source of human error.

Figure 2. The SHEL model

Information Processing Model

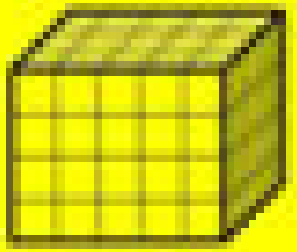


HFACS®

Human Factors Analysis and Classification System

- It is a system-safety model that effectively **bridges the gap between human error theory** and **applied human error analysis**. It is a proven tool for **identifying and analyzing human error in complex, high-risk systems**.

- HFACS provides a clear understanding of the reasons errors occur so that effective intervention programs can developed

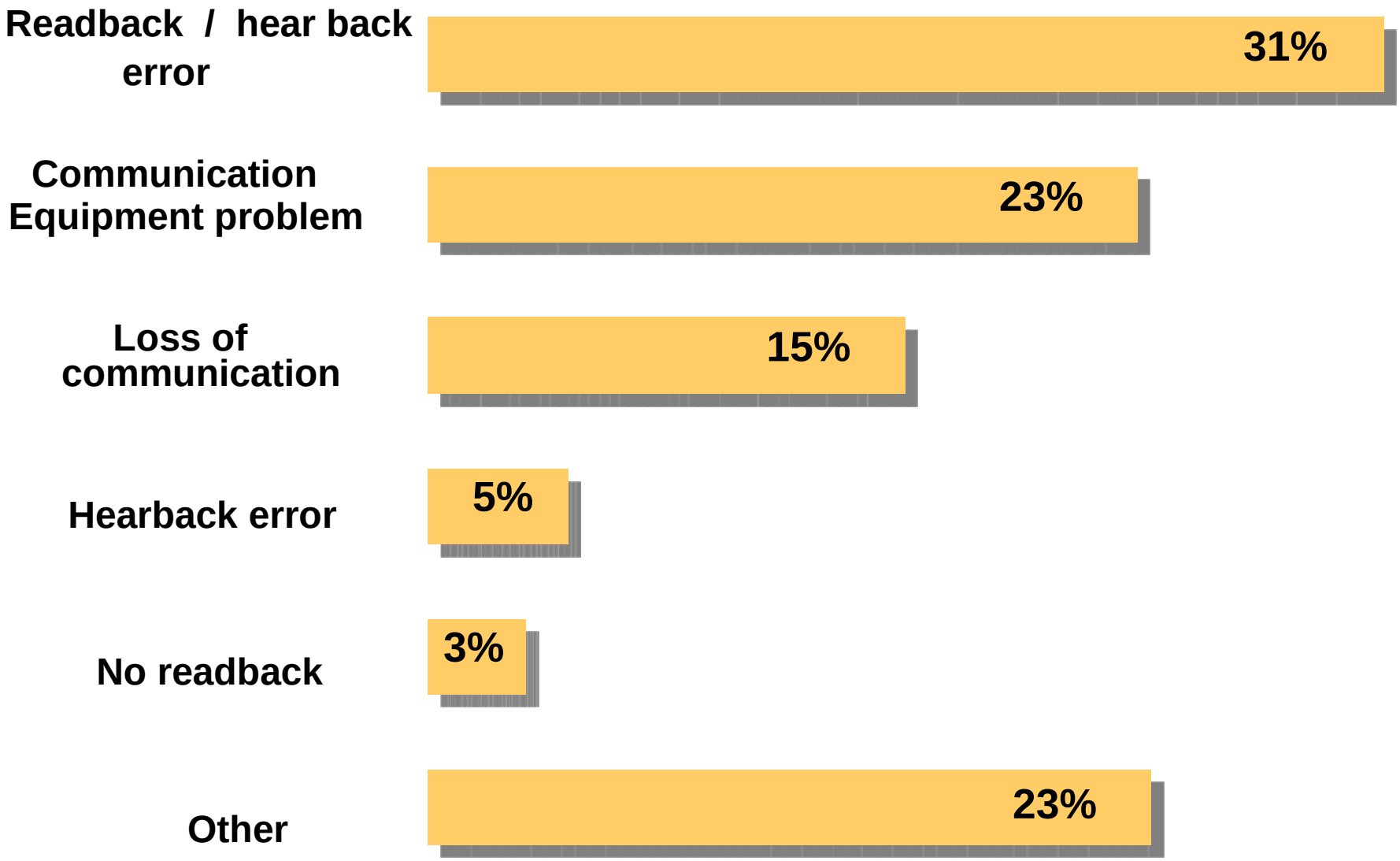


HFIX®

Human Factors Intervention matriX

- It is an innovative tool for **mapping intervention strategies** onto the specific forms of human error identified in the Human Factors Analysis & Classification System model.
- HFIX allows users to systematically **generate enterprise intervention strategies** that directly target the underlying systemic causes of errors.

Generic Communication Problems



Avianca 1990

(NTSB Report AAR-91/04). "

The NTSB attributes the inadequate communication to ATC from, basically, a lack of knowledge of FAA phraseology. The First Officer failed to declare an emergency, or to say, “Pan Pan” or “Mayday:” he did not use the word “emergency.” He did at one point request “priority,” but after they had lost two engines, “we just ah lost two engines and we ah need priority please.” Even at this point, the FO’s communication is mitigated (and softened) by his use of “please.”

Captain to First Officer:

2124:06 “Digale que estamos en **emergencia**.”(Tell him that we are in an emergency.)

2124:17 “Que dijo?”(What did he say?)

2124:26“Ya le dijo?”(Did you already tell him?)

2125:08“Diagle que no tenemos comubstible.” (Tell him that we don’t have fuel.)

2125:28 “Ya le dijiste que no tenemos combustible.”(Did you already tell him that we don’t have fuel?”

Controller to First Officer:

21:26:35 “I’m going to bring you about 15 M northeast and then turn you back on for the approach. Is that fine with you and your fuel?

- I guess so ,thank you sir

21:30:36 “Avianca 52 Climb, Maintain 3000”

-Ah Negative sir. We.. We just running out of fuel .

21:32:49“Avianca52 you have enough fuel to make it to the airport?”

-We have just lost 2 engines and we need priority sir……Radar contact lost……

Suggested Model for air-ground communication

Controller issues unambiguous instruction

Pilot executes instruction flawlessly

Pilot reads back message correctly

Sample of the intervention OJT language Program

- Listen to the following ATC Recording of Avianca Flight 52 accident
- https://www.youtube.com/watch?v=ie8kLg9Xvd8

a) If you are a pilot, write in your own words different sentences to express that you ran out of fuel.

b) If you are an air traffic controller, write down different questions to clarify the fuel status onboard.

- Think, pair, and share your ideas concerning the idea that accidents and serious incidents may result from the lack of communication or language deficiency. Discuss in groups the safety recommendations to be taken in order to avoid them.

Thank You for your attention

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