

GUIDE TO THE *GUIDE*

Most aviation maintenance tasks are well-defined and bounded. They are described by explicit procedures, work cards, and instruction manuals. Certain job characteristics, however, are implicit and diffuse, permeating every aspect of the aviation maintenance workplace. Human factors is one of these overreaching elements. During initial and recurrent training, through each workday, throughout a maintainer's career, various human factors elements come into play and affect their job performance.

One purpose of this *Guide* is to serve as a training resource and an everyday reference for those human factors elements that are most important in daily work situations. Fortunately, most maintenance tasks are completed in a competent, timely, and safe manner. Certainly, that is the goal of all aviation maintenance organizations. Barriers, both physical and procedural, are intentionally put into place to prevent maintenance errors and to isolate maintenance workers and the flying public from the effects of errors. This *Guide* contains concepts, methods, data, and reference sources that can help define, monitor, and maintain such barriers.

The purpose of this section is to use the graphical categorization scheme below as a troubleshooting guide to determine the human-factors-related root-causes of an incident investigation. To move from general root-causes to specific root-causes click on a box where the cursor turns into a hand. Once you have identified the most probable human-factors-related root-causes of an incident, click on the chapter number associated with the root cause to open the chapter.

Figure 1: Root Cause Categories

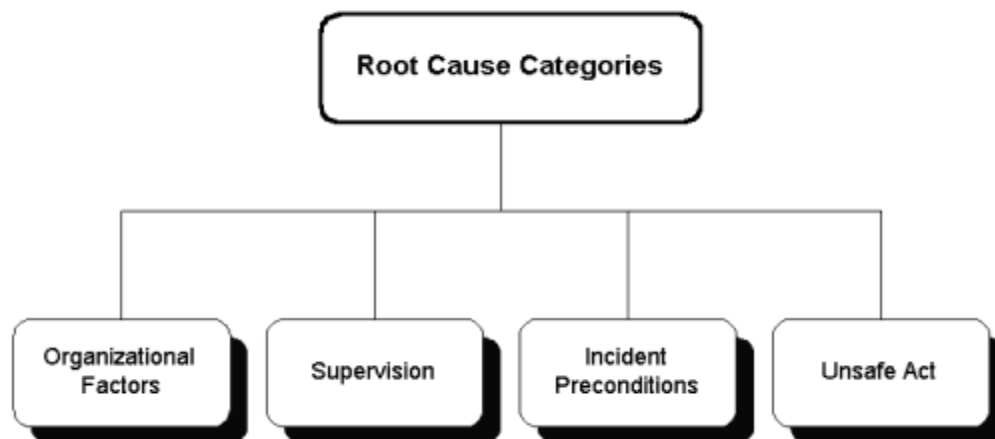


Figure 2: Maintenance Incident Root Cause Classification Framework

Maintenance Incident Root Cause Classification Framework

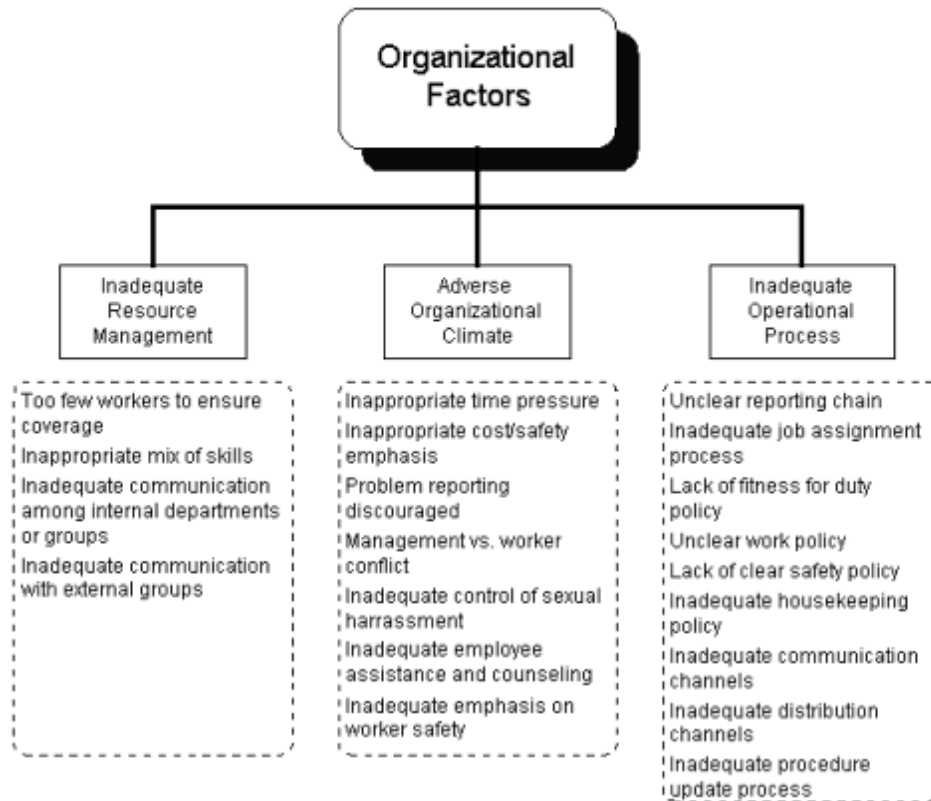


Figure 3: Inadequate Resource Management

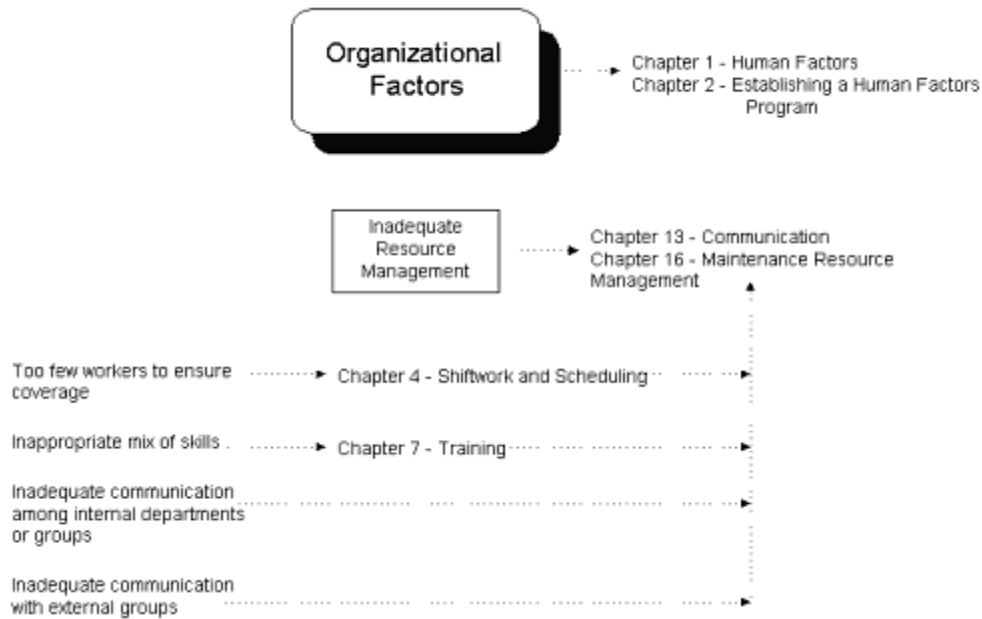


Figure 4: Adverse Organizational Climate

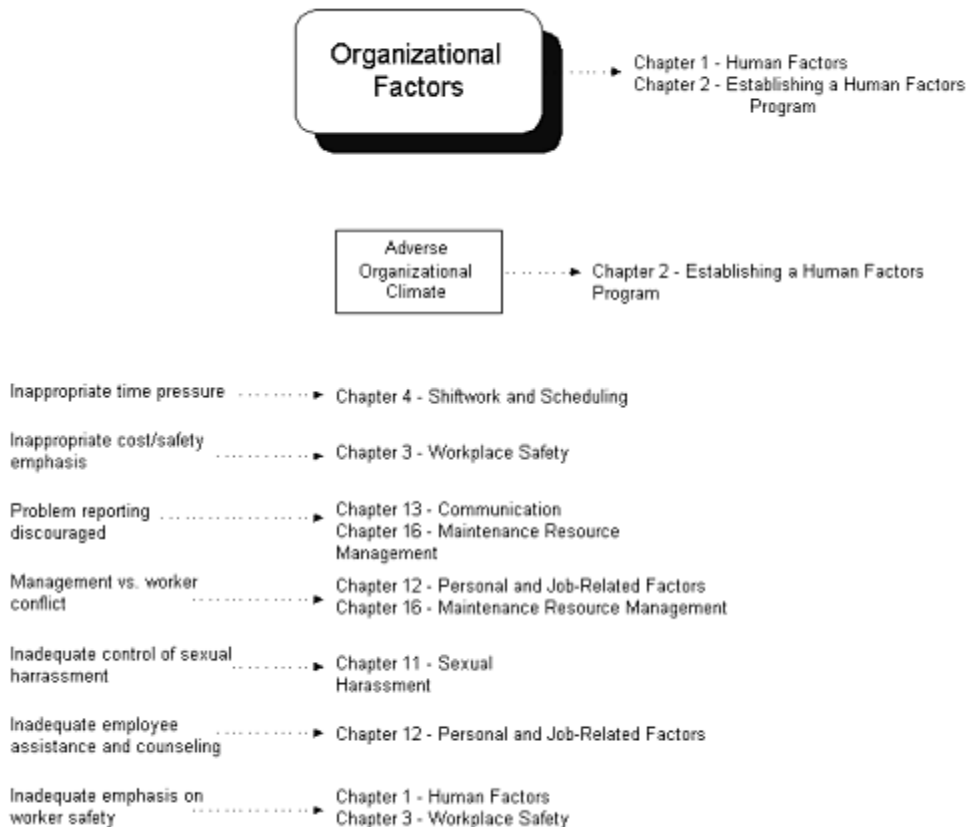


Figure 5: Inadequate Operational Process

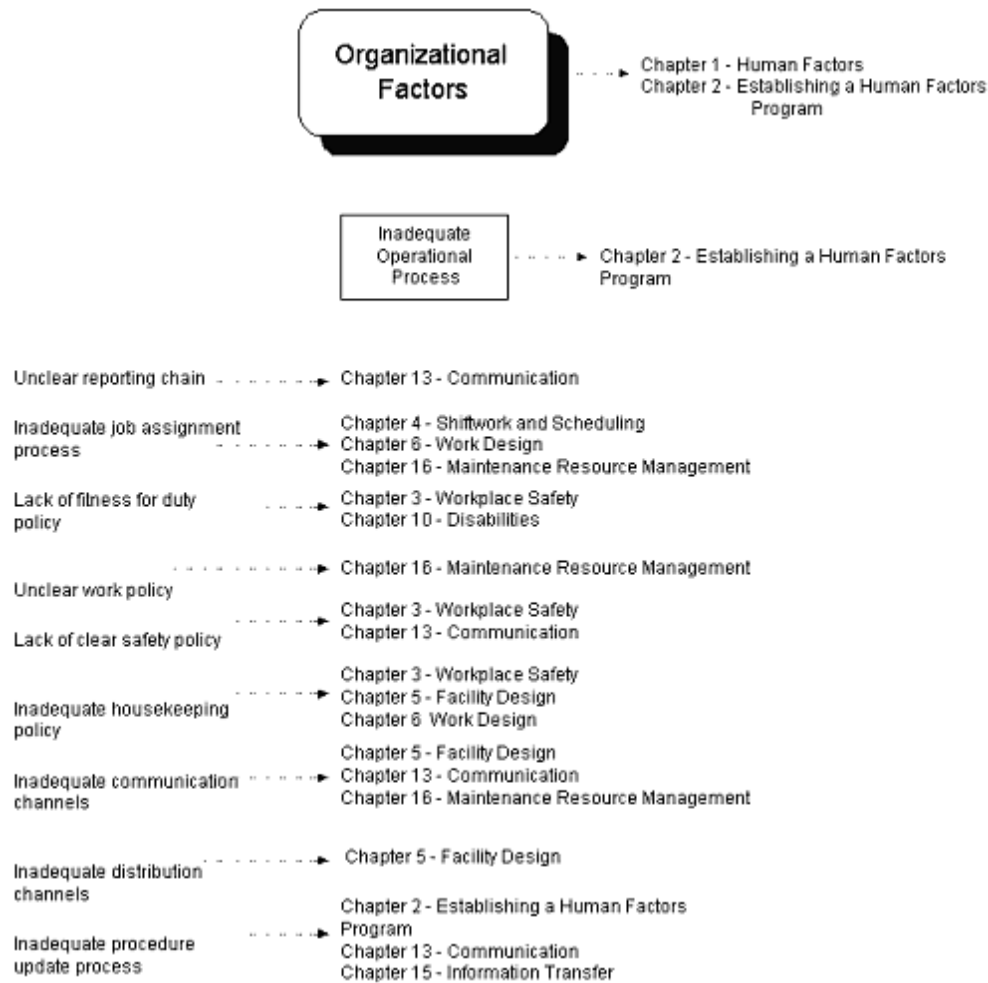


Figure 6: Supervision

Maintenance Incident Root Cause Classification Framework

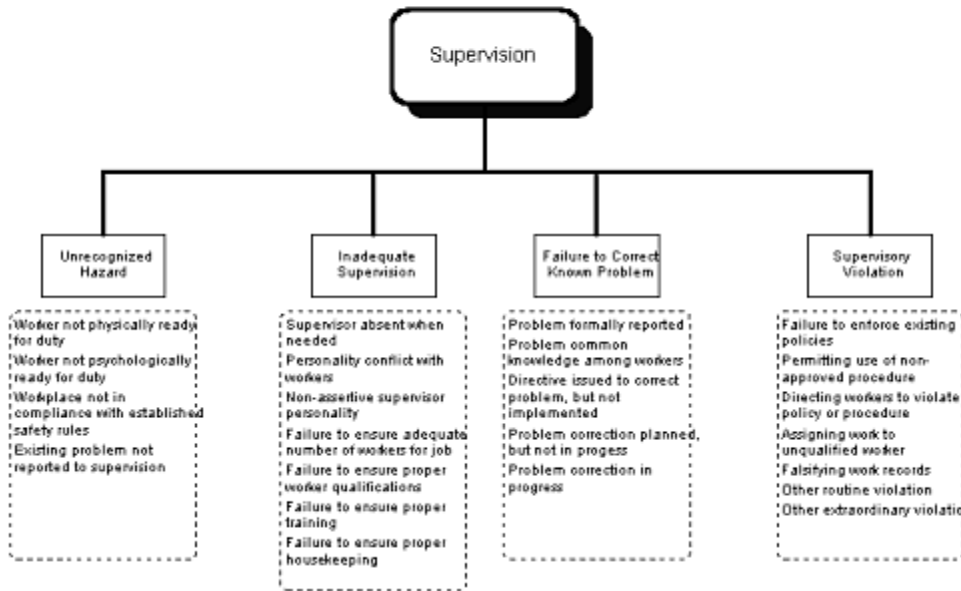


Figure 7: Unrecognized Hazard

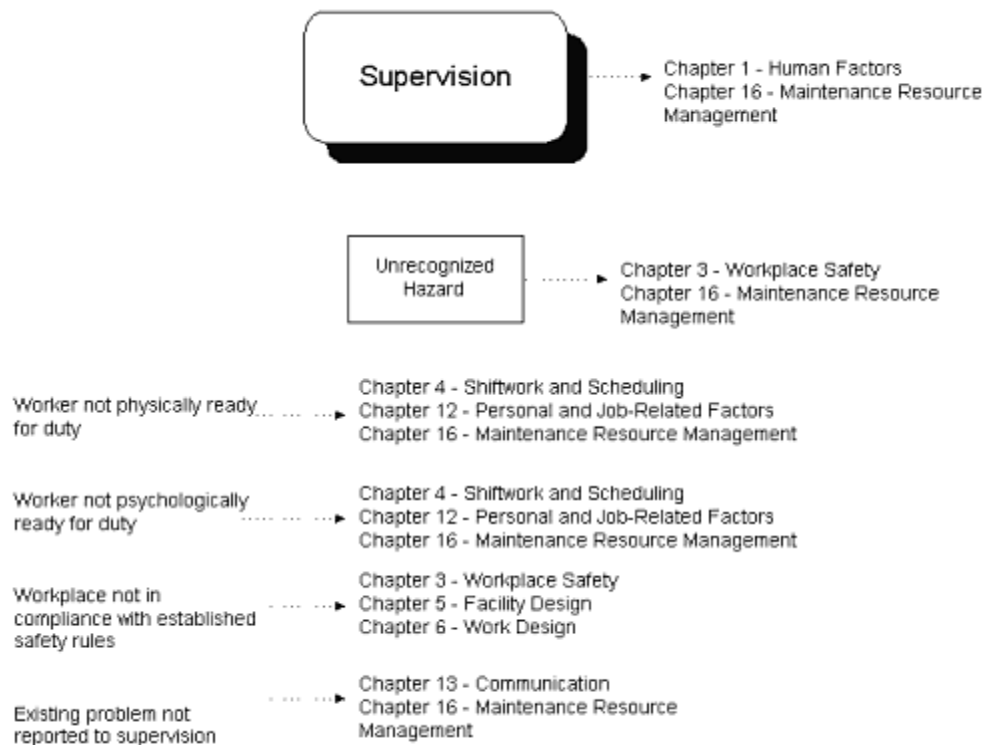


Figure 8: Inadequate Supervision

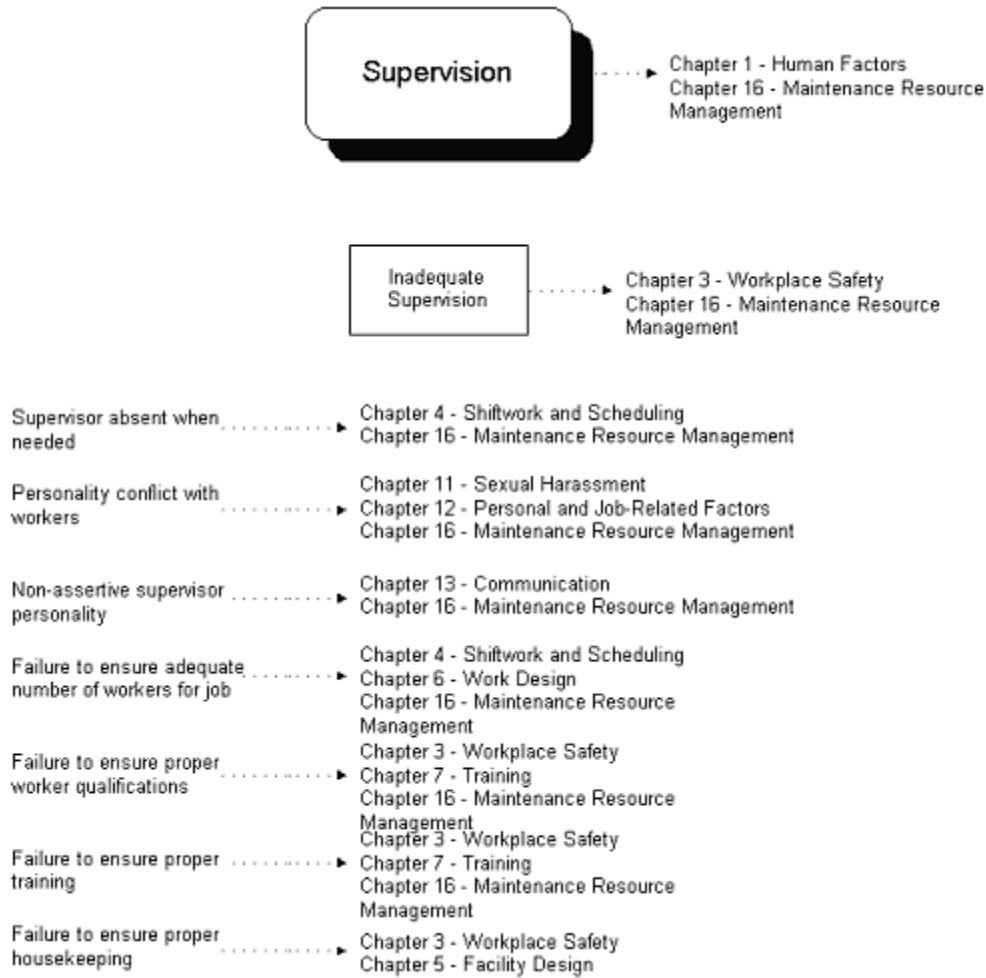


Figure 9: Failure to Correct Known Problem

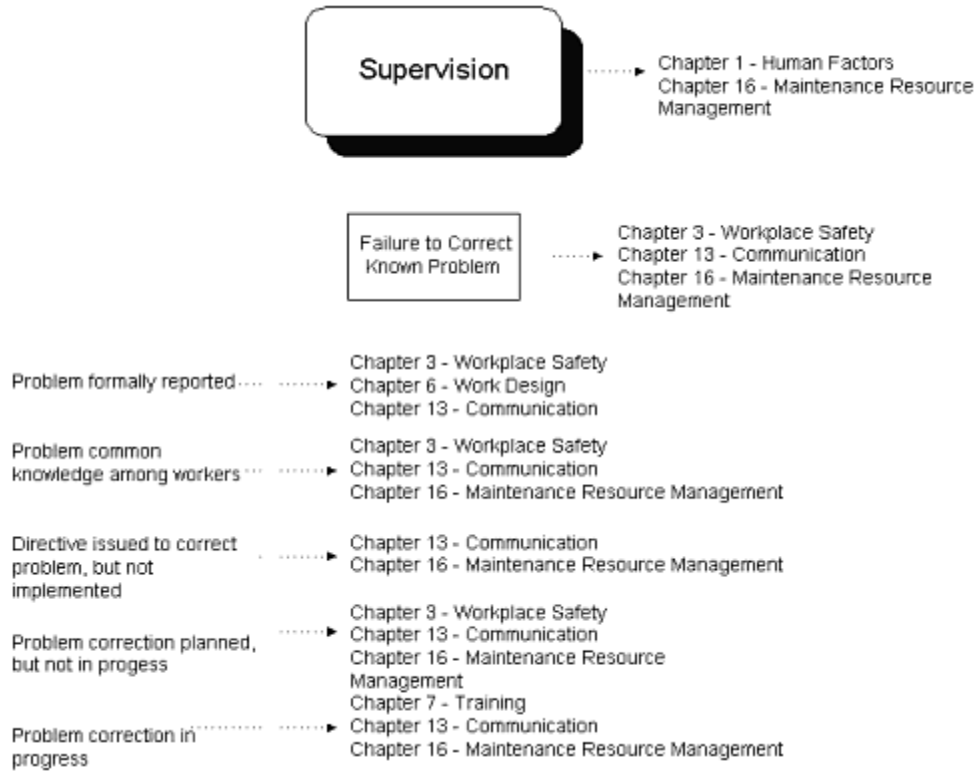


Figure 10: Supervisory Violation

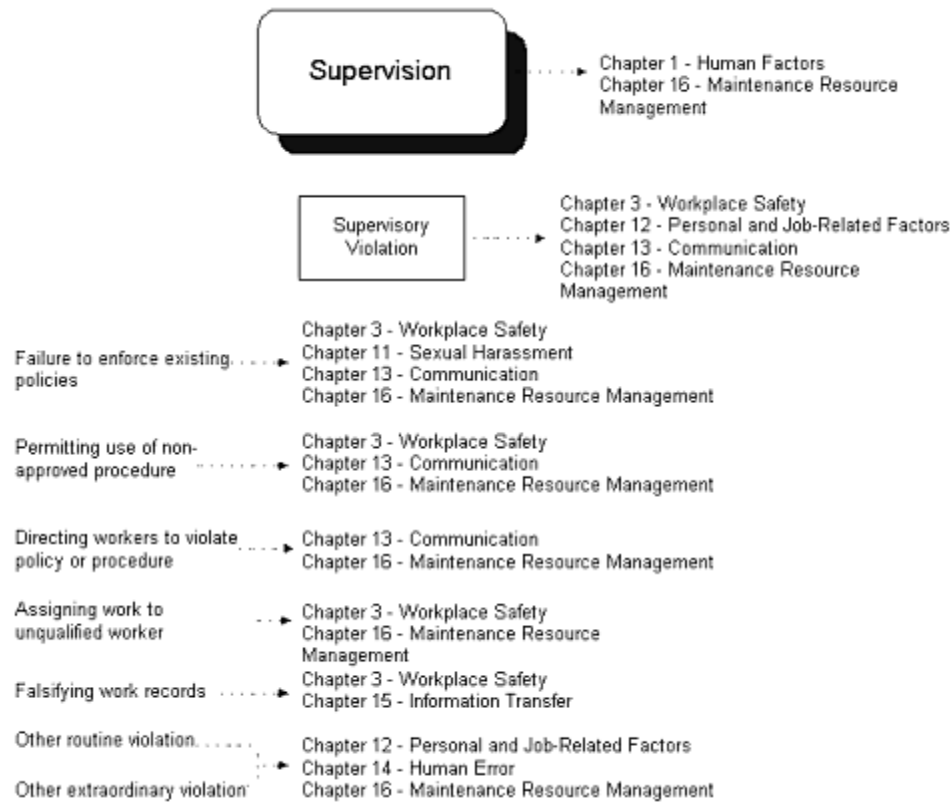


Figure 11: Incident Preconditions

Maintenance Incident Root Cause Classification Framework

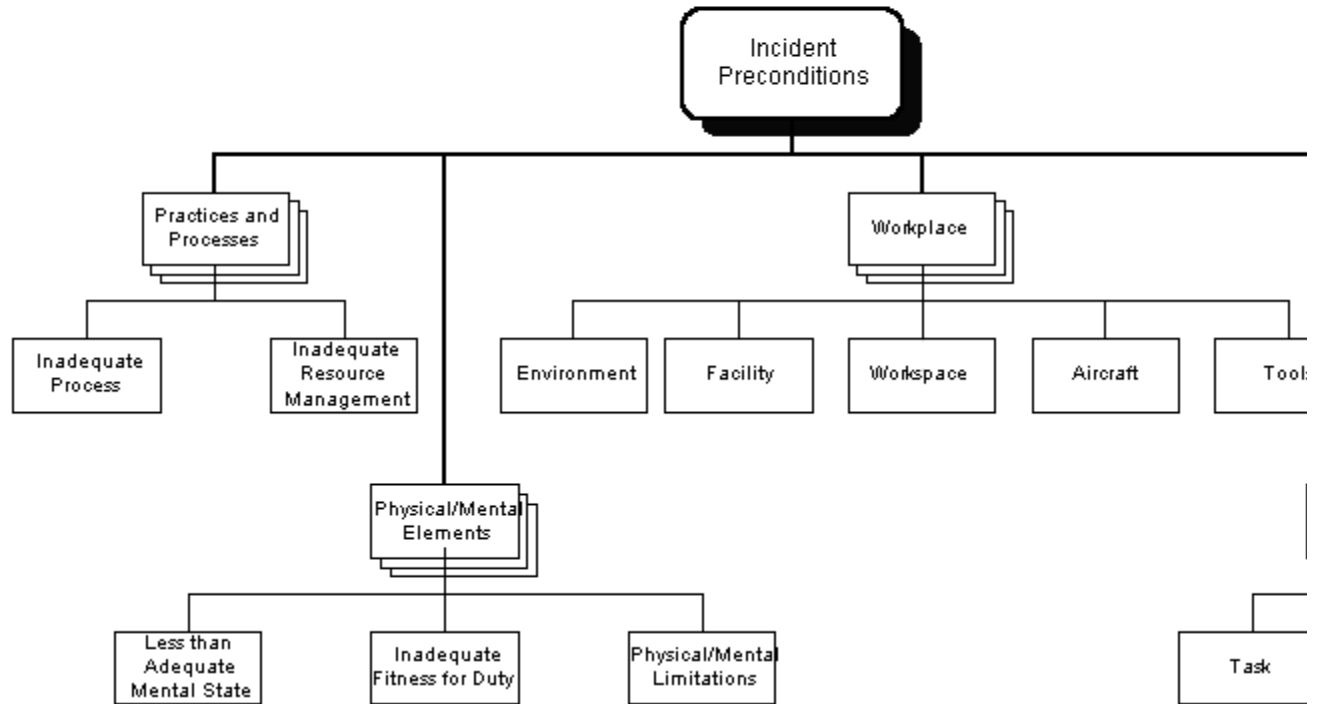


Figure 12: Inadequate Process

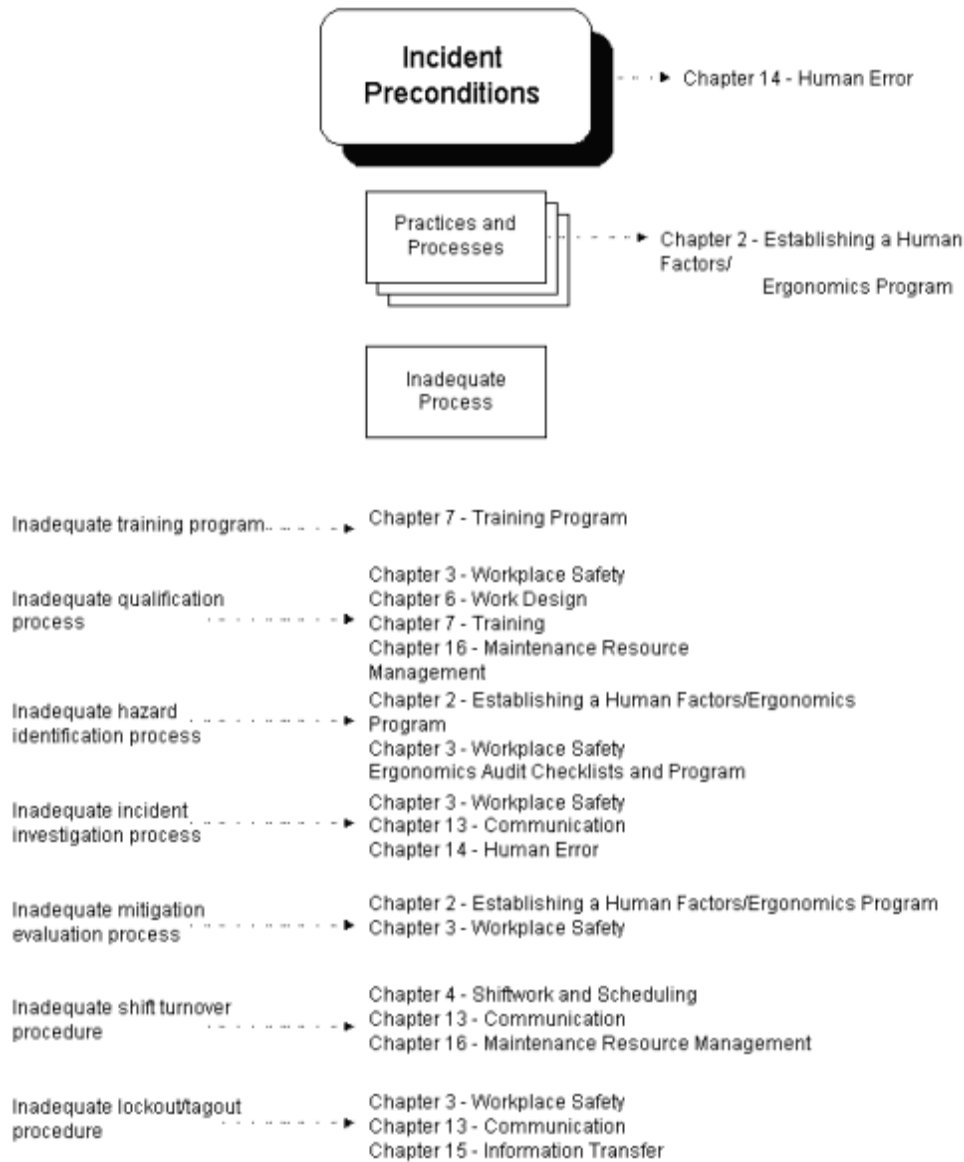


Figure 13: Inadequate Resource Management

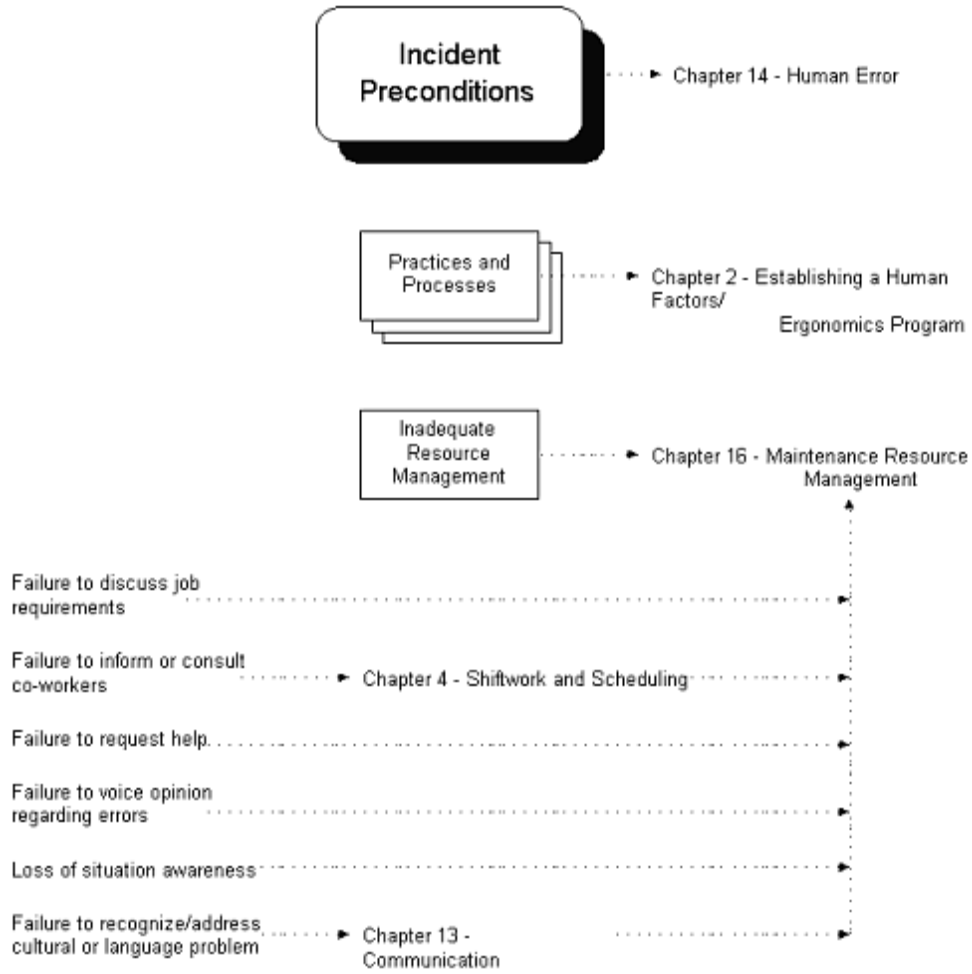


Figure 14: Less than Adequate Mental State

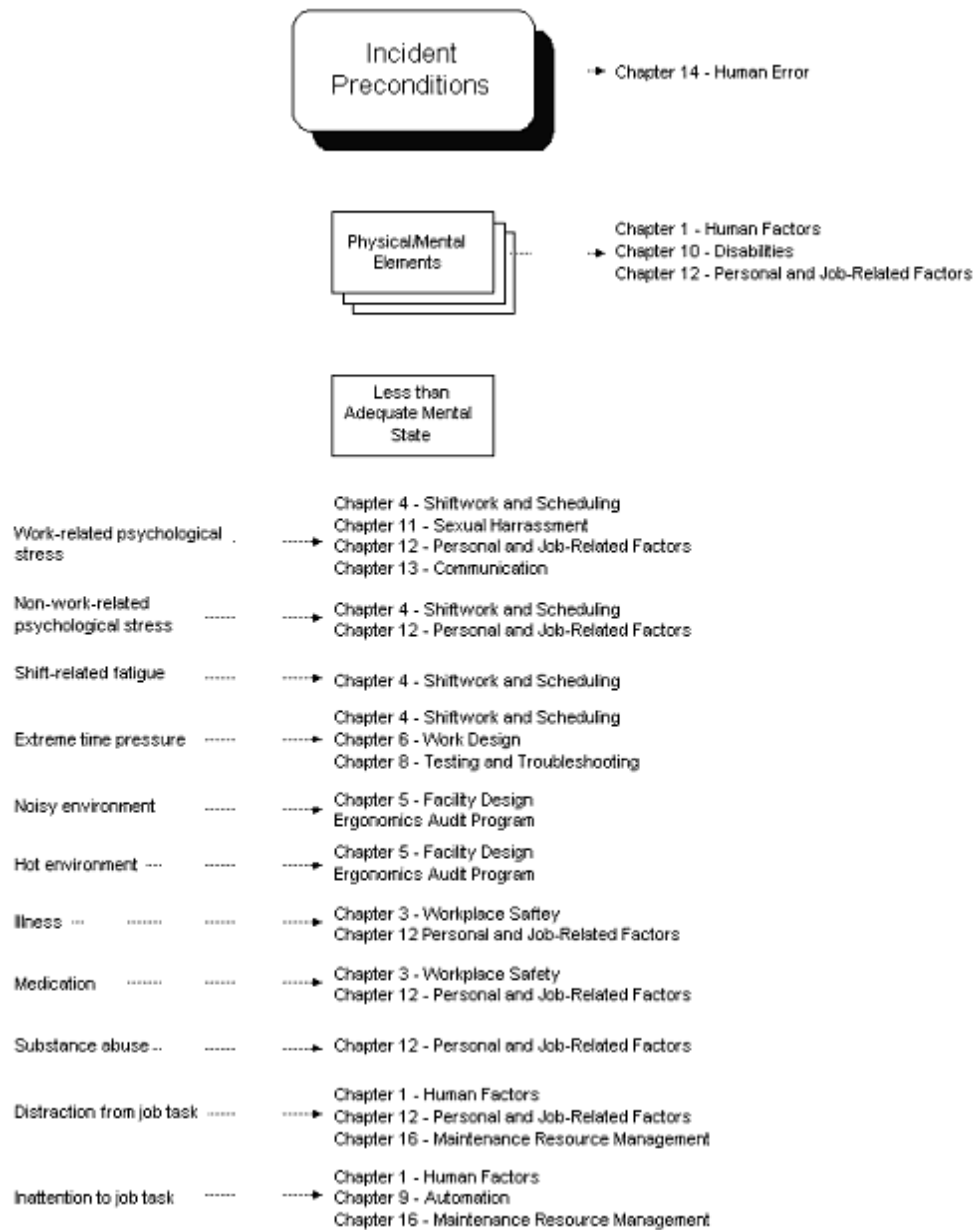
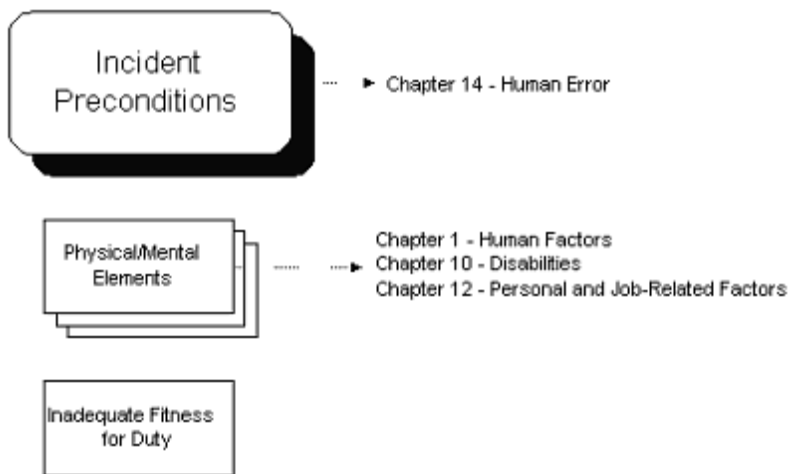


Figure 15: Inadequate Fitness for Duty



Lack of fitness for duty awareness	.....	---	-	▶	Chapter 3 - Workplace Safety Chapter 7 - Training Chapter 13 - Communication
Intentional substance abuse	---	-	▶		Chapter 12 - Personal and Job-Related Factors
Inadvertent substance abuse	---	-	▶		Chapter 7 - Training Chapter 12 - Personal and Job-Related Factors Chapter 13 - Communication
Excessive fatigue	.....	---	-	▶	Chapter 4 - Shiftwork and Scheduling Chapter 6 - Work Design
Physical injury	...	.....	---	▶	Chapter 3 - Workplace Safety Chapter 10 - Disabilities Chapter 16 - Maintenance Resource Management Chapter 13 - Communication
Known illness	.....	---	-	▶	Chapter 16 - Maintenance Resource Management
Excessive psychological stress	.....	---	-	▶	Chapter 11 - Sexual Harrassment Chapter 12 - Personal and Job-Related Factors Chapter 13 - Communication Chapter 16 - Maintenance Resource Management
Non-job-related pre-occupation	.....	---	-	▶	Chapter 12 - Personal and Job-Related Factors
Known training or qualification deficiency	.....	---	-	▶	Chapter 7 - Training Chapter 16 - Maintenance Resource Management

Figure 16: Physical/Mental Limitations

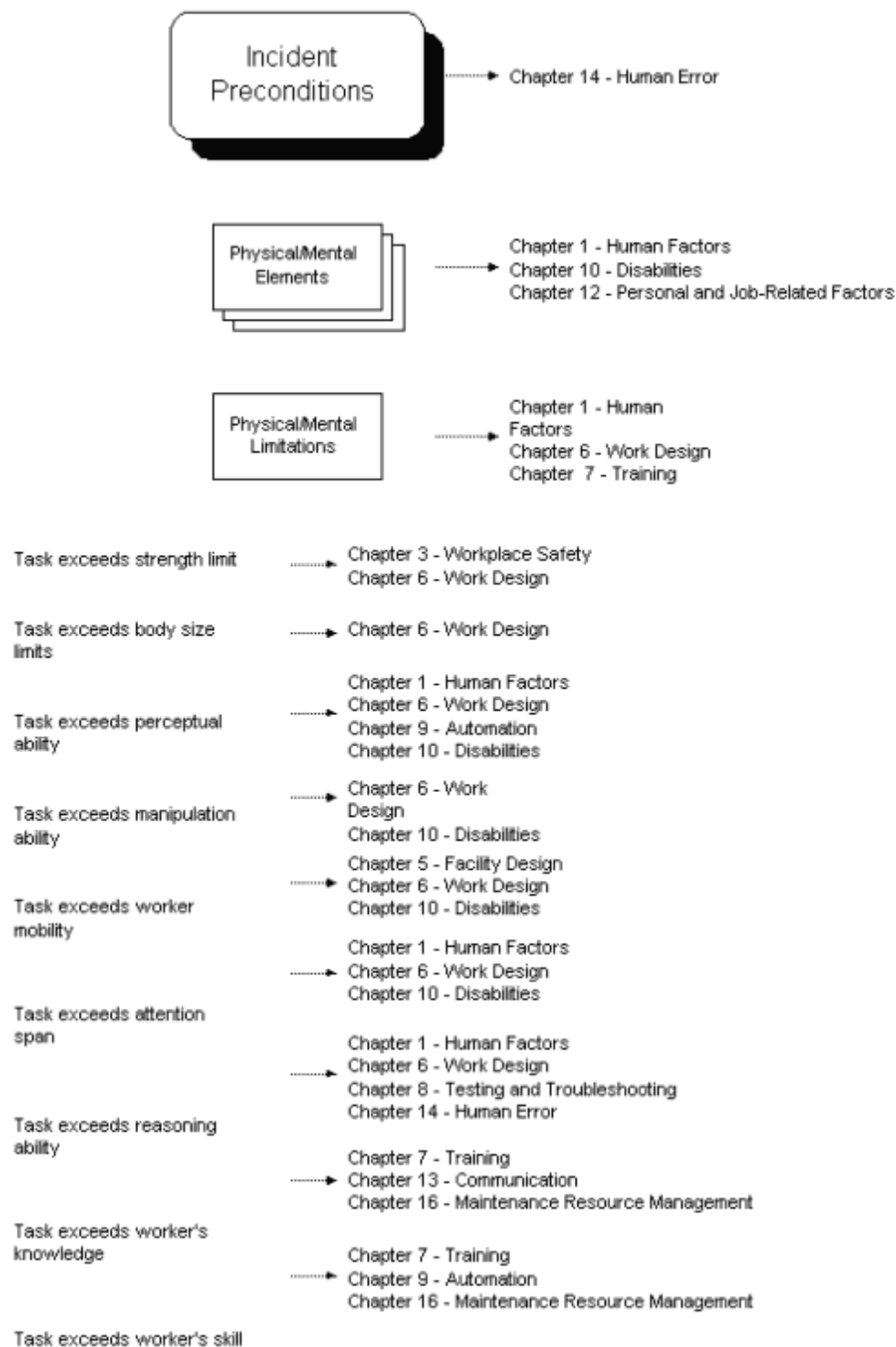


Figure 17: Environment

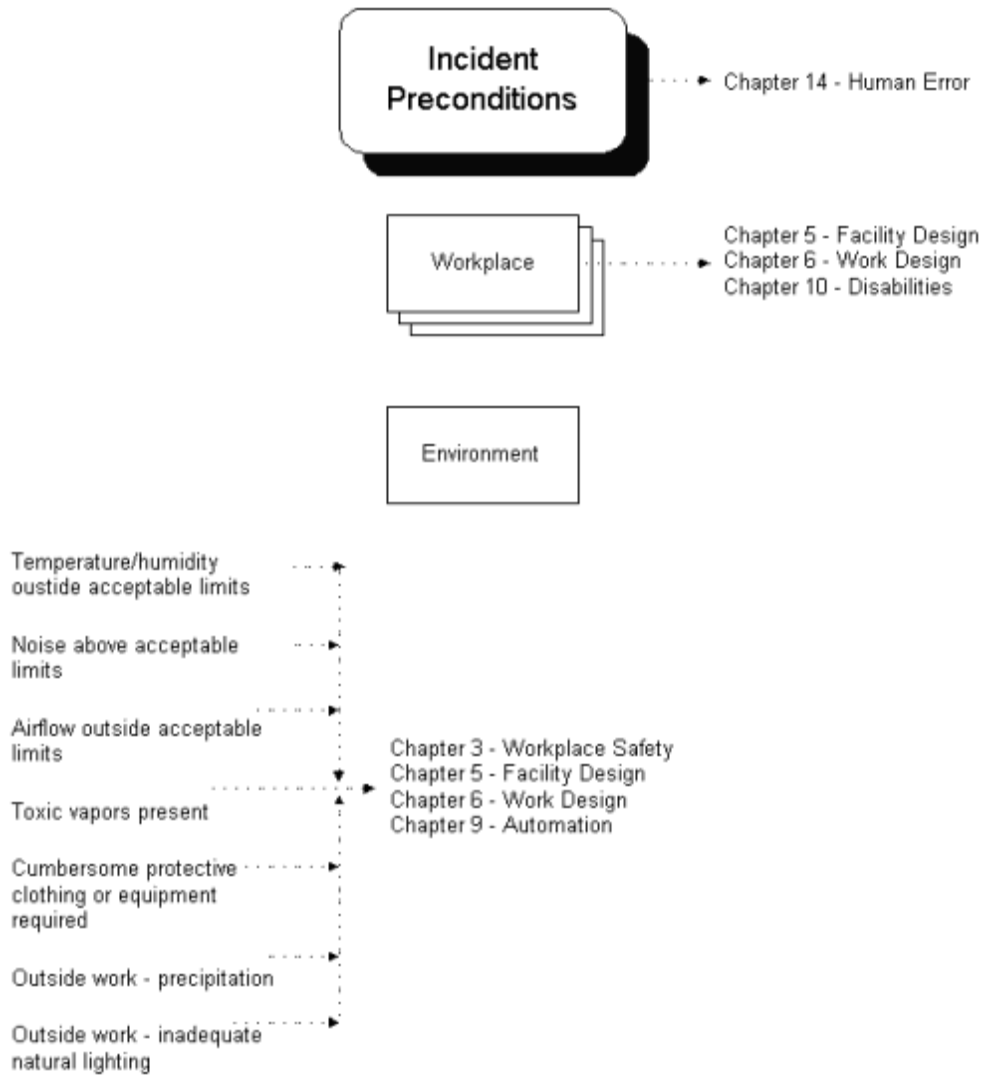


Figure 18: Facility

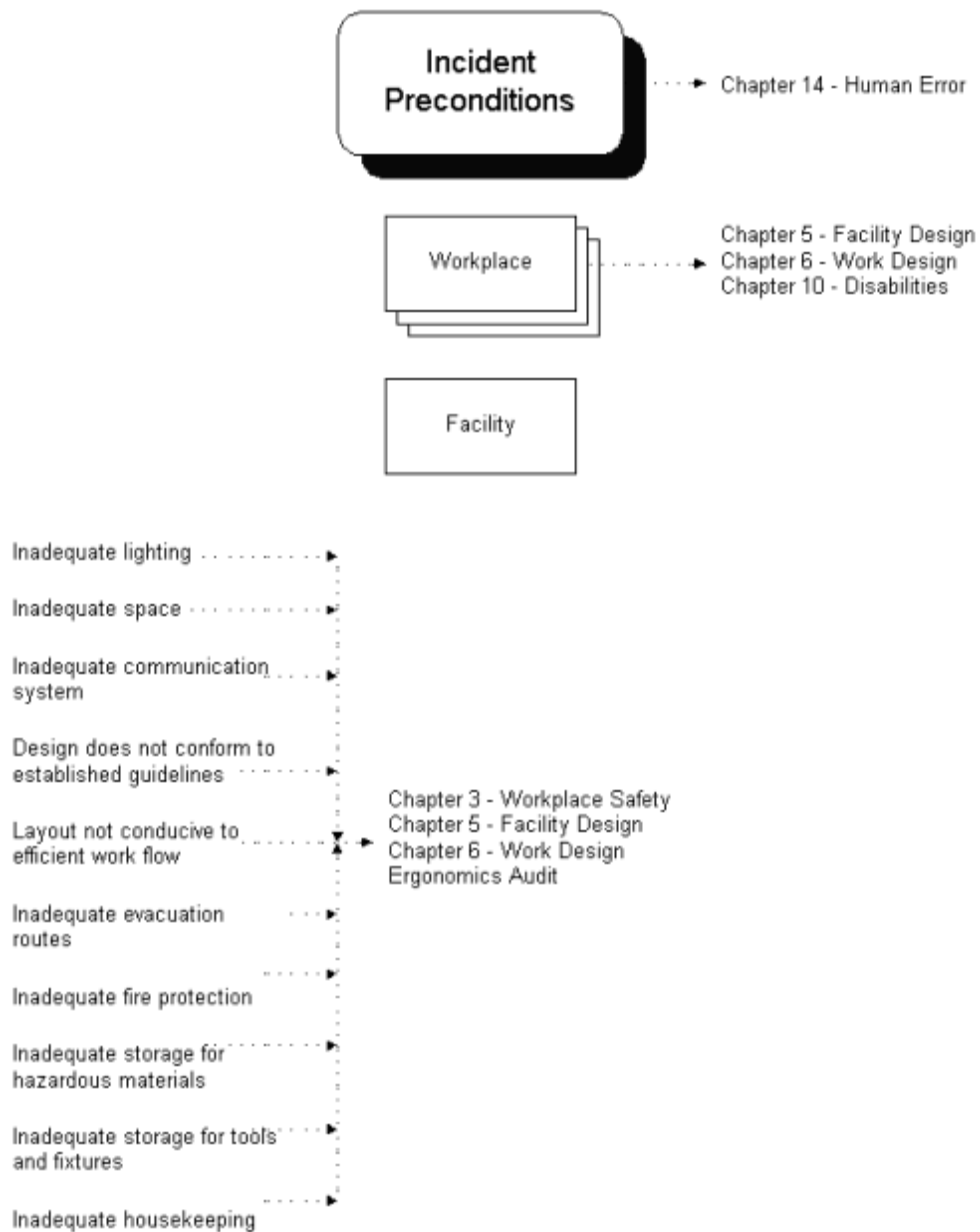


Figure 19: Workspace

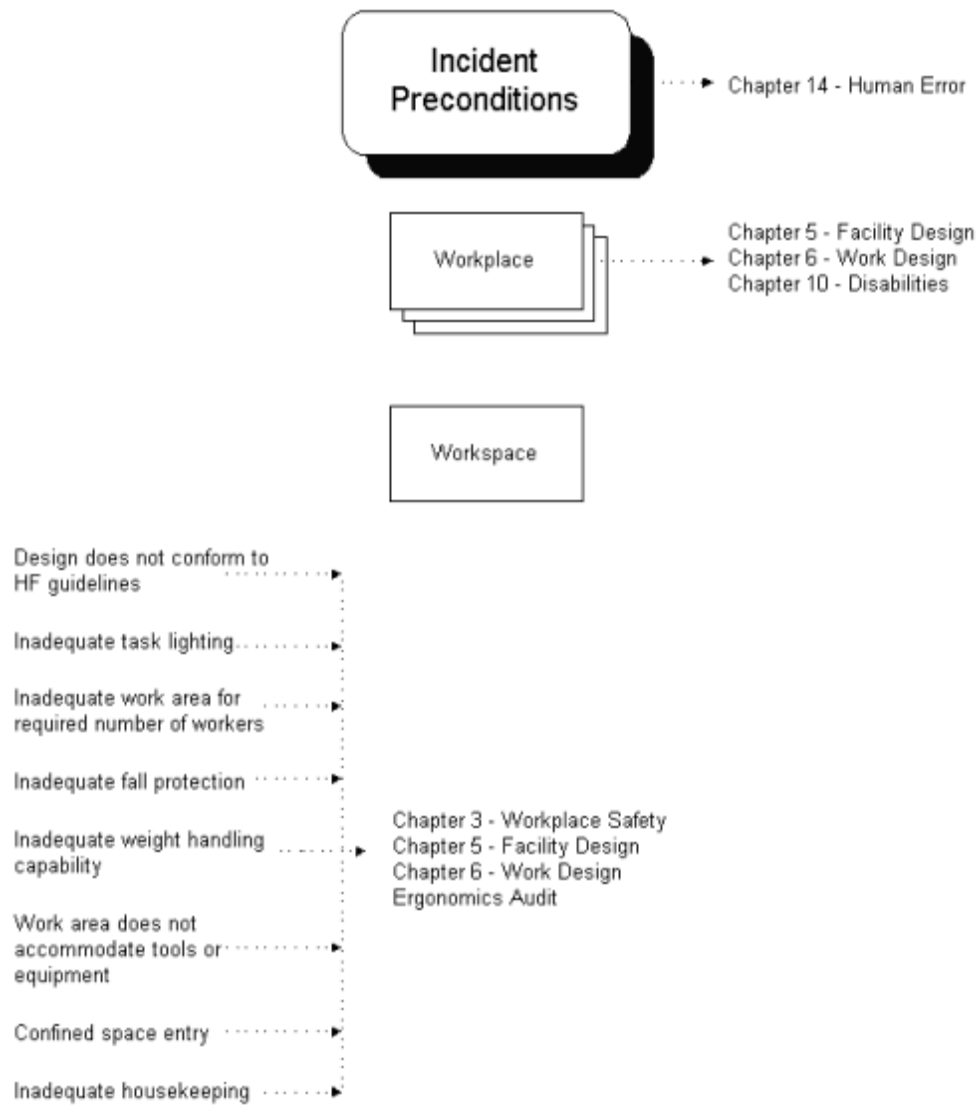


Figure 20: Aircraft

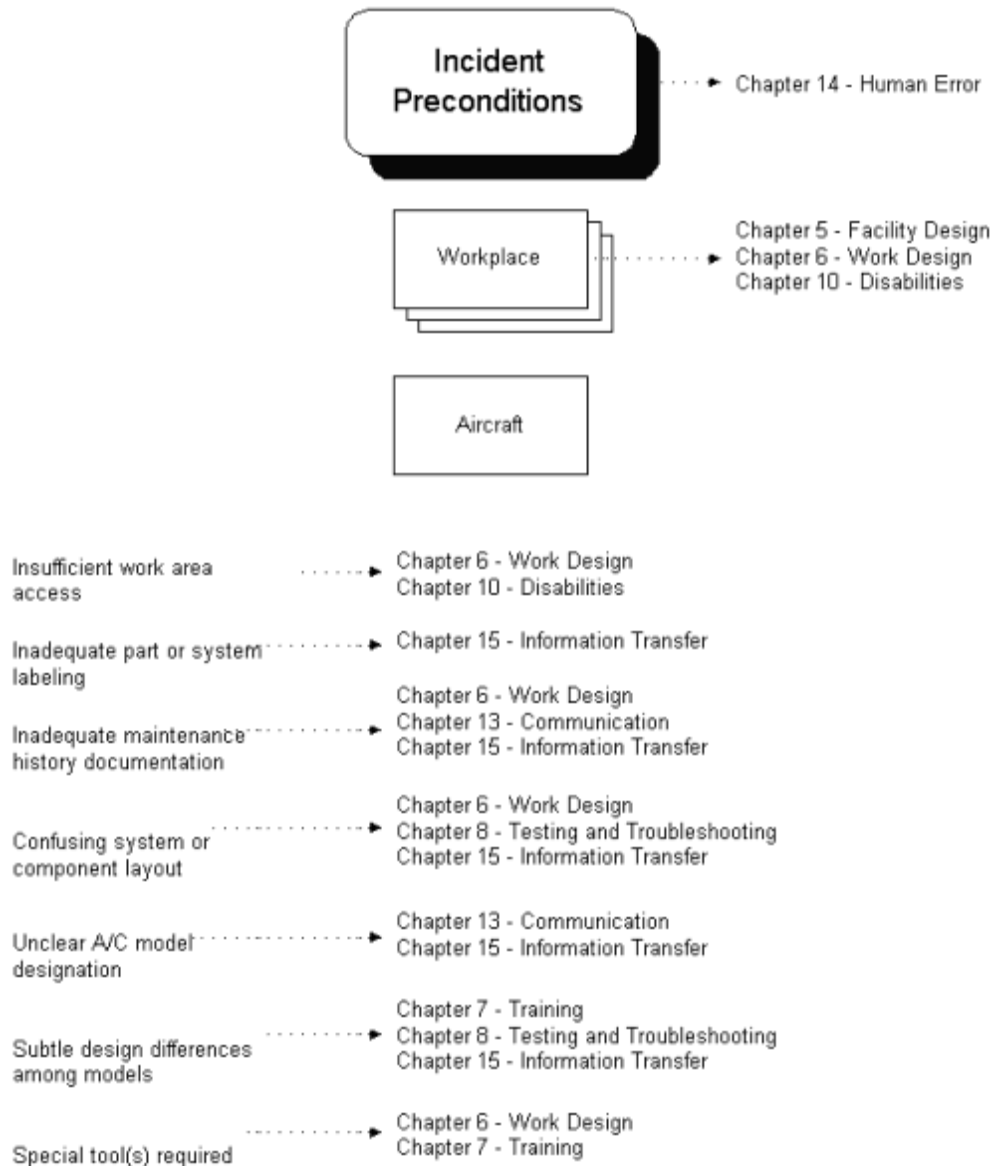


Figure 21: Tools

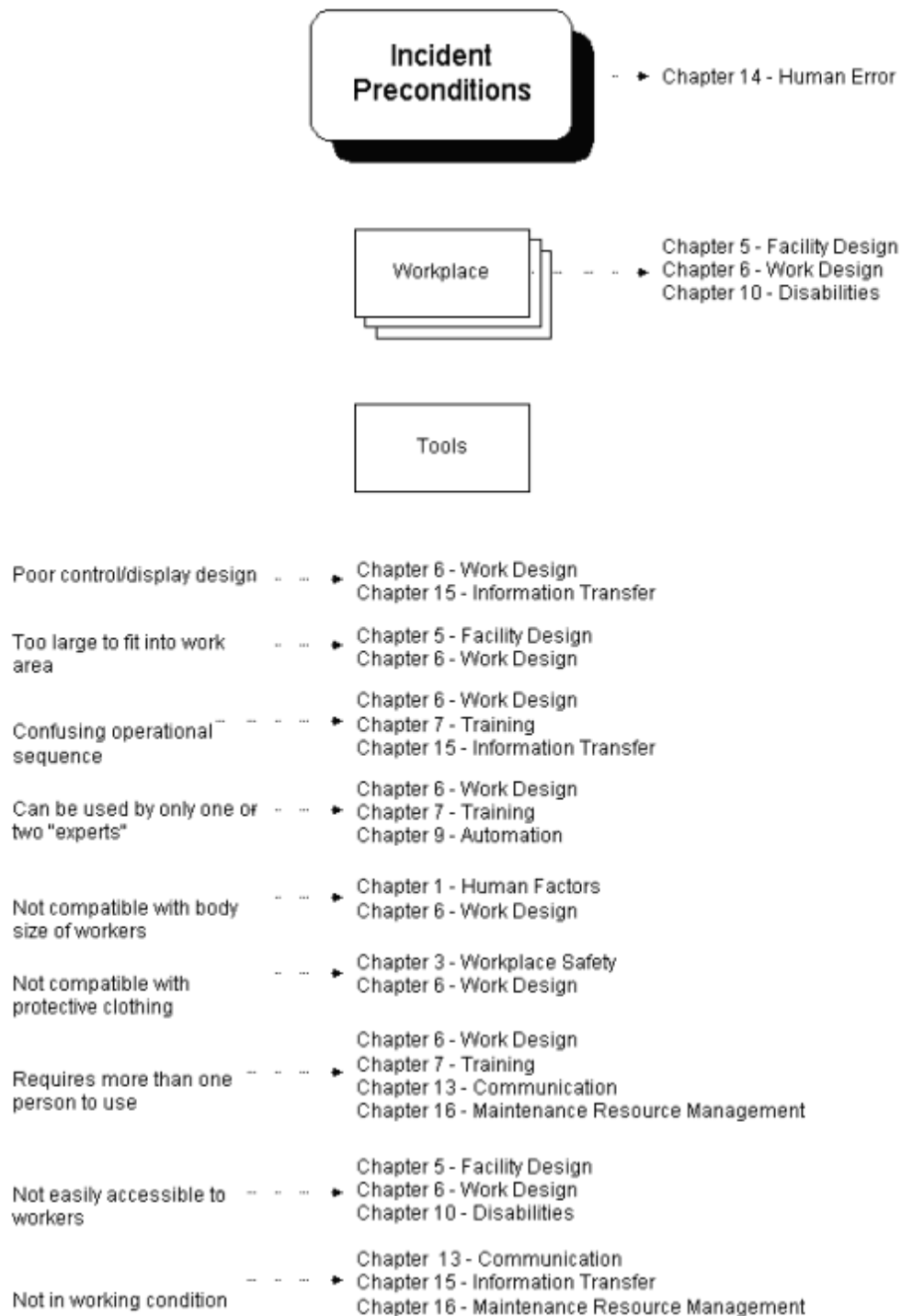
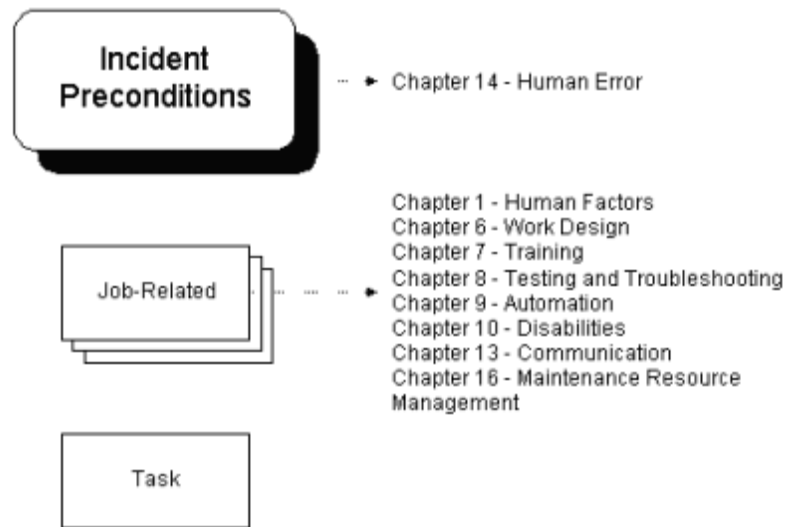
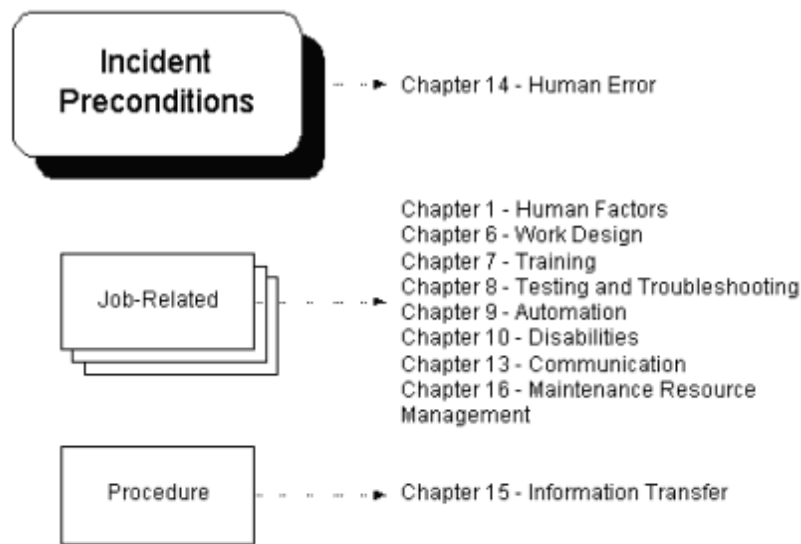


Figure 22: Task



Requires extended monitoring or vigilance	.. ..	▶ Chapter 1 - Human Factors Chapter 6 - Work Design
Requires frequent simple, repetitive actions	.. ..	▶ Chapter 6 - Work Design Chapter 9 - Automation
Extremely complex with multiple sub-tasks	.. ..	▶ Chapter 6 - Work Design Chapter 7 - Training Chapter 16 - Maintenance Resource Management
Contains subtle differences from similar tasks	.. ..	▶ Chapter 6 - Work Design Chapter 7 - Training
Extends over more than one shift	.. ..	▶ Chapter 4 - Shiftwork and Scheduling Chapter 6 - Work Design Chapter 13 - Communication Chapter 16 - Maintenance Resource Management
Requires parallel tasks among multiple workers	.. ..	▶ Chapter 6 - Work Design Chapter 13 - Communication Chapter 16 - Maintenance Resource Management
Critical failure points are not obvious	.. ..	▶ Chapter 7 - Training Chapter 8 - Testing and Troubleshooting Chapter 15 - Information Transfer
New task, not previously performed	.. ..	▶ Chapter 6 - Work Design Chapter 7 - Training

Figure 23: Procedure



Inadequate or improper sequencing of tasks	-- -- -->	Chapter 6 - Work Design Chapter 15 - Information Transfer
Layout and format do not conform to HF guidelines	-- -- -->	Chapter 15 - Information Transfer Documentation Design Aid
Terminology is confusing and difficult to understand	-- -- -->	Chapter 13 - Communication Chapter 15 - Information Transfer Documentation Design Aid
Requires transcription or mental arithmetic	-- -- -->	Chapter 6 - Work Design Chapter 7 - Training
Not written in worker's first language	-- -- -->	Chapter 6 - Work Design Chapter 13 - Communication
Not updated to latest revision	-- -- -->	Chapter 13 - Communication Chapter 15 - Information Transfer Documentation Design Aid
Not correct	-- -- -->	Chapter 7 - Training Chapter 15 - Information Transfer Chapter 16 - Maintenance Resource Management
First time to be used since last update	-- -- -->	Chapter 7 - Training Chapter 16 - Maintenance Resource Management

Figure 24: Unsafe Act

Maintenance Incident Root Cause Classification Framework

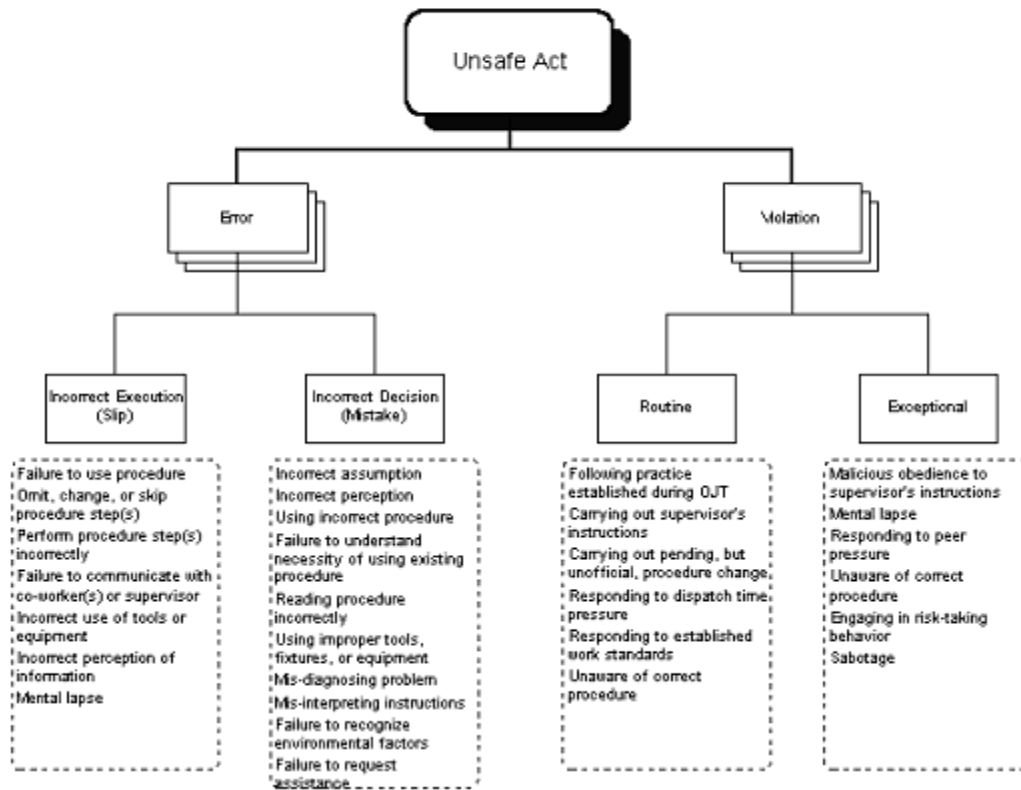


Figure 25: Incorrect Execution (Slip)

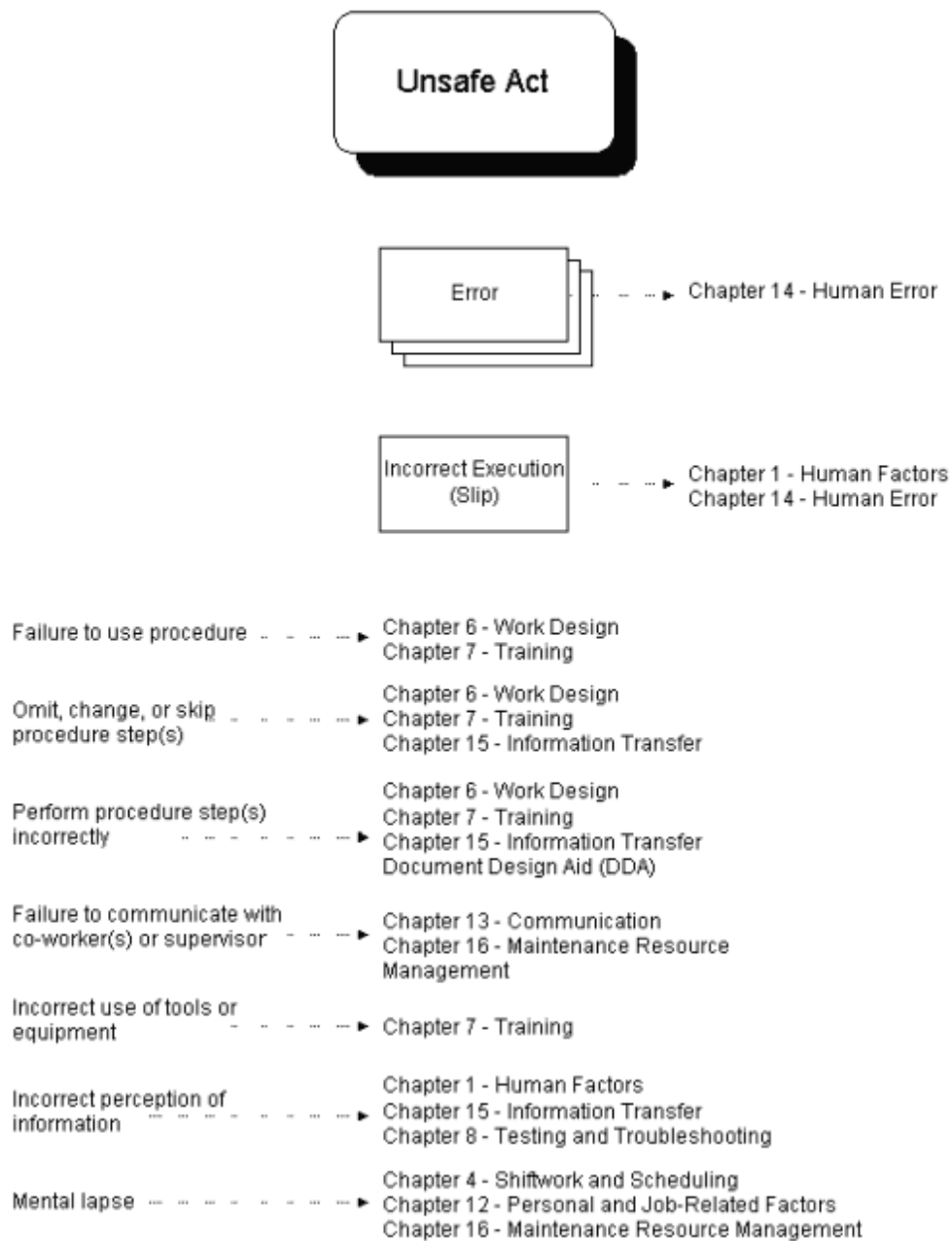


Figure 26: Incorrect Decision (Mistake)

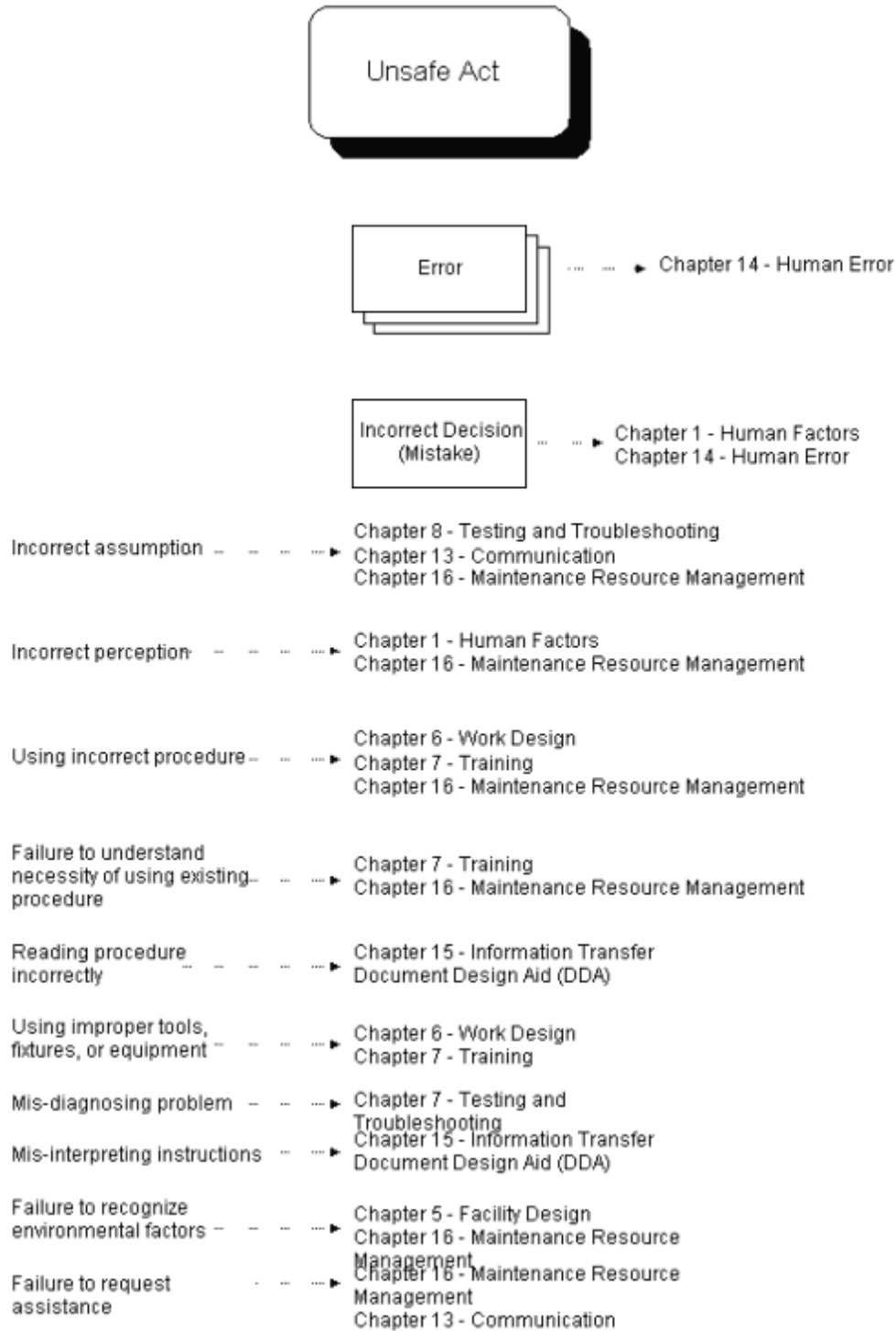
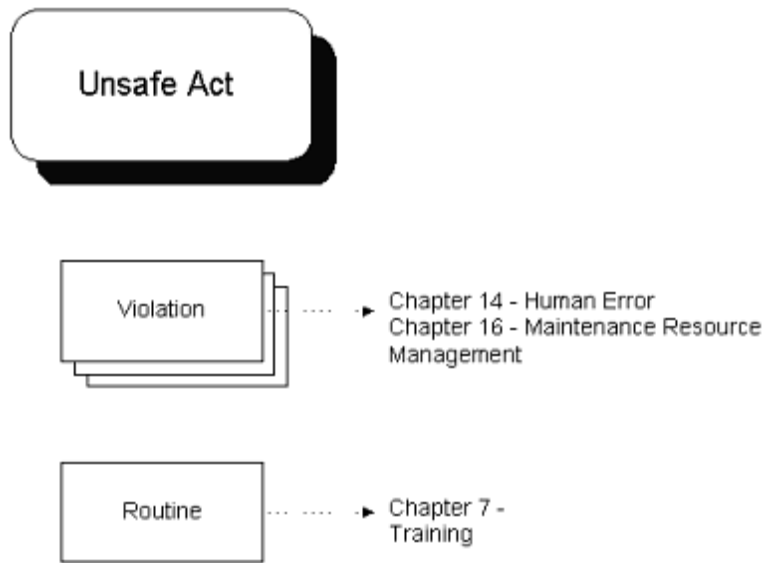


Figure 27: Routine



- Following practice Chapter 7 - Training
established during OJT
- Carrying out supervisor's Chapter 6 - Work Design
instructions Chapter 13 - Communication
- Carrying out pending, but Chapter 13 - Communication
unofficial, procedure change Chapter 15 - Information Transfer
- Responding to dispatch time Chapter 6 - Work Design
pressure Chapter 14 - Human Error
- Responding to established Chapter 6 - Work Design
work standards Chapter 7 - Training
- Unaware of correct Chapter 7 - Training
procedure Chapter 16 - Maintenance Resource
Management

Figure 28: Exceptional

Unsafe Act

Violation

Chapter 14 - Human Error
Chapter 16 - Maintenance Resource Management

Exceptional

- Malicious obedience to supervisor's instructions → Chapter 3 - Workplace Safety
Chapter 12 - Personal and Job-Related Factors
Chapter 13 - Communication
Chapter 1 - Human Factors
- Mental lapse → Chapter 4 - Shiftwork and Scheduling
Chapter 6 - Work Design
Chapter 9 - Automation
Chapter 12 - Personal and Job-Related Factors
Chapter 16 - Maintenance Resource Management
- Responding to peer pressure → Chapter 12 - Personal and Job-Related Factors
Chapter 16 - Maintenance Resource Management
- Unaware of correct procedure → Chapter 7 - Training
- Engaging in risk-taking behavior → Chapter 12 - Personal and Job-Related Factors
Chapter 16 - Maintenance Resource Management
- Sabotage → Chapter 3 - Workplace Safety
Chapter 12 - Personal and Job-Related Factors