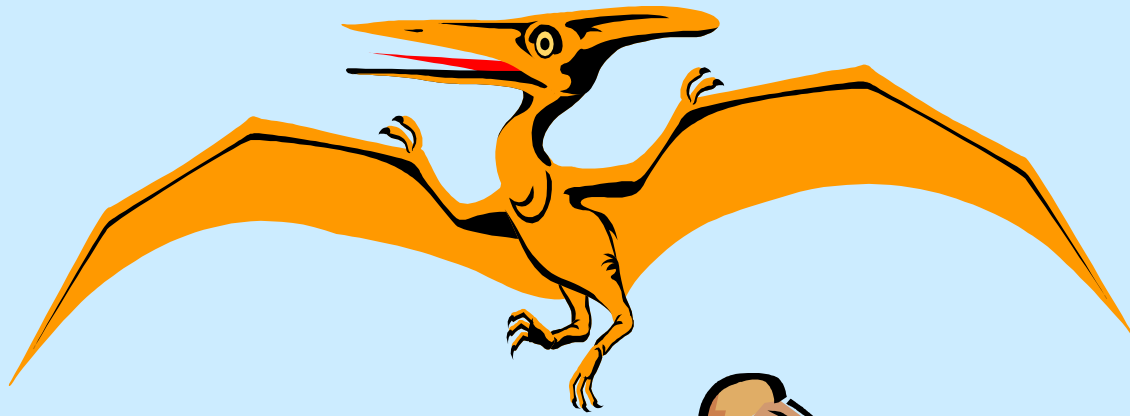


ACCIDENT CAUSATION



Protect the Force Through Risk Management

AC1



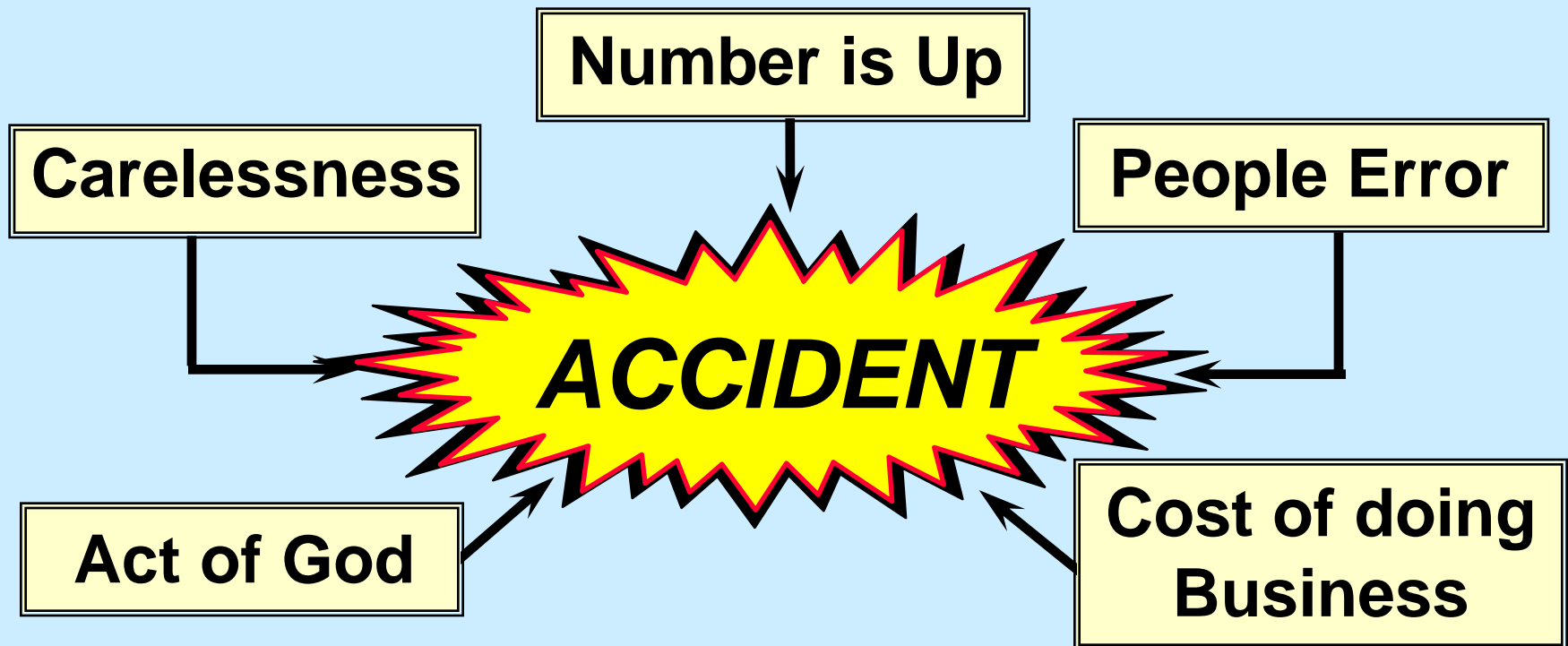
Early Man



Industrial Revolution



Factory managers reasoned that workers were hurt because —



PEOPLE PROBLEM

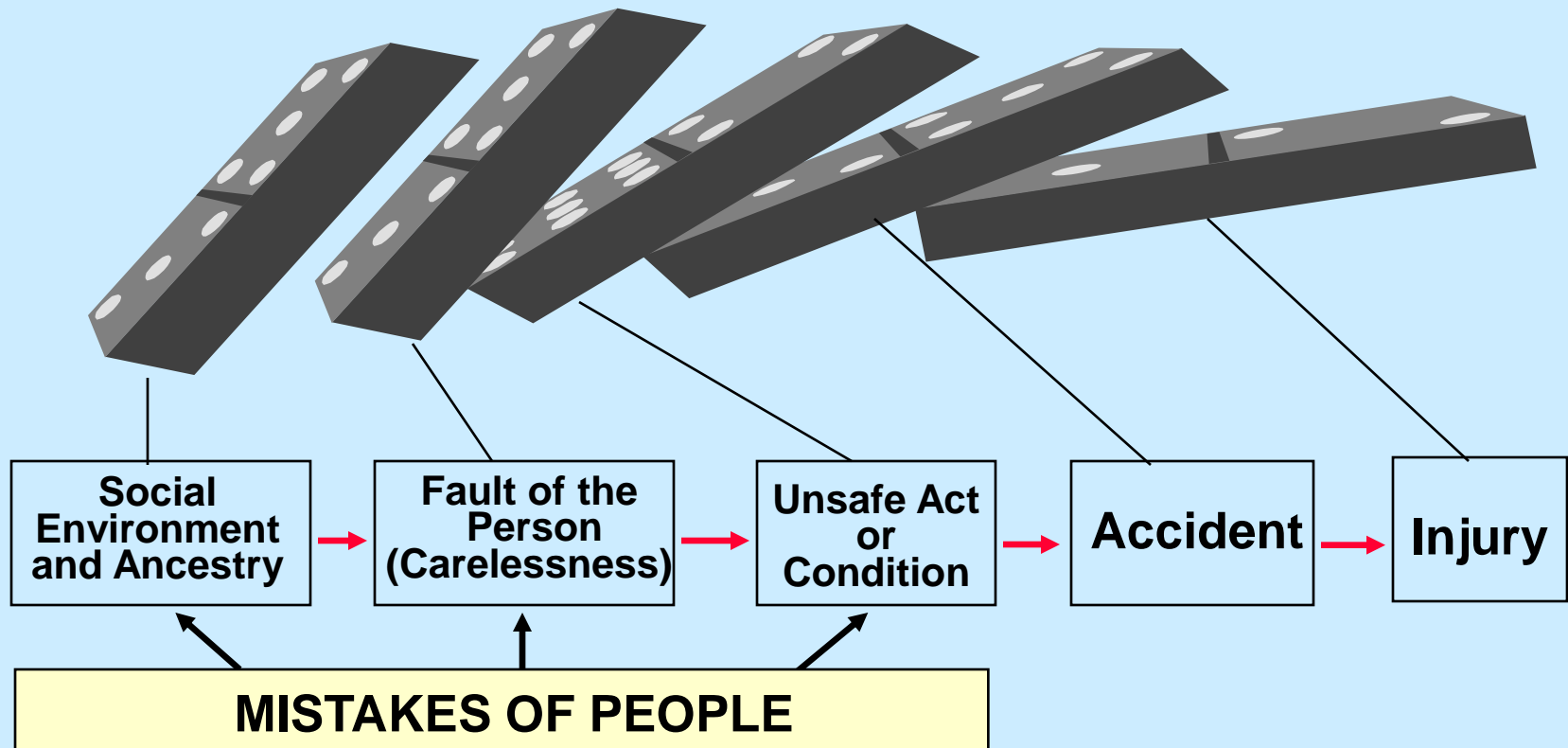
Protect the Force Through Risk Management

Domino Theory



1932 First Scientific Approach to
Accident/Prevention - H.W. Heinrich.

“Industrial Accident Prevention”



Protect the Force Through Risk Management

Heinrich's Theorems



- ***INJURY*** - caused by accidents.
- ***ACCIDENTS*** - caused by an unsafe act – injured person or an unsafe condition – work place.
- ***UNSAFE ACTS/CONDITIONS*** - caused by careless persons or poorly designed or improperly maintained equipment.
- ***FAULT OF PERSONS*** - created by social environment or acquired by ancestry.
- ***SOCIAL ENVIRONMENT/ANCESTRY*** - where and how a person was raised and educated.

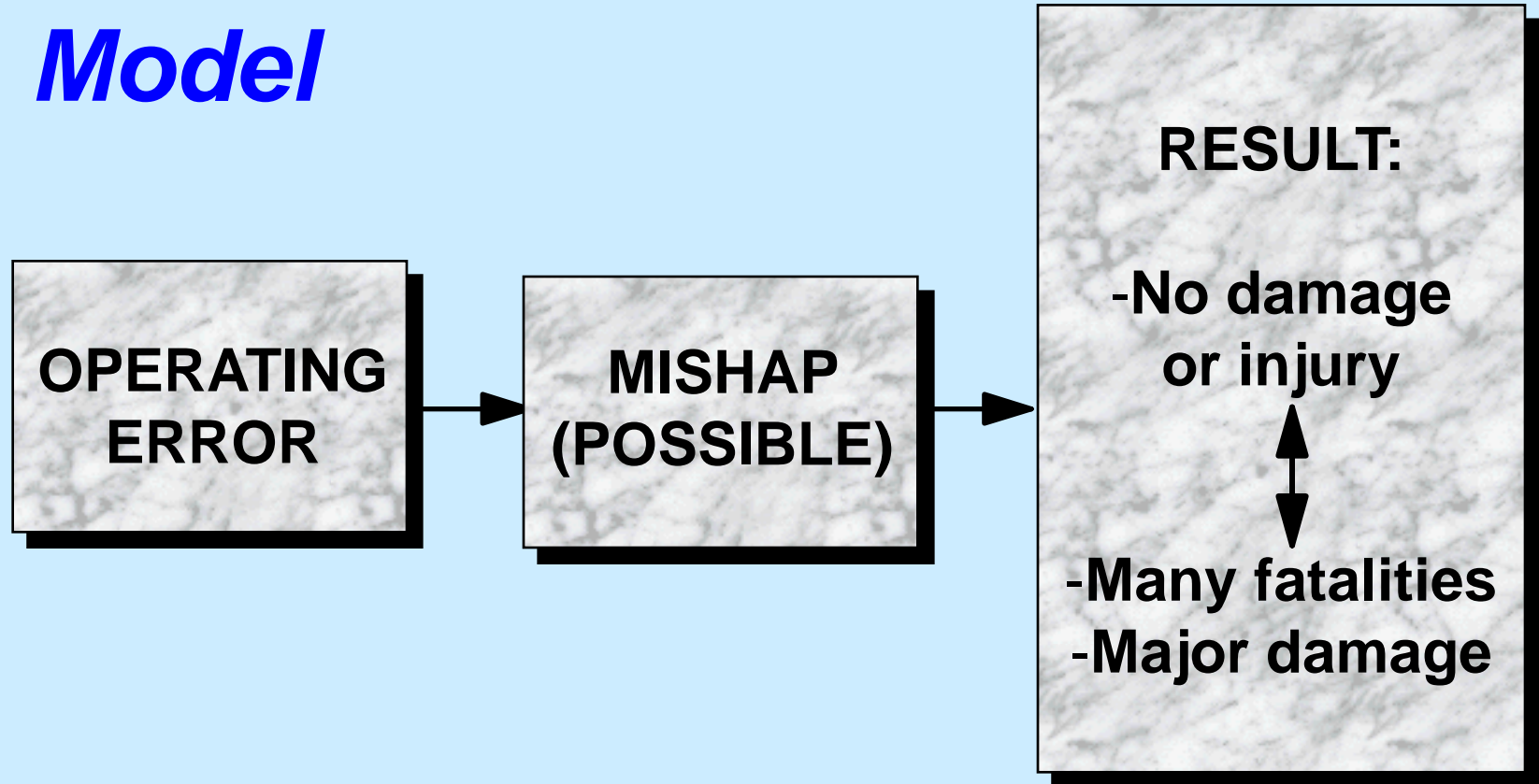
Heinrich's Theory



Corrective Action Sequence (The three “E”s)

- **Engineering**
- **Education**
- **Enforcement**

Modern Causation Model



Modern Causation



- *How accidents are caused & how to correct those causes.*
- **Parallels Heinrich's to a point.**
 - Injury is called **RESULT**, indicating it could involve damage as well as personal injury and the result can range from no damage to the very severe.
 - The word **MISHAP** is used rather than Accident to avoid the popular misunderstanding that an accident necessarily involves injury or damage.
 - Finally, the term **OPERATING ERROR** is used instead of Unsafe Act & Unsafe condition.

Examples



Operating Errors:

- **Being in an unsafe position**
- **Stacking supplies in unstable stacks**
- **Poor housekeeping**
- **Removing a guard**

Systems Defect



- **Revolutionized accident prevention**
- **A weakness in the design or operation of a system or program**

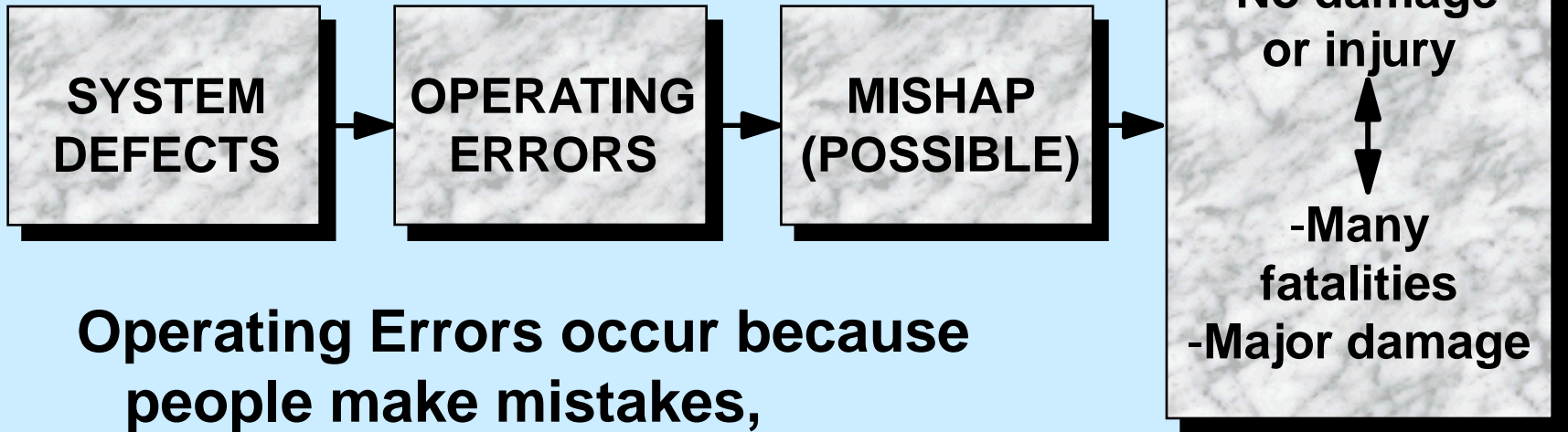
Examples



Systems defects include:

- **Improper assignment of responsibility**
- **Improper climate of motivation**
- **Inadequate training and education**
- **Inadequate equipment and supplies**
- **Improper procedures for the selection & assignment of personnel**
- **Improper allocation of funds**

Modern Causation Model



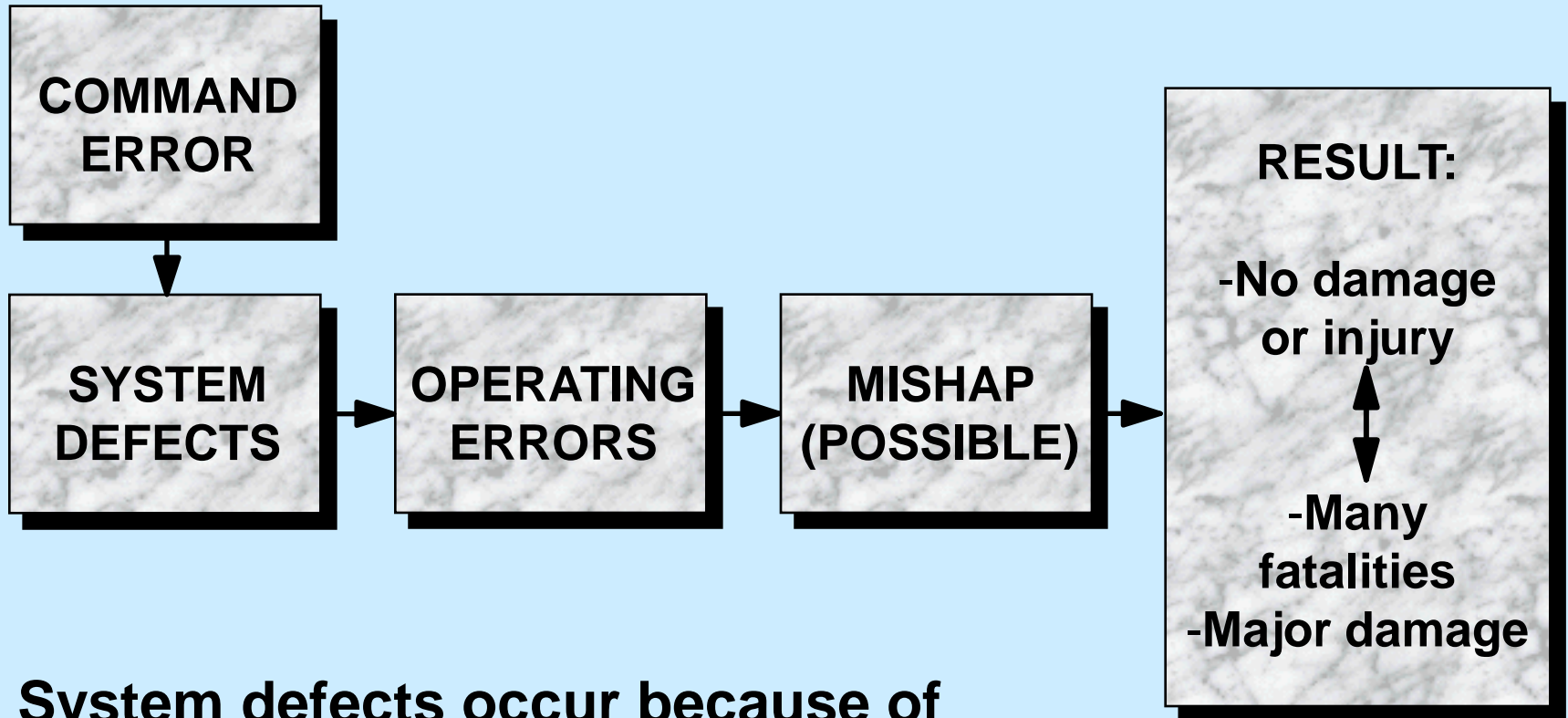
Operating Errors occur because people make mistakes, but more importantly, they occur because of

SYSTEM DEFECTS

Modern Causation Model



Managers design the Systems



System defects occur because of

MANAGEMENT / COMMAND ERROR

Safety Program Defect



A defect in some aspect of the safety program that allows an avoidable error to exist.

- **Ineffective Information Collection**
- **Weak Causation Analysis**
- **Poor Countermeasures**
- **Inadequate Implementation Procedures**
- **Inadequate Control**

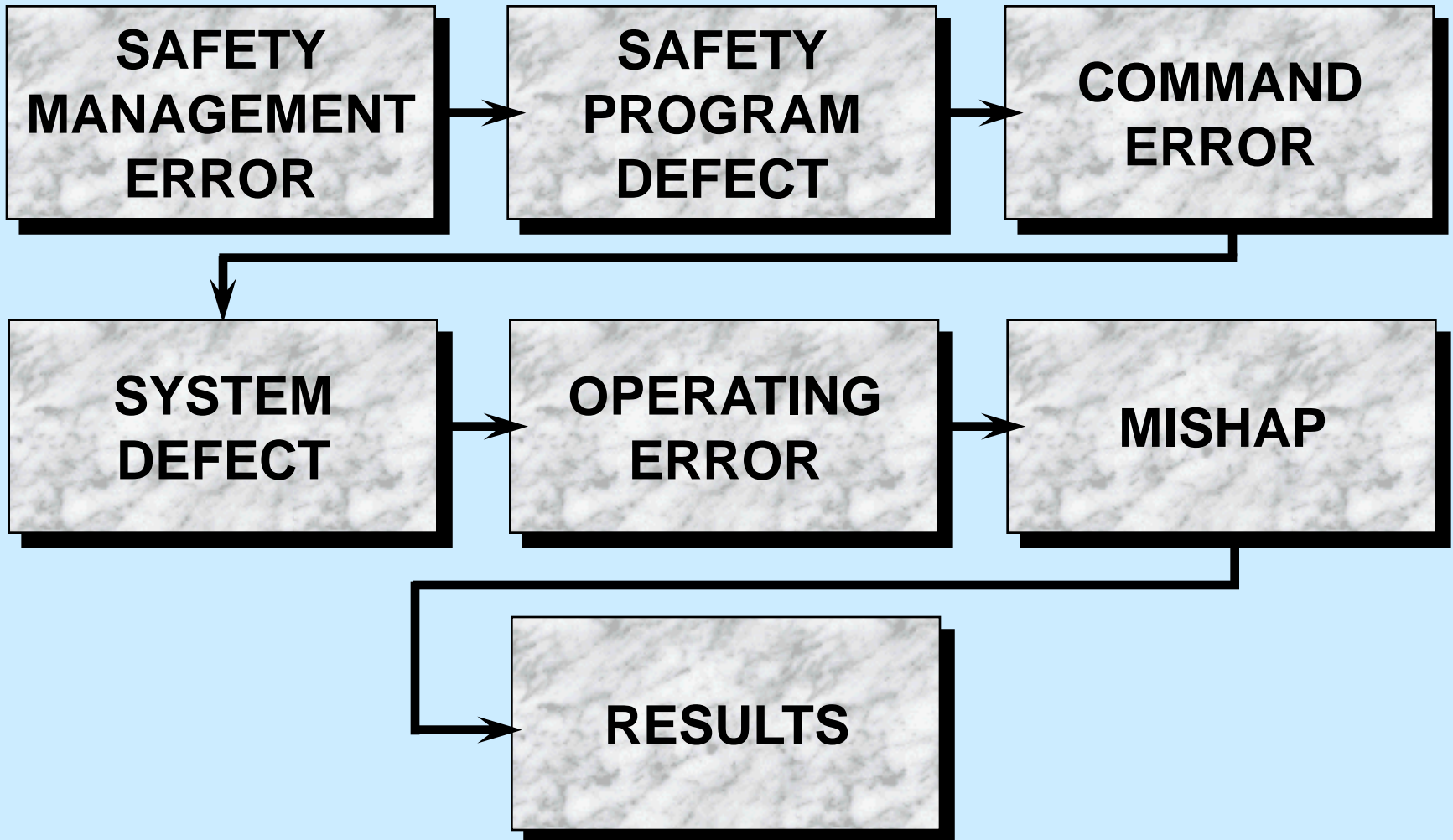
Safety Management Error



A weakness in the knowledge or motivation of the safety manager that permits a preventable defect in the safety program to exist.

**SAFETY
MANAGEMENT
ERROR**

Modern Causation Model

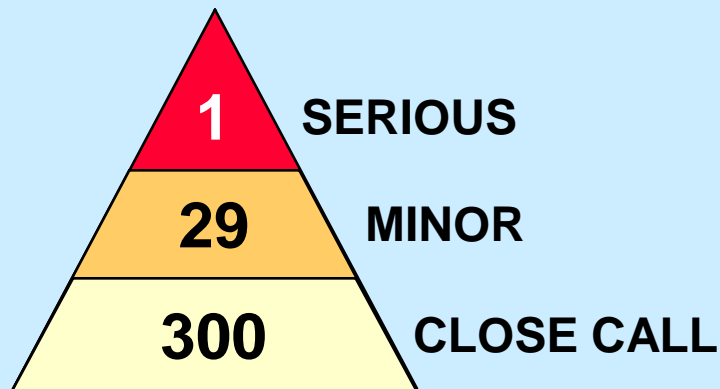


Near-Miss Relationship

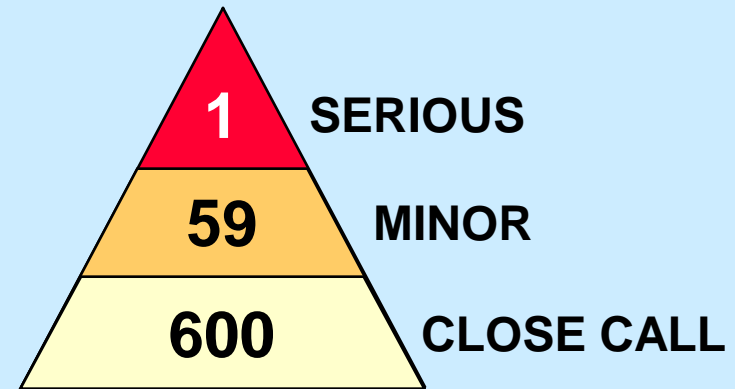


- Initial studies show for each disabling injury, there were 29 minor injuries and 300 close calls/no injury.
- Recent studies indicate for each serious result there are 59 minor and 600 near-misses.

INITIAL STUDIES



RECENT STUDIES



Seven Avenues



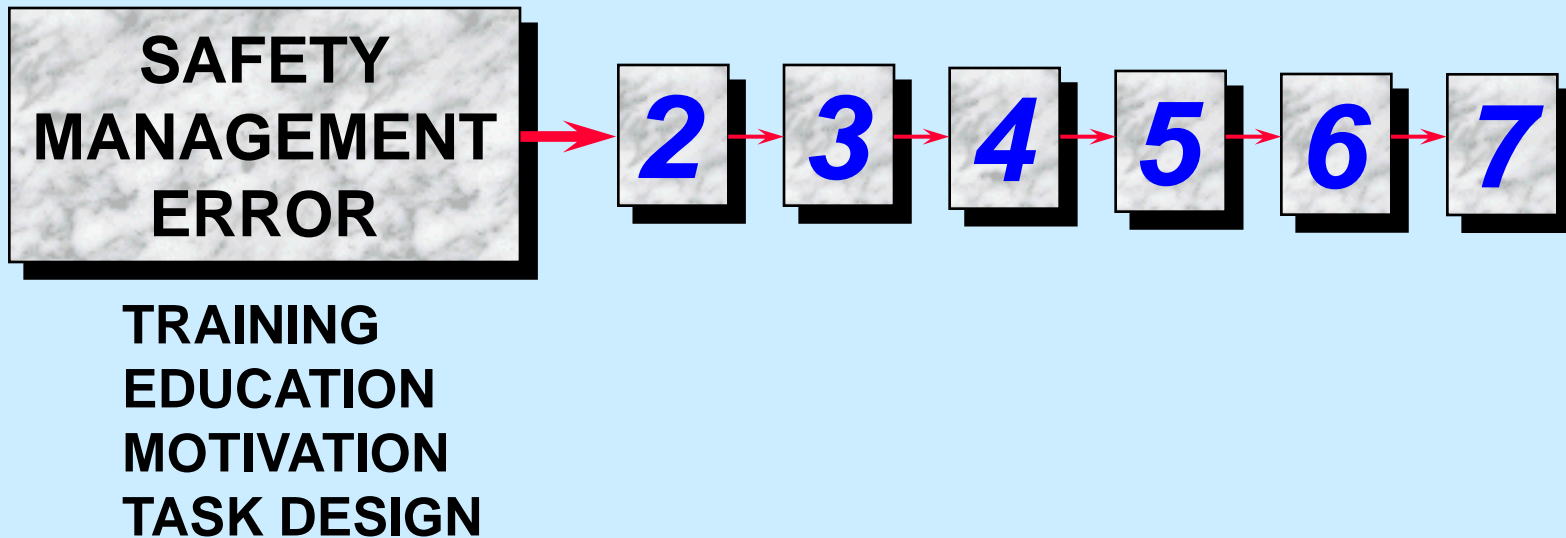
There are seven avenues through which we can initiate countermeasures. None of these areas overlap. They are:

- **Safety management error**
- **Safety program defect**
- **Management / Command error**
- **System defect**
- **Operating error**
- **Mishap**
- **Result**

Seven Avenues

Potential countermeasures for each modern causation approach include:

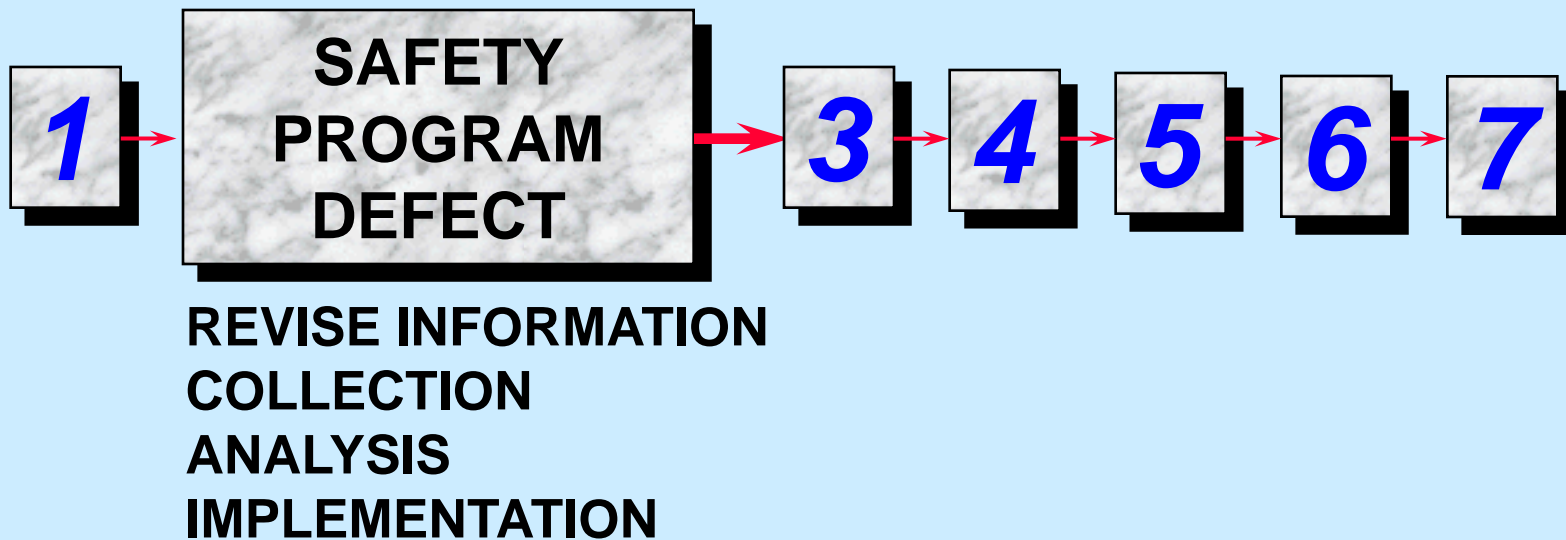
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Seven Avenues

Potential countermeasures for each modern causation approach include:

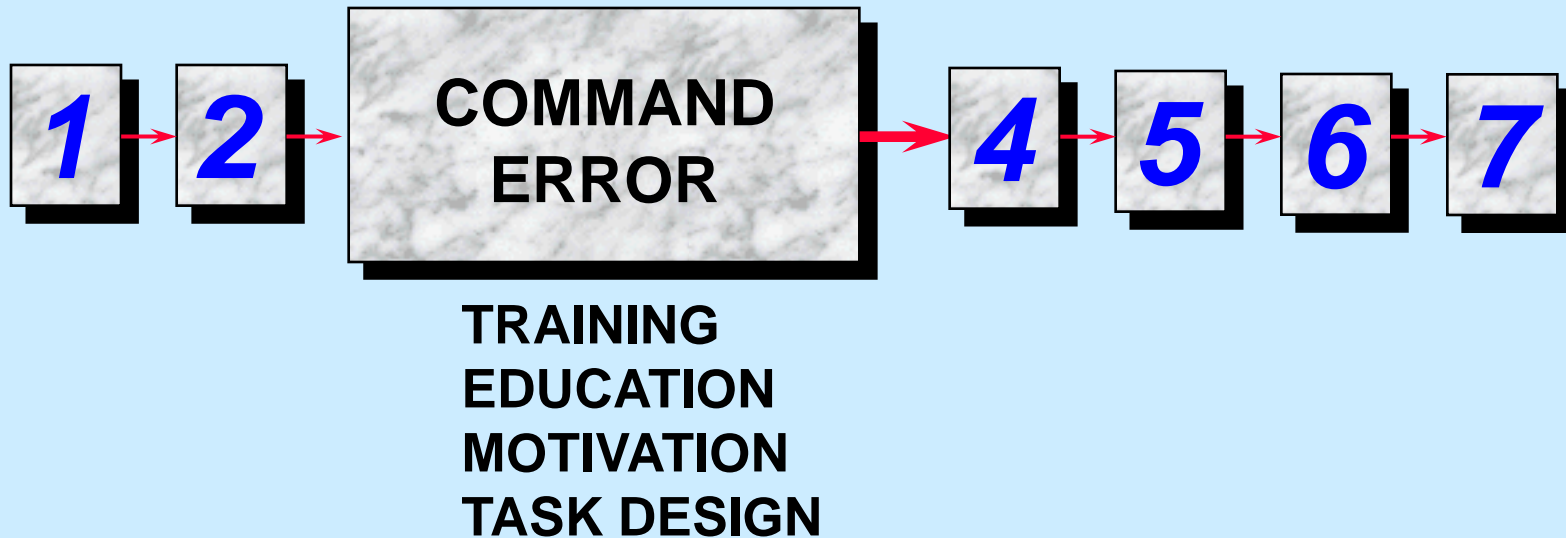
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Seven Avenues

Potential countermeasures for each modern causation approach include:

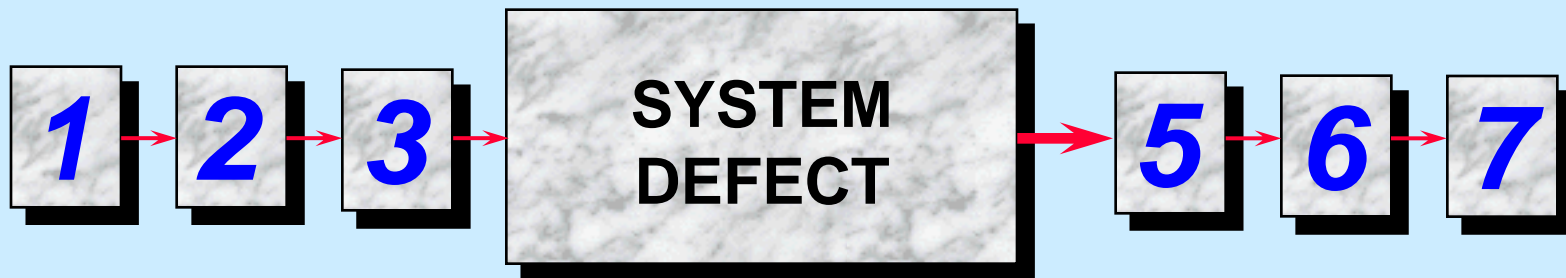
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Seven Avenues

Potential countermeasures for each modern causation approach include:

4



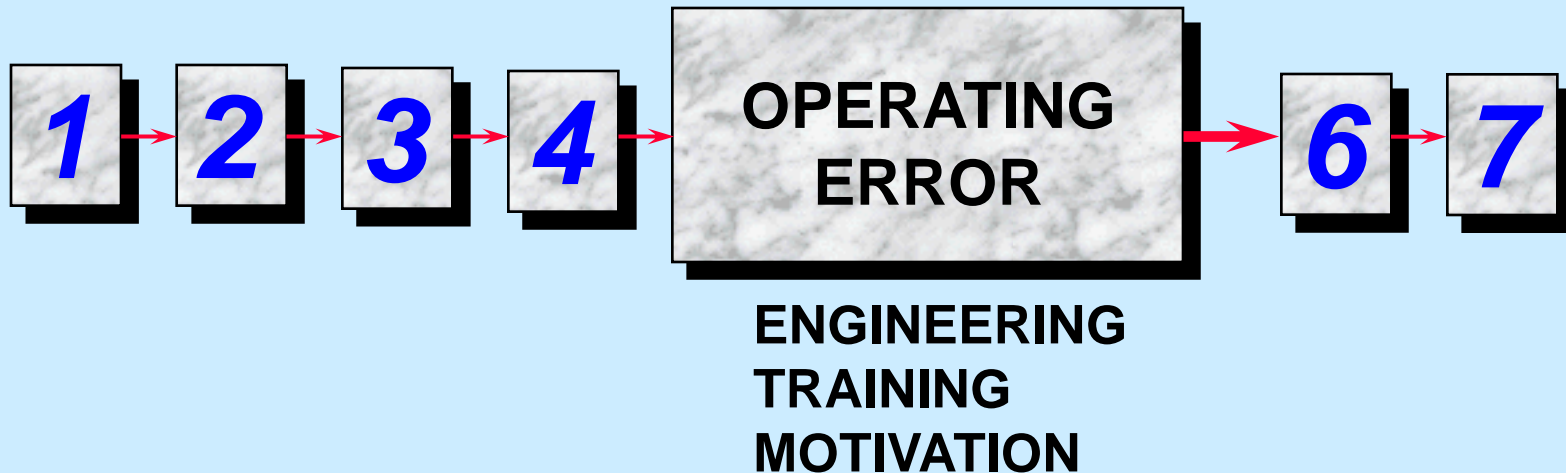
DESIGN REVISION VIA--

- SOP
- REGULATIONS
- POLICY LETTERS
- STATEMENTS

Seven Avenues

Potential countermeasures for each modern causation approach include:

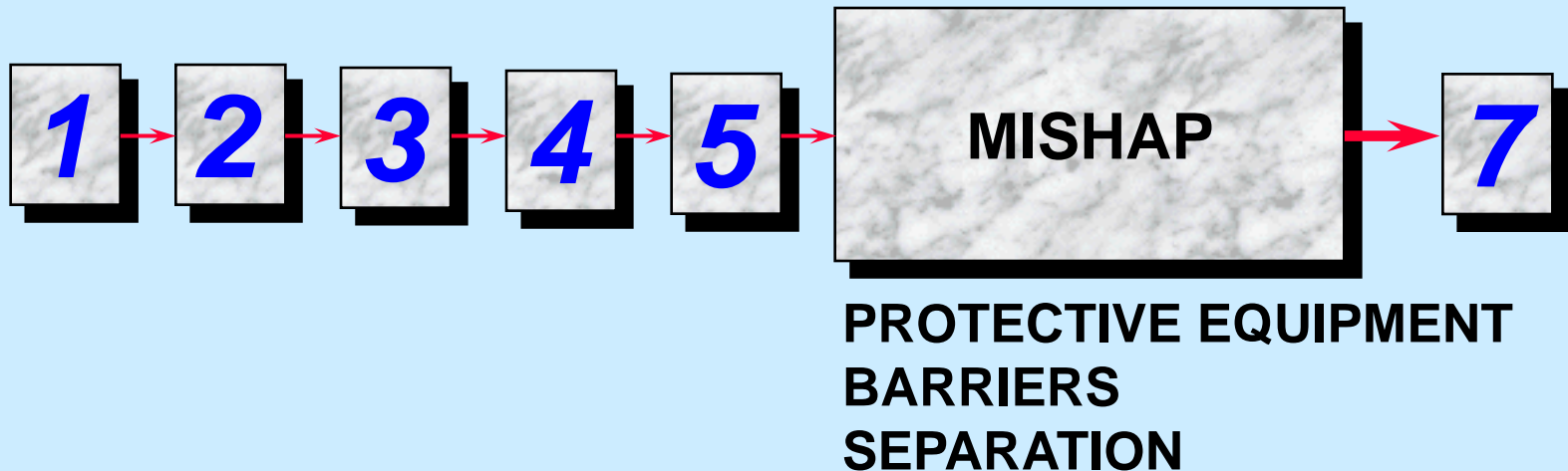
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Seven Avenues

Potential countermeasures for each modern causation approach include:

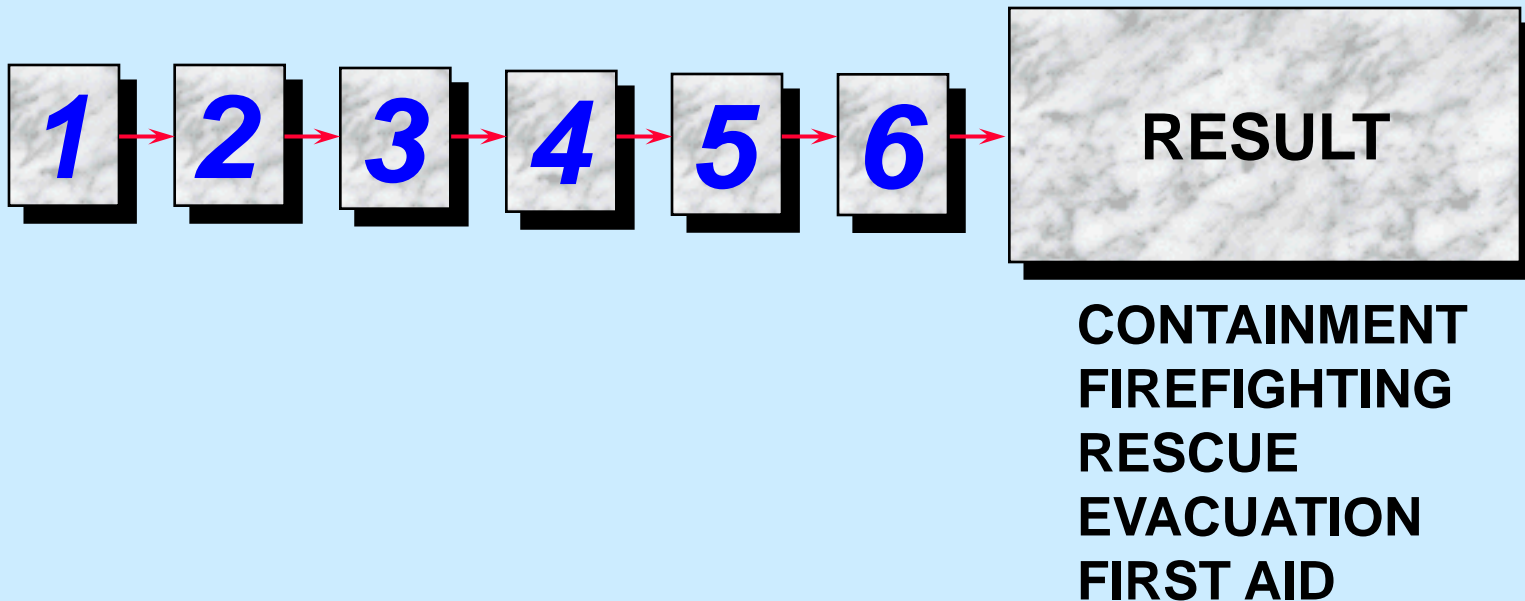
6



Seven Avenues

Potential countermeasures for each modern causation approach include:

7



Army Systems Model



A system is simply a group of interrelated parts which, when working together as they were designed to do, accomplish a goal. Using this analogy, an installation or organization can be viewed as a system.

The elements of the Army Systems Model are:

- **Task**
- **Person**
- **Training**
- **Environment**
- **Materiel**

Army Systems Model



TASK

- **Communication Control**
- **Arrangement**
- **Demands on soldiers**
- **Time aspects**

Army Systems Model



PERSON

Selection

- Mentally
- Physically
- Emotionally
- Qualified

Motivation

- Positive
- Negative
- Retention

Army Systems Model



TRAINING

Types

- Initial
- Update
- Remedial

Targets

- Operator
- Supervisor
- Management

Considerations

- Quality/Quantity

Army Systems Model



ENVIRONMENT

- **Noise**
- **Weather**
- **Facilities**
- **Lighting**
- **Ventilation**

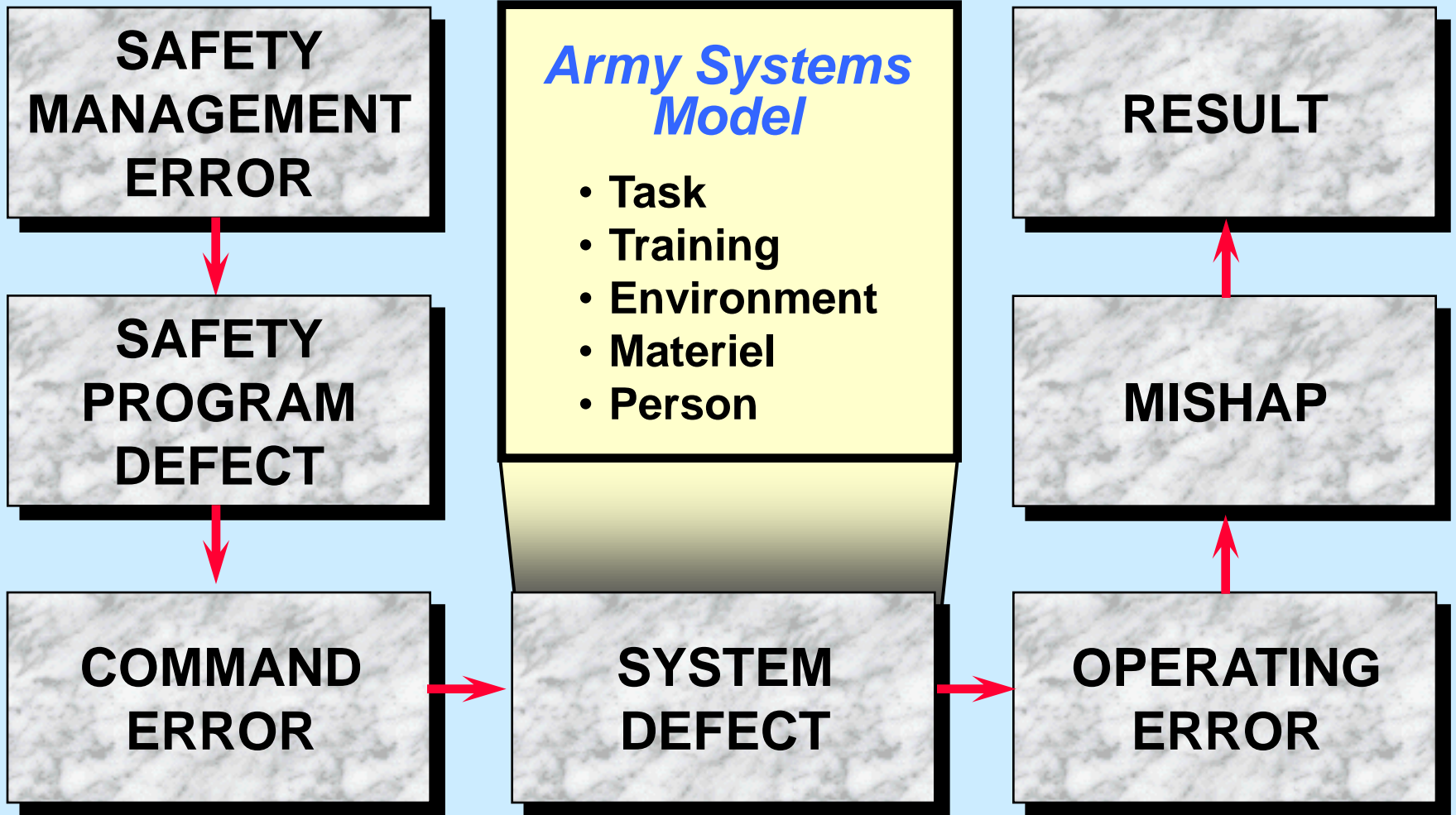
Army Systems Model



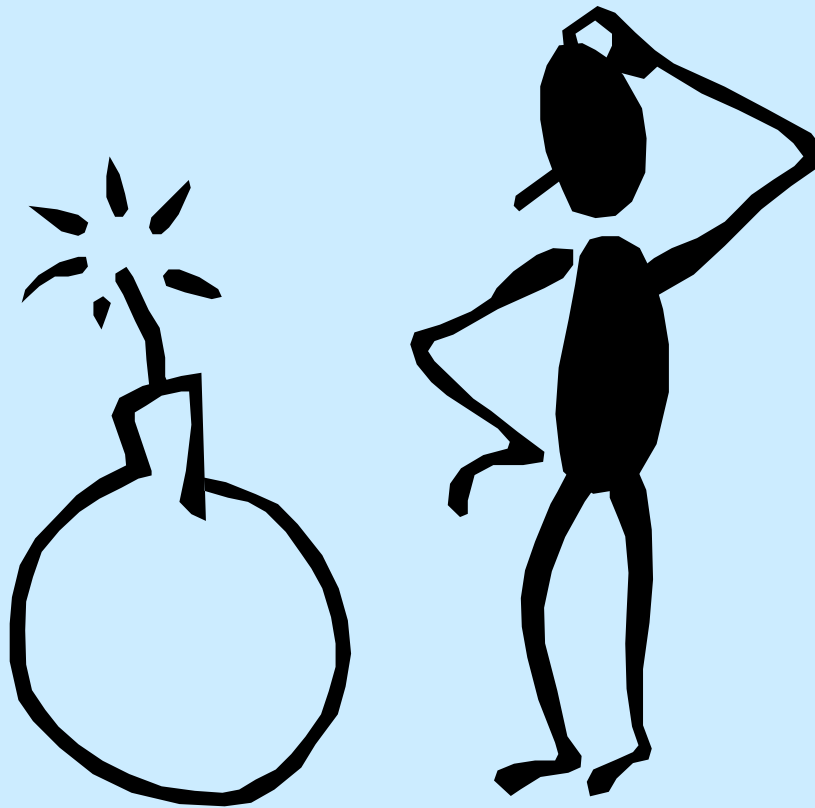
MATERIEL

- **Supplies**
- **Equipment**
- **Machine Design**
- **Maintenance**

Army Systems Model



ARE THERE ANY QUESTIONS?





U.S. ARMY SAFETY CENTER®