



#3 Accident Theory

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Work System

Safety

Health

Ergo-Safety

Terminologies in Safety

- **Hazard** is the potential condition for harm.
- **Risk** is the potential for realization of unwanted/ negative results of an event. The source of risk is hazard.
- **Incident** is an instance of something happening; an event or occurrence.
- **Accident** is an unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury.
- **Injury** is an instance of being injured (the fact of being injured; harm or damage).

Terminologies in Safety

Hazard: keadaan atau situasi yang potensial dapat menyebabkan kerugian seperti luka, sakit, kerusakan harta benda, kerusakan lingkungan atau kombinasi seluruhnya.



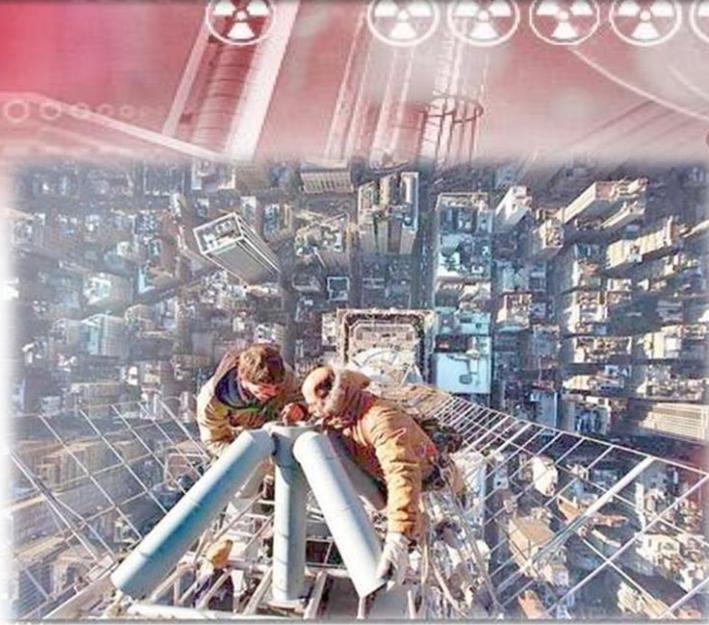
Risk: kombinasi dari kemungkinan terjadinya kejadian berbahaya atau paparan (panas, bunyi dll), dengan keparahan dari cedera atau gangguan kesehatan yang disebabkan oleh kejadian atau paparan tersebut (seberapa sering dan parah).



Accident: kejadian yang berhubungan dengan pekerjaan yang dapat menimbulkan cedera, penyakit kerja atau kematian.



Tinjauan 'Bahaya' di Tempat Kerja



STRESS → BAHAYA ??

atau

BAHAYA → STRESS ??

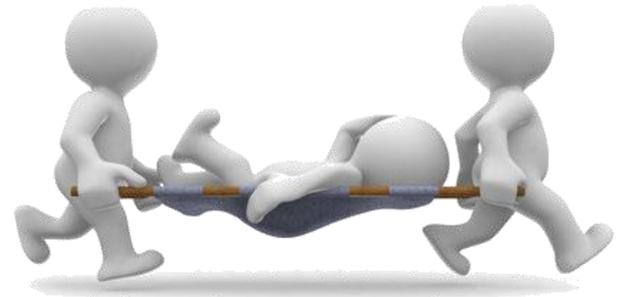
Kecelakaan

Suatu kejadian tak diduga dan tak dikehendaki yang mengacaukan proses suatu aktivitas yang telah diatur (*M. Sulaksmo, 1997*)

Kecelakaan terjadi tanpa disangka-sangka dalam sekejap mata dan terdapat empat faktor dalam satu kesatuan berantai : lingkungan, bahaya, peralatan & manusia (*Bennett NBS, 1995*)



Kecelakaan (accident) – terjadi bila suatu kejadian yang tidak diinginkan/direncanakan muncul, baik yang berakibat cedera (ringan maupun berat) atau kerusakan maupun tidak.



Kecelakaan Kerja

- Kecelakaan yang terjadi berhubungan dengan hubungan kerja, termasuk penyakit yang timbul karena hubungan kerja, demikian pula kecelakaan yang terjadi dalam perjalanan berangkat dari rumah menuju tempat kerja, dan pulang ke rumah melalui jalan yang biasa atau wajar dilalui.

(UU 3/1992 tentang JAMSOSTEK)

Accident Prevention

- Industrial Place Accidents – Typical Year
 - Work related accidents cost \$48 Billion
 - 7,100,000 injured workers per year
 - On average, 3 injured workers per 100 workers
 - One accidental death every 51 minutes
 - One serious injury every 19 seconds
- To prevent accidents, need to know why accidents happen and what causes them.
- *Accident Causation Theories* are used as models to help predict and prevent accidents.

Report Near Misses



Checking a near thing can prevent the real thing!

Accident Causation Theory

1. Heinrich's
Domino Theory

2. Human
Factors Theory

3. Accident /
Incident Theory

4.
Epidemiological
Theory

5. Systems
Theory

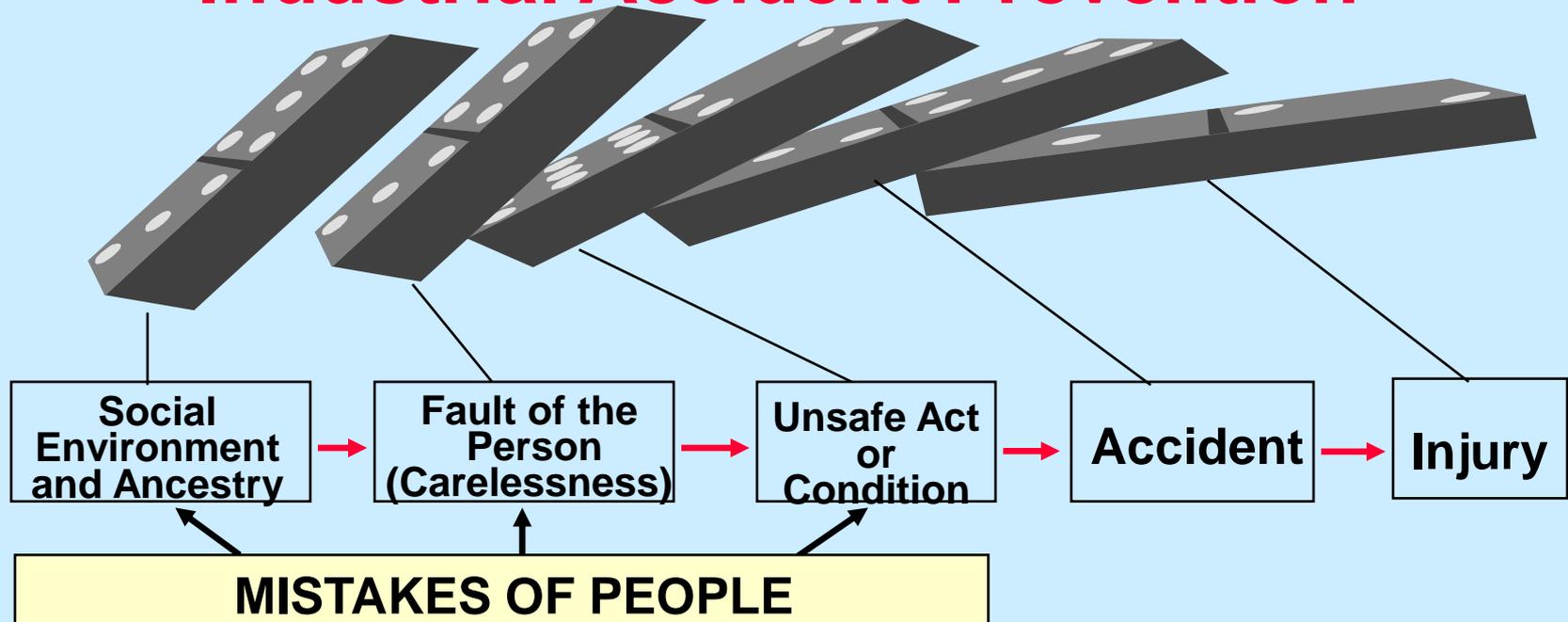
6. Combination
Theory

See : Occupational Safety and Health for Technologist, Engineers, and Managers
by David L. Goetsch

Domino Theory



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



Protect the Force Through Risk Management

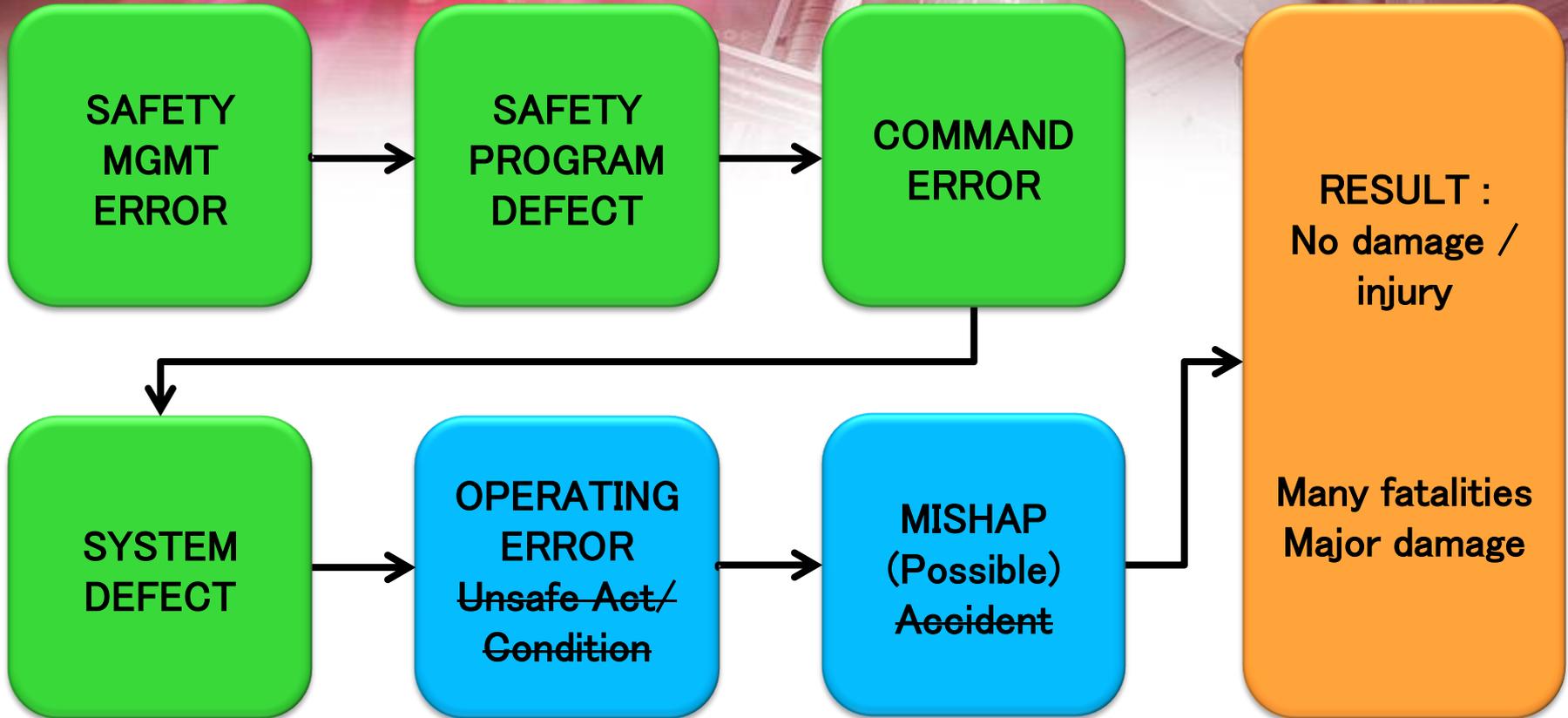
AC10

Heinrich's Theorems



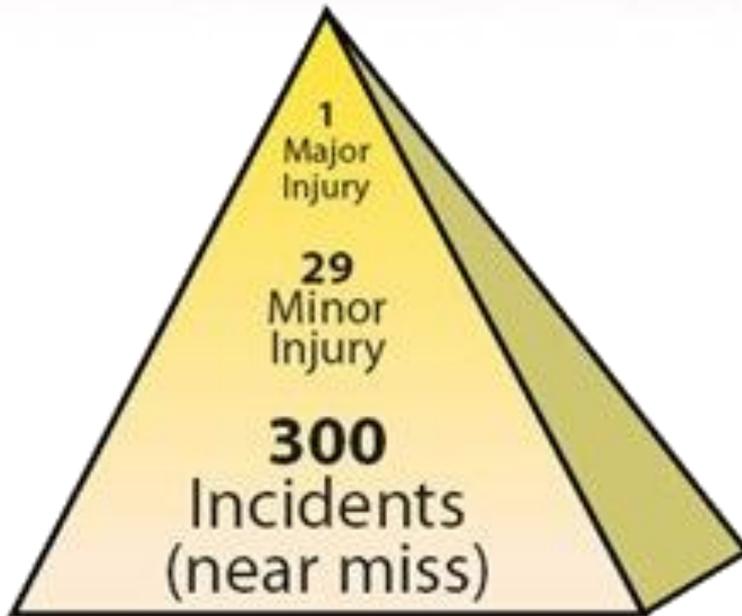
- ***INJURY*** - caused by accidents.
- ***ACCIDENTS*** - caused by an unsafe act – injured person or an unsafe condition – work place.
- ***UNSAFE ACTS/CONDITIONS*** - caused by careless persons or poorly designed or improperly maintained equipment.
- ***FAULT OF PERSONS*** - created by social environment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

Modern Causation Model



(US Army Safety Center)

Safety Pyramid



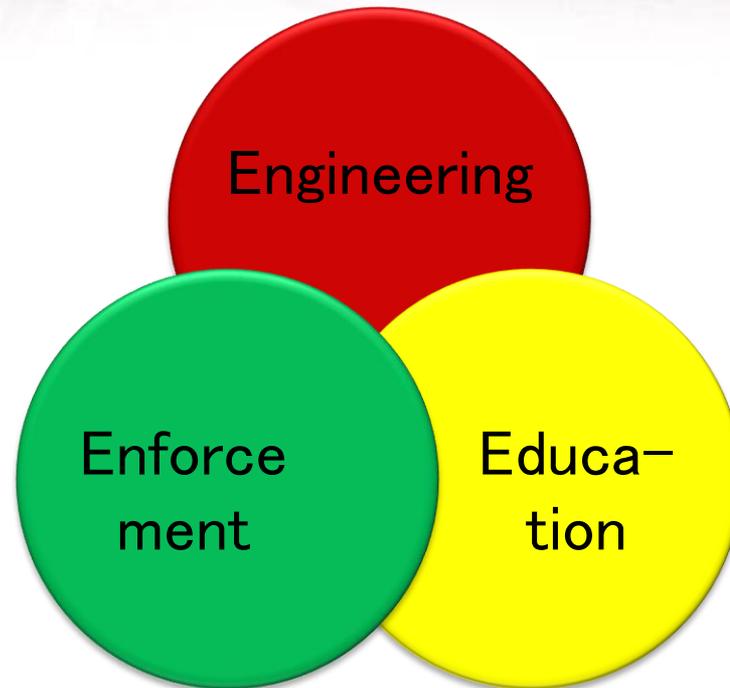
Safety Pyramid developed by H.W. Heinrich (1931)



Conoco Phillips Marine Safety Pyramid (April 2003)

Corrective Action Sequence

The three
E's



Contoh Perilaku

UNSAFE CONDITION

1. Peralatan tidak layak pakai
2. Terdapat api di tempat bahaya
3. Pengamanan gedung kurang standar
4. Terpapar bising
5. Terpapar radiasi
6. Kurang cahaya atau ventilasi
7. Kondisi suhu yang membahayakan
8. Sifat pekerjaan yang mengandung potensi bahaya

UNSAFE ACTION

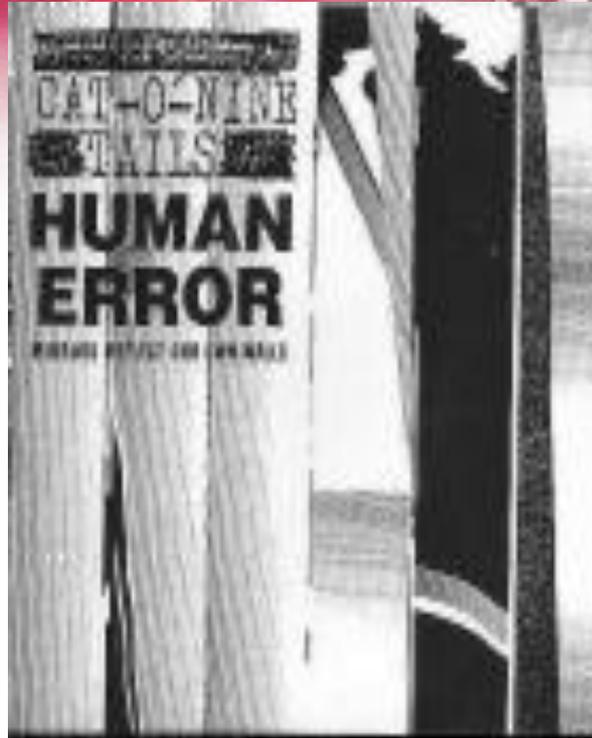
1. Mengabaikan aturan K3
2. Mengoperasikan fasilitas kerja yang bukan kewenangannya
3. Bersendau-gurau dan main-main
4. Tidak memakai peralatan K3
5. Unsafe lifting, pulling and pushing
6. Ketidak-tepatan (teliti) dalam pengoperasian mesin/peralatan kerja
7. Safety devices tidak dioperasikan dengan benar



HUMAN ERROR

85 %

Human Error



Setiap perilaku atau tindakan yang diluar batas yang bisa diterima adalah *human error*.

1. Human Error karena **LUPA**
2. Human Error karena **SALAH PAHAM**
3. Human Error karena **SALAH IDENTIFIKASI**
4. Human Error karena **dilakukan AMATIR**
5. Human Error karena **KESENGAJAAN**
6. Human Error karena **TIDAK SENGAJA**
7. Human Error karena **KETERLAMBATAN**
8. Human Error karena **KURANGNYA STANDAR**
9. Human Error **spesial / SURPRISE**
10. Human Error karena **KESENGAJAAN untuk sabotase**



Karakteristik Manusia

Signifikansi penyebab kecelakaan :

- Nekad (recklessness)
- Keras kepala (stubbornness)
- Gugup (nervousness)
- Lamban (slowness to learn)
- Kondisi fisik (tired, sleepy)
- Masalah pribadi (mental, stress)



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Poka Yoke

- Mengeliminasi penyebab error dari sumbernya
- Mendeteksi error yang akan terjadi
- Mendeksi error sesaat setelah terjadi sebelum proses berikutnya



Poka-yoke detects an error, gives a warning, and can shut down the process.

Example of Poka Yoke



Retail stores and libraries use “electronic article surveillance” systems to prevent removal of merchandise and books that have not been paid for or checked out.

Example of Poka Yoke

This stove burner turns off automatically when pot or pan is removed.



Example of Poka Yoke



INCORRECT



CORRECT

Safety harness buckle has a red mark indicating that it has not been locked (incorrect). When the buckling is complete the red mark is covered.



TAKE : One minute to write safety rule
One hour to hold a safety meeting
One week to plan a safety program
One month to put it in operating
One year to win a safety award
One life time to make a safe worker

But it takes only

One second to destroy it all with an accident



Thank you...

Have an enjoy study and see you next week...