



OPENCOURSEWARE

CONSTRUCTION SAFETY: 4

THEORY OF ACCIDENTS

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What Is An Incident?

- An incident is:
 - An **unexpected, unplanned event in a sequence of events**
 - That occurs through a **combination of causes**
 - Which result in:
 - **Physical harm** (injury, ill-health or disease) to an individual,
 - **Damage to property,**
 - A **near-miss,**
 - Any **combination** of these effects.

Why Prevent Incidents?

- Legal
- Human Rights
- Business



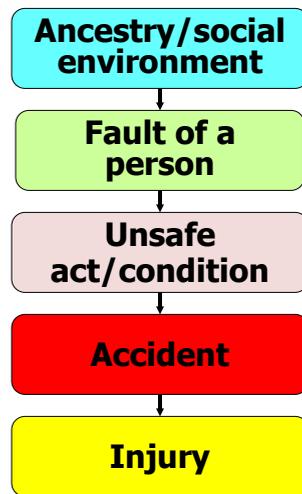
Types of Incidents

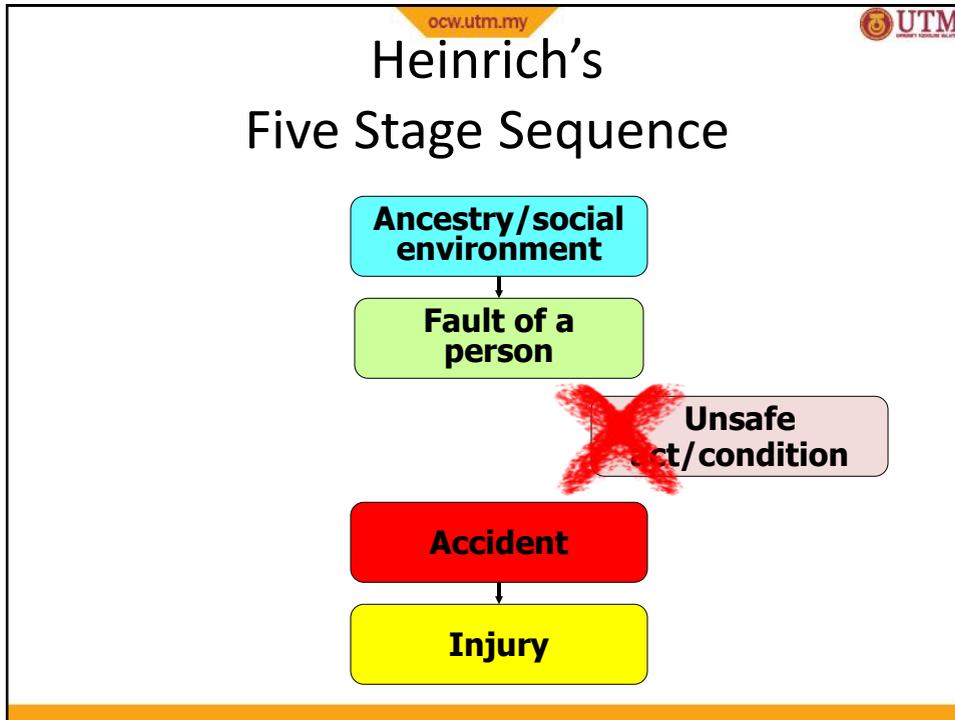
- Cause immediate injury or damage to equipment or property:
 - A forklift dropping a load
 - Someone falling off a ladder
- That occur over an extended period:
 - Hearing loss
 - Illness resulting from exposure to chemicals

Emergence Of Safety Management

- Role of Herbert W. Heinrich (1930's),
 - Developed **Domino Theory** and **promoted control of workers behaviour**.
- Problem:
 - Focused on worker behaviour and not management
 - Caused people to think that safety is about policing worker

Early Theory Of Accidents (Heinrich (1930's))

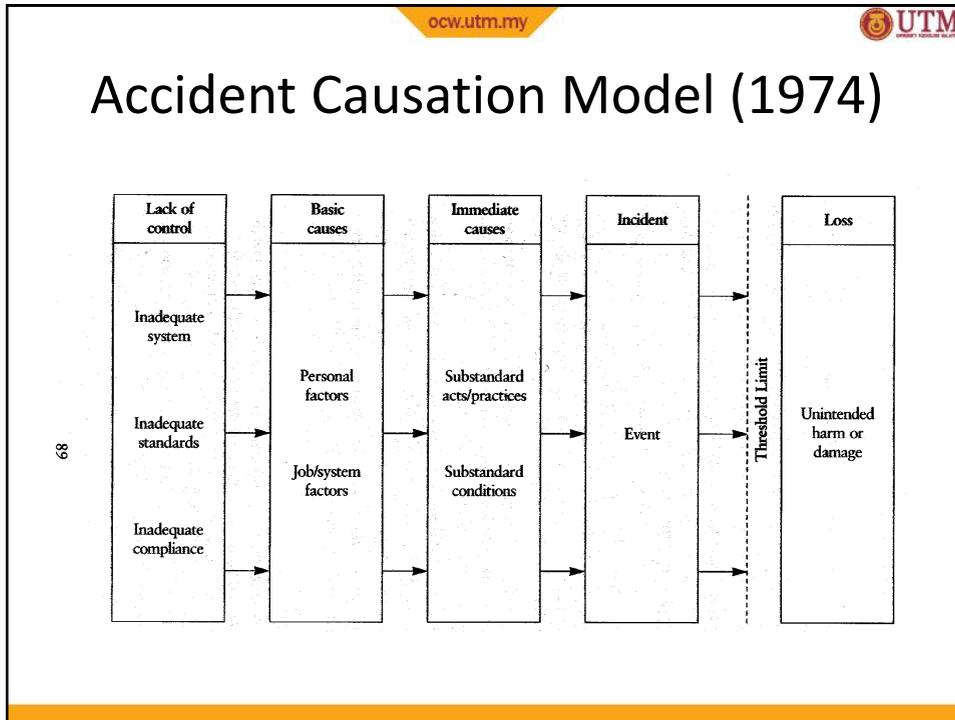




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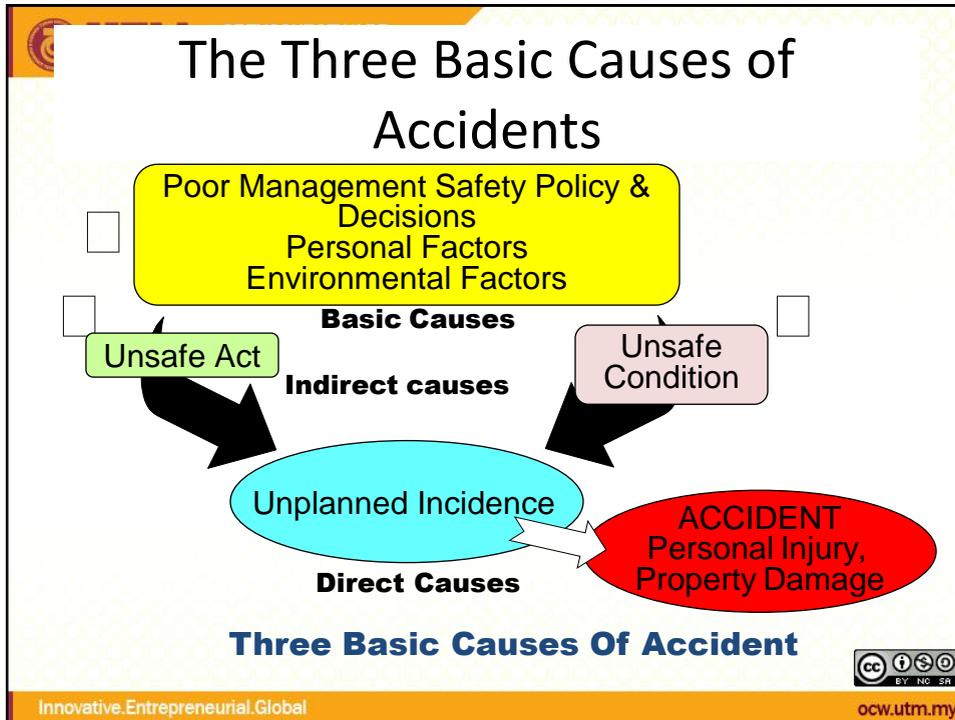
Emergence Of Safety Management

- Frank Bird (1970) developed Loss Control Theory.
- Suggested that underlying cause of accidents are lack of management controls and poor management decisions.
- Problem:
 - Not so popular: blames management (responsibility and control).



Emergence Of Safety Management

- In 1980's, **Behavioural Based Safety** (BBS) was introduced;
- Based on Heinrich's findings.
- Work by recognizing safe work habits and offering rewards and punishment.
- Problem:
 - Focuses on **workers** and not on hazard or management
 - **Reward and punishment system have flaws**



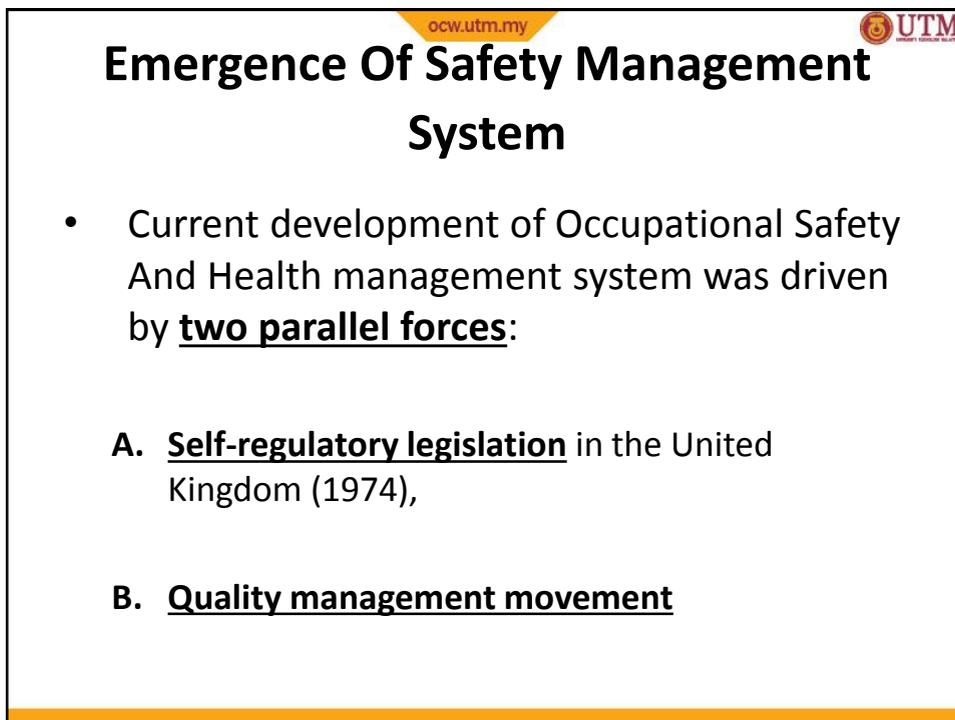
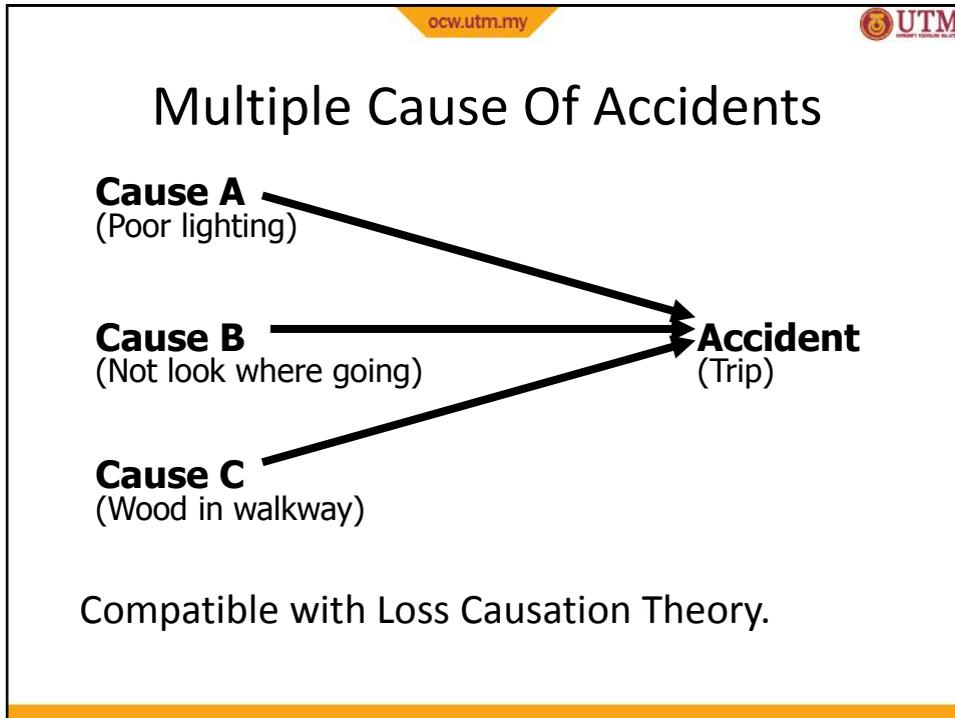
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Lack of Management Control

Management responsible for:

- Selection of workers
- Machinery and equipment
- System of work
- Information and training
- Supervision, etc

The accident prone worker is a false approach. It is like blaming the victim instead of the perpetrator.



A Self-Regulation Legislation

- **Lord Robens**, Chairman of a Royal Safety Commission Report noted that:
 - there was too many OSH legislation,
 - was fragmented,
 - limited in coverage (specific hazards & workplace),
 - out of date and difficult to update,
 - inflexible (prescriptive),
 - people thought that safety was what government inspectors enforced.

A Self-Regulation Legislation

- Lord Robens recommended
 - **Self regulation**
- Report resulted in the Health and Safety of Workers At Work Act in the UK in 1974

A Self-Regulation Legislation

- Similar legislation was enacted in Australia in 1984
- Enacted in Malaysia in 1994 after the 1992 **Bright Sparkler accident** in Sungai Buloh

A Self-Regulation Legislation

Legislation follow major accidents and reinforce need for management system

ACCIDENT	REGULATION/PROGRAMME
Flixborough (1974)	CIMAH regulations 1996
Bhopal (1984)	“Responsible Care” / Process safety
Piper Alpha (1988)	Risk Assessment / Management system

What is Risk?

- Definitions
 - Hazard is anything that can cause harm
 - The danger is the exposure to harm
 - The risk is the likelihood (chance / probability) of harm being done
- Risk is estimated by calculation
 - Risk = Severity (consequence) x Likelihood of harm

Definitions

- **Risk**: A **combination of the likelihood** of an occurrence of a hazardous event with specified period or in specified circumstances **and the severity** of injury or damage to the health of people, property, environment or any combination of these caused by the event.

Risiko

- **Kebarangkalian, peluang** atau **kemungkinan** sesuatu atau seseorang akan tercedera, musnah atau rosak disebabkan oleh penggunaan hazard.
- **Gabungan faktor-faktor** kebarangkalian berlakunya sesuatu peristiwa malang, dedahan dan impak kemalangan tersebut. Kebarangkalian di sini bermaksud kebarangkalian kemalangan itu berlaku.

Definitions

- **Hazard:** A source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these.
- **Danger:** Relative exposure to hazard

Hazard

- **Apa sahaja** (objek, alatan, bahan, dsb) secara bersendirian atau bersalingtindak antara satu dengan yang lain mampu mengakibatkan kemudaratan dan bencana kepada manusia, harta benda atau persekitaran.
- Sesuatu elemen yang berpotensi untuk menyebabkan kecederaan apabila digabungkan dengan situasi bahaya dan tahap hazard boleh dikenal pasti .

Bahaya

- Bahaya lebih menerangkan **dedahan relatif seseorang kepada hazard**. Perkataan ini lebih bersifat untuk menerangkan atau menunjukkan sesuatu keadaan risiko.
- Bahaya merupakan **satu situasi yang wujud** apabila terdapatnya perubahan tenaga di luar kawalan atau had normal, terhasil daripada perbuatan atau perlakuan manusia atau perubahan secara semulajadi

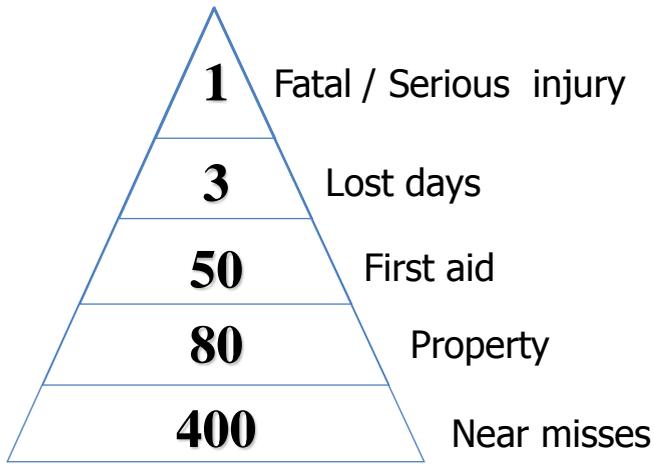
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CAUSES OF ACCIDENT

- 1. BASIC CAUSE**
 - Unsafe Act
 - Unsafe Conditions
- 2. IMMEDIATE CAUSE**
 - Job Factor
 - Personal/Human Factor
- 3. ROOT CAUSE**

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The Accident Pyramid



Number of Incidents	Description
1	Fatal / Serious injury
3	Lost days
50	First aid
80	Property
400	Near misses

Figure: TYE/PEARSON/BIRD 1969-1975

Accepted Accident Theory

- **Multiple Causation Theory**
 - A single unsafe act or condition may or may not cause an accident but both are caused by lack of management control.
- **Bird Loss Causation Model**
 - In line with Schewhart(1930's) theory of quality control.
- **Heinrich's theory is weak and negative**
 - Blaming victim and lack system thinking, continual improvements, upstream control and worker participation.

THANK YOU