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BPS1353 Hazard Recognition & Risk Management

Risk Assessment (Part II)

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Chapter Description

- Aims
  - Explain quantitative and semi-quantitative risk assessment methods
  - Demonstrate semi-quantitative risk assessment process
- Expected Outcomes
  - Able to explains quantitative risk assessment
  - Able to conduct semi-quantitative risk assessment
- References

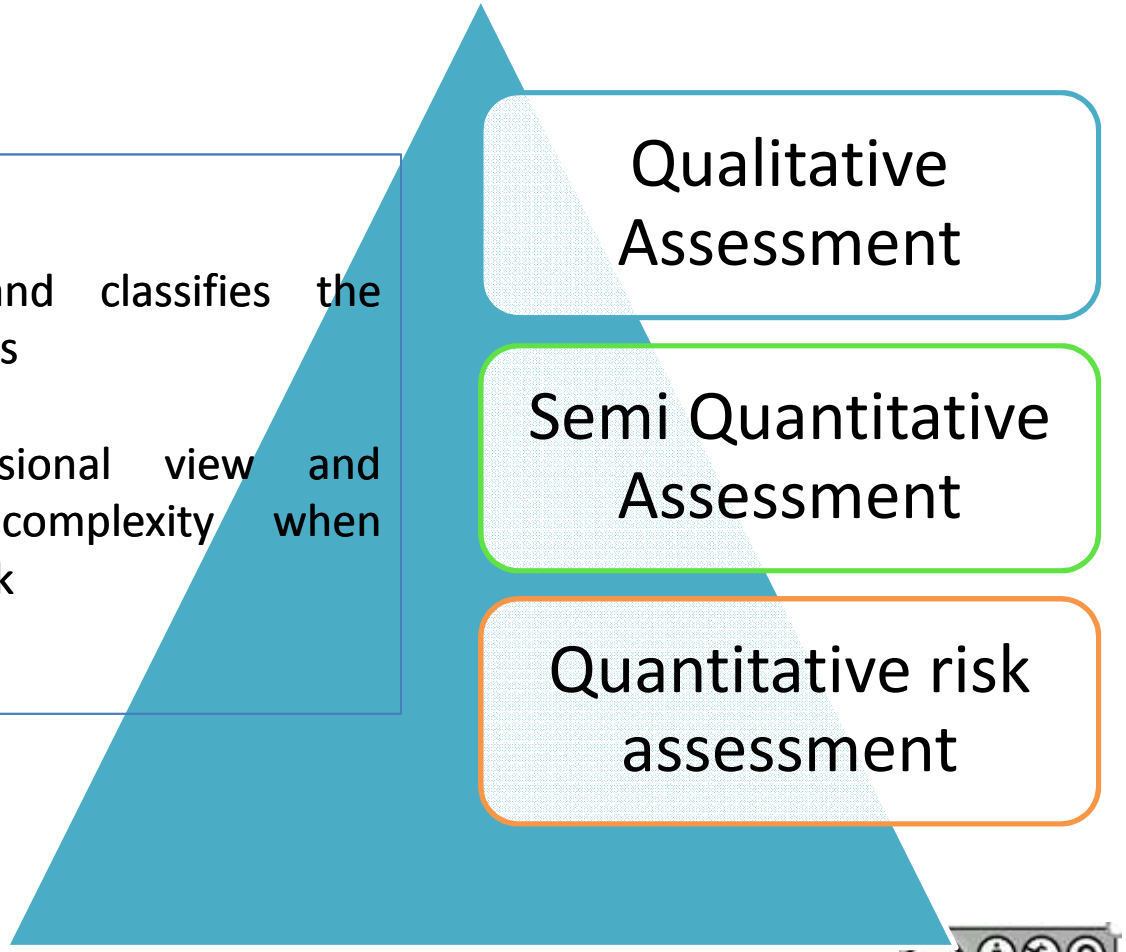
  - NIOSH. 2013. Practical Guide to OSH Risk Management. National Institute of Occupational Safety and Health, Ministry of Human Resources. Malaysia.
  - CCPS, Guidelines for Chemical Process Quantitative Risk Analysis. 2nd Edition. Wiley (1999)

Content

- Semi-quantitative Risk Assessment
- Quantitative Risk Assessment

Risk Assessment Methodology

- Identifies and classifies the inherent risks
- Multi-dimensional view and level of complexity when assessing risk



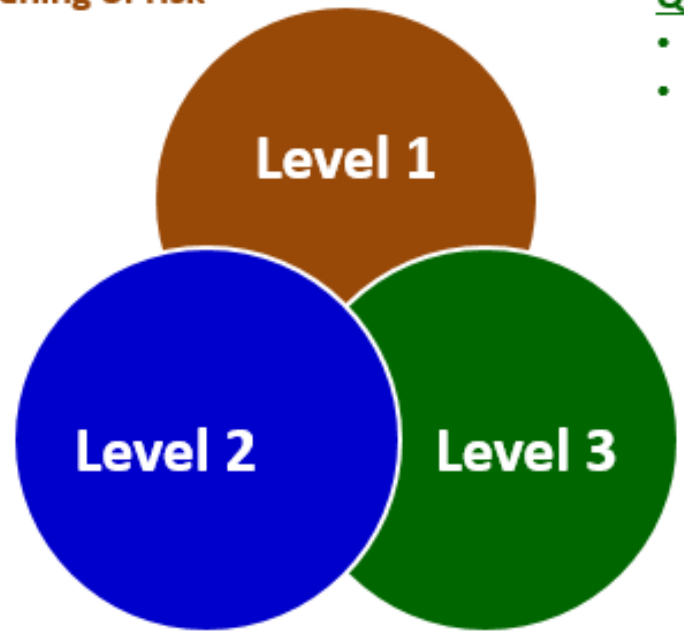
Risk Assessment Methodology

Qualitative

- Simple,
- Quick & easy but result in fairly conservative risk rankings
- For initial pre-screening of risk

Semi-quantitative

- Intermediate method
- Ask more questions, takes more time to accomplish
- Avoid overly conservative risk ranking



Quantitative

- Detail & accurate
- Calculate specific consequence scores and failure scores of each variable

Semi-Quantitative Risk Assessment: NIOSH RISK MATRIX

Example: NIOSH Risk Matrix

i) Likelihood Index
Based on likelihood of an event occurring.

Likelihood Index	Likelihood description
4	Daily
3	Weekly
2	Monthly
1	Yearly

 (Source: NIOSH, 2013)

- "4" means the event happened every day
- "1" means the event happened once per year

NIOSH Risk Matrix

ii) Severity Index

Based on the severity of the cases.

Severity Index	Severity description
4	Fatality & permanent disability (P.D.)
3	≥ 4 days M.C
2	< 4 days M.C
1	First aid cases (F.A.C) & near misses (N.M.)

- "4" means the fatality or the P.D. case
- "1" means the event is a F.A.C or N.M. case

(Source: NIOSH, 2013)

NIOSH Risk Matrix

Severity	Likelihood			
	Yearly (1)	Monthly (2)	Weekly (3)	Daily (4)
First aid cases (F.A.C) & near misses (N.M.) (1)	1	2	3	4
< 4 days M.C (2)	2	4	6	8
≥ 4 days M.C (3)	3	6	9	12
Fatality & permanent disability (P.D.) (4)	4	8	12	16

Risk Level: 1-2 Low; 3-7 Medium; 8-16 High

(Source: NIOSH, 2013)

Quantitative Risk Assessment

QRA is a method that identifies where operations, engineering or management systems can be modified to reduce the risk.

The complexity of QRA depends on the objectives of the study and the available information.

QRA is used to evaluate potential risks when qualitative methods cannot provide an adequate understanding of the risk.

QRA is especially effective for evaluating risk reduction strategies

The Major Steps of a QRA Study

Defining potential event sequences and incidents

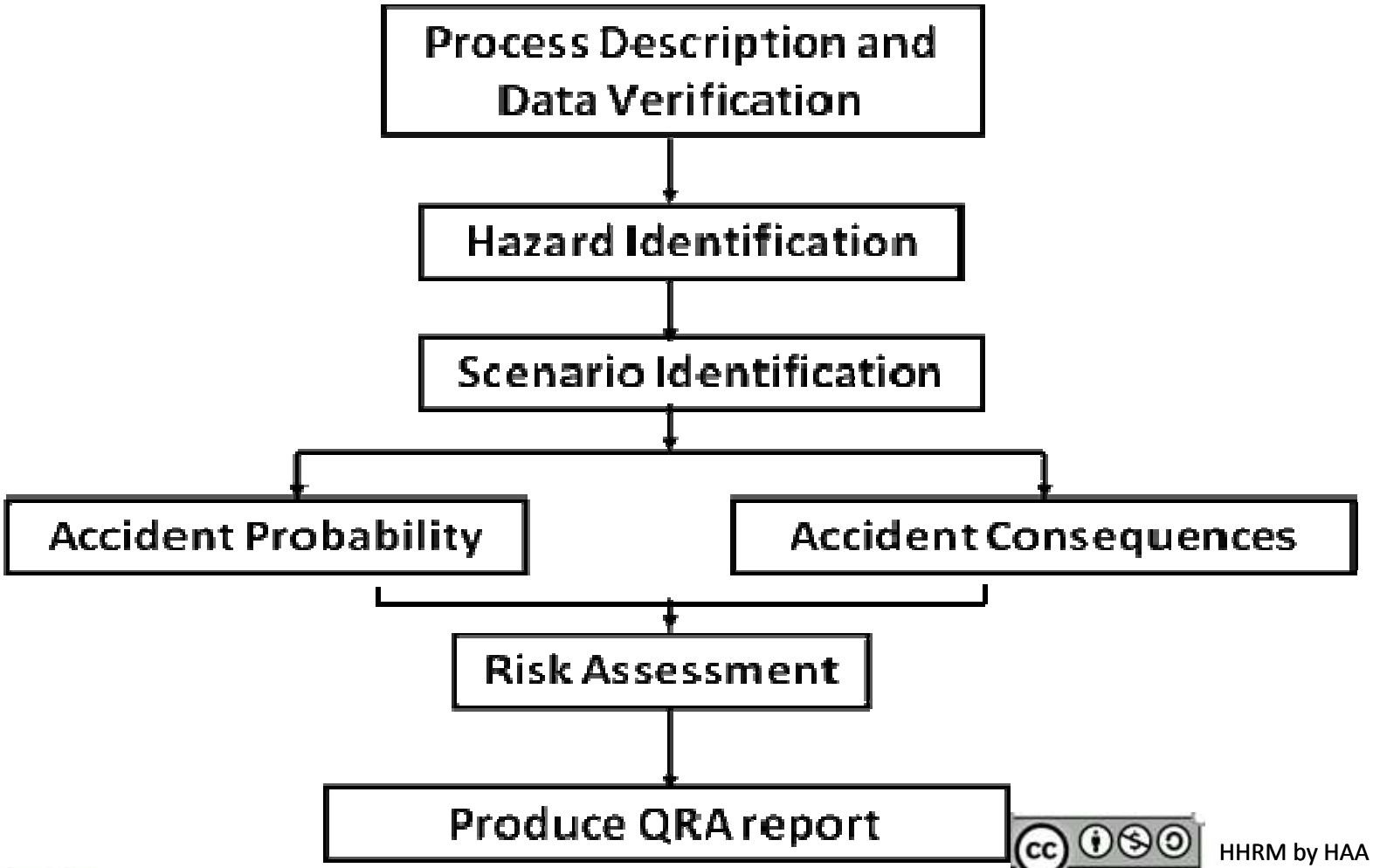
Evaluating the incident consequences

Estimating the potential incident frequencies using ETA and FTA

Estimating the incident impacts on people, environment and property

Estimating and recording the risk

Strategy and Approach of QRA



(Sources: CCPS, 1999)

Conclusion

- Semi-quantitative risk assessment method can avoid overly conservative risk ranking.
- Quantitative risk assessment is highly effective for evaluating risk reduction strategy.

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