

품질관리/안전관리

건축시공 및 건설관리 입문 Introduction to Building Construction Engineering & Management

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품질관리

Quality

Joseph M. Juran

품질의 주관적 측면에서의 의미로 사용의 적합성(Fitness for Use)

Philip Crosby

품질의 객관적 측면에서의 의미로 요구에 대한 일치(Conformance to Requirements)

W. Edwards Deming

현재 뿐만 아니라 미래의 고객의 필요(Needs)까지 품질에 포함

Genichi Taguchi

제품이 출하된 후에 발생하는 손실(기능의 산포+사용비용+폐해항목) 포함

Quality Product

- Properly serves the intended use
- Meets customer's expectations

How to Measure?

- Performance
- Reliability
- Accuracy
- Durability
- Perfection of Details
- Aesthetics
- Maintainability
- Environment Friendliness

Quality Cost

	의 미
1.예방코스트 (P-Cost)	품질관리를 실시할 경우 최초부터 불량이 일어나지 않도록 하기 위해 발생하는 코스트 . 품질관리기술, 종업원의 품질관리교육, 공정관리, 품질계획 등의 요소를 포함하고 있음
2.평가코스트 (A-Cost)	시험·검사를 위한 코스트로 제품의 품질을 정식으로 평가하는 것에 의해, 회사의 품질수준을 유지해 가기 위한 경비를 포함. 이것에는 검사, 시험, 외부기관에 의한 보증과 품질 검사, 제품, 부품 및 구입재료의 계측, 평가 등의 요소를 포함함
3.내부 실패 코스트 (IF-Cost)	사내 제품 사양에 일치되지 않는 불량률의 재료·제품에 의해 생긴 코스트 수집, 수정, 재생불능의 물건에 기인한 손실을 포함. 즉 품질요소에 합치하지 않고 제품 손실이 될 것 같은 것을 말함
4.외부 실패 코스트 (EF-Cost)	이미 고객의 손에 인도된 제품의 불량대책에 요구되었던 코스트 고객으로 부터의 크레임 처리비용 및 보증기간중의 서비스 비용을 포함

Quality Management

- Korean Industrial Standard (KSA3001)
 - ✓ System of all means to economically produce products of quality that meet the requirements of the customer
- PMBOK
 - ✓ PQM includes all the activities of the overall management function that determine the quality policy, objectives, and responsibilities and implement them within the quality system.

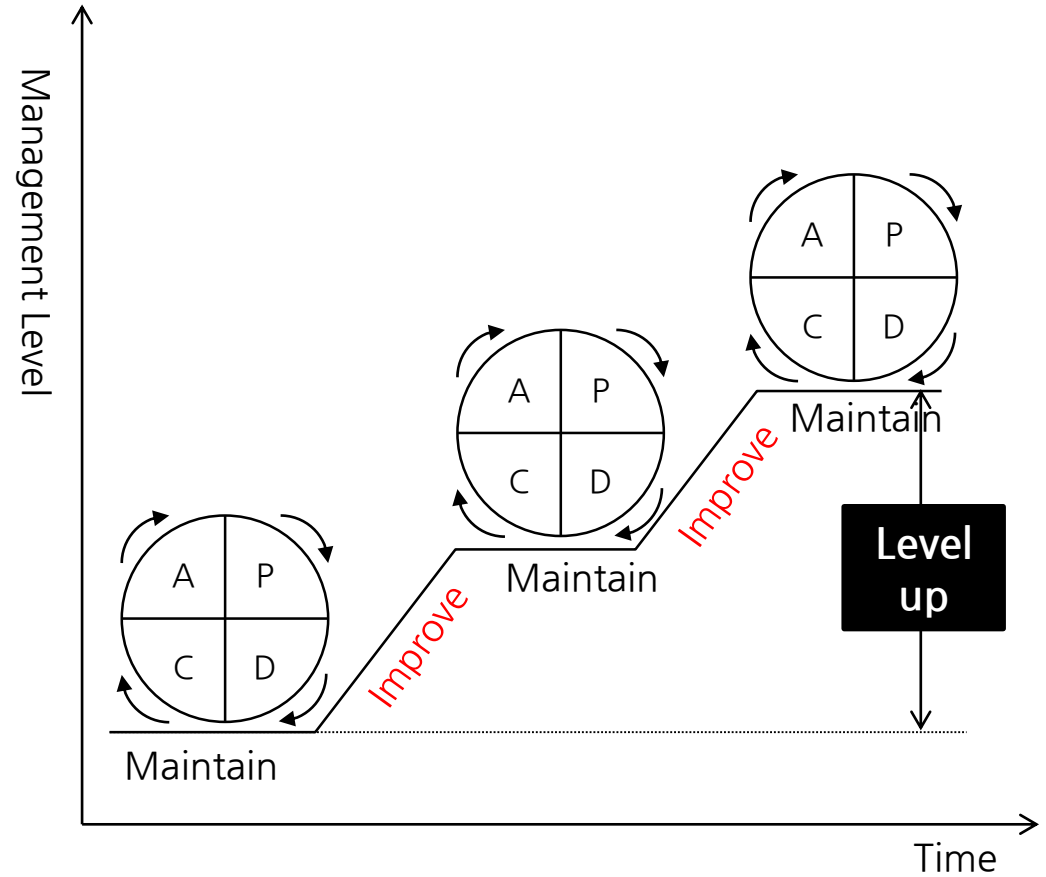
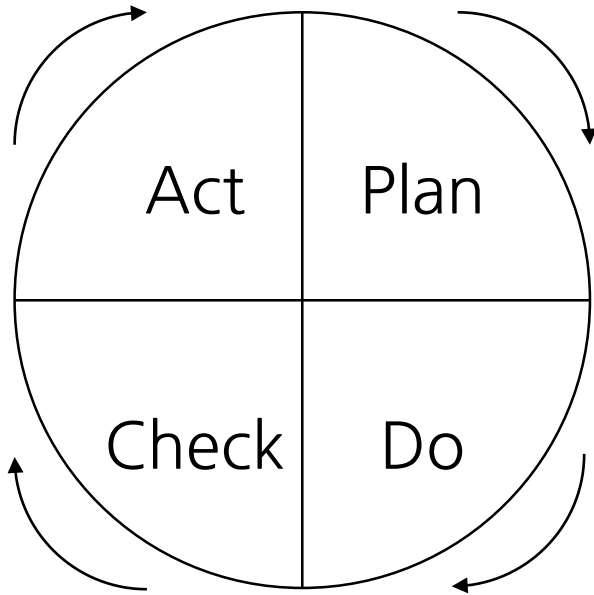
Changing QM

- Past Concepts
 - ✓ Supplier-oriented industry → Simple inspection and testing → Quality **inspection** / test person in charge
- Current Concepts
 - ✓ Consumer-oriented industry → Comprehensive inclusion of quality management and quality **assurance** → Enterprise quality management need

ISO Standard

- ✓ ISO 8402: Definition of quality terms
- ✓ ISO 9000: Guidelines for Selection and Use
- ✓ ISO 9001 quality system: Quality assurance model in design, development, production, installation and service
- ✓ ISO 9002 quality system: Quality assurance model in production and installation
- ✓ ISO 9003 Quality System: Quality Assurance Model for Final Inspection and Testing
- ✓ ISO 9004: Guidelines for quality management and quality system elements

Process of QM



품질관리

QS 9000

무결점 운동

SQC

QM

Business Process Reengineering

TQM

100ppm 운동

TL 9000

ISO 9000

QC

품질경영

종합적 품질경영

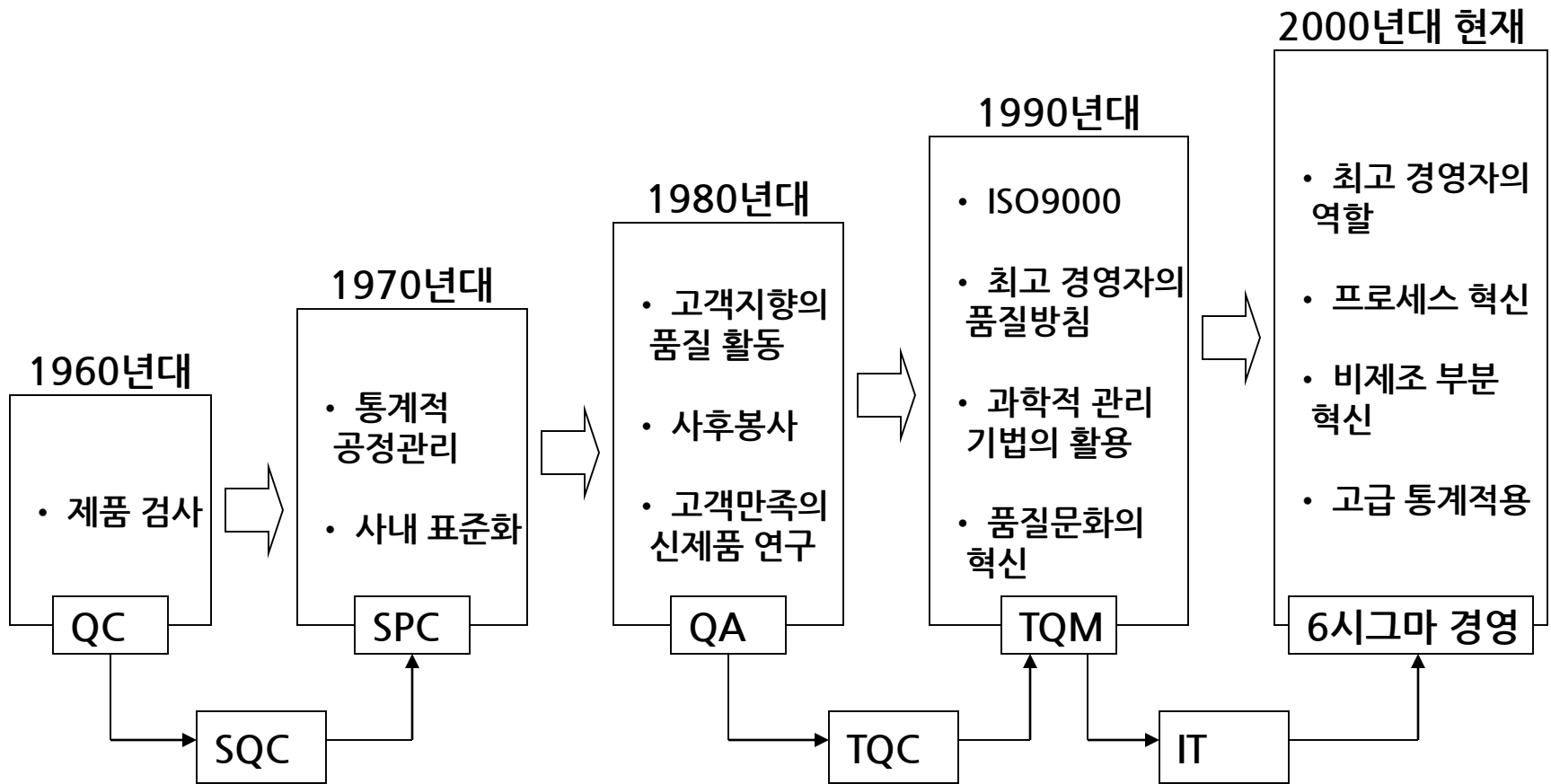
SPC

TQC

Six Sigma

TPM

Evolution of Quality Management Methods



Inspection

- Usually done by customer's representatives
- At the end of a process
- On a 'accept or reject' basis
- The parties are inherently in adversarial positions

Quality Control (QC)

- Usually done by appointed inspectors of the producer
- At the end of major phases during the production
- The parties are placed in adversarial positions by the management (although both QC division and production division belong to the same organization)
- The production people tend to cover and hide their mistakes by nature.

Quality Assurance (QA)

- Usually done by production people themselves (designated 'QA instructors'), in order to identify and correct quality related problems
- During the process
- QA instructors mainly provide guidance and leadership to the production people rather than criticizing their work

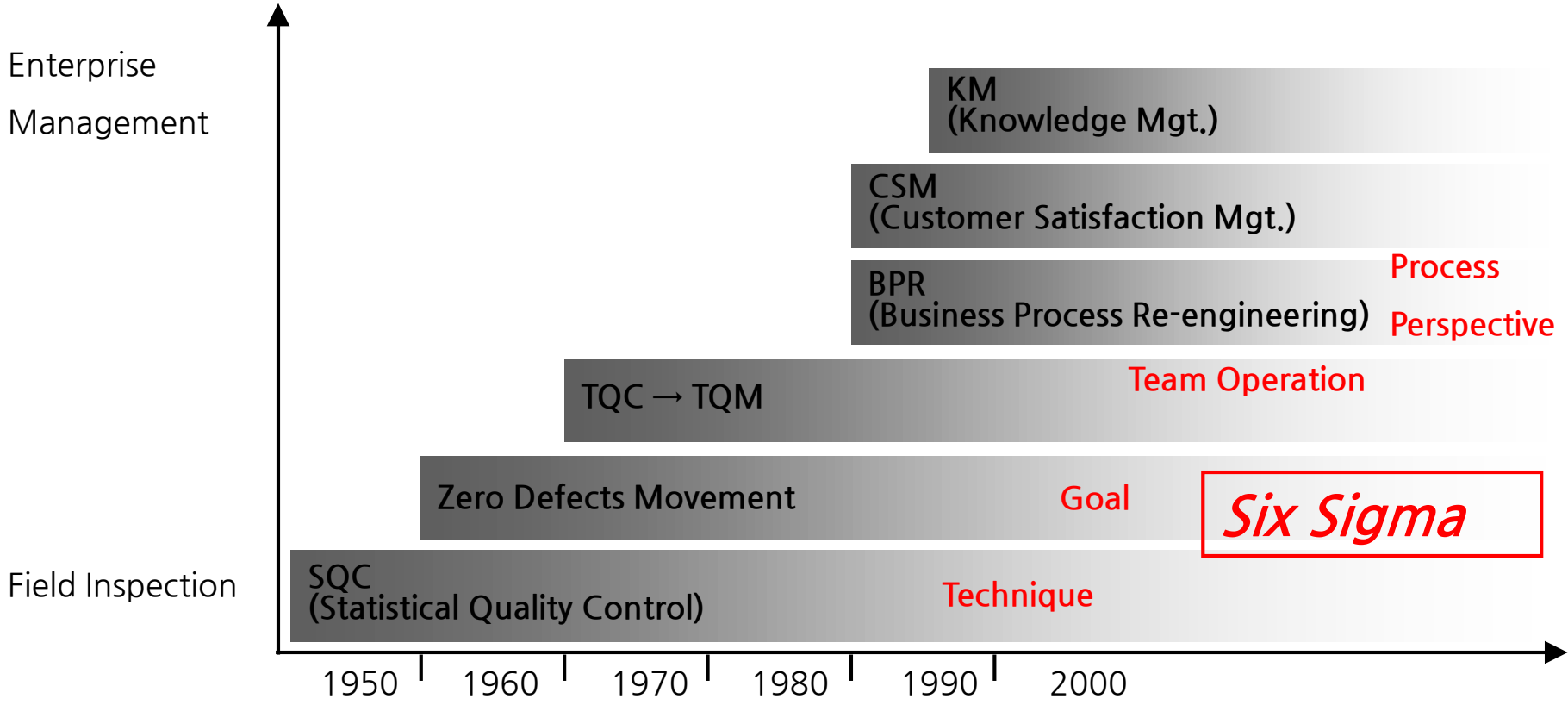
Quality Management

- Initiated and orchestrated by senior managers
- Involves all parts of the organization
- Through a systematic, comprehensive and well-documented QA process
- Aiming at 'Zero Defects'

Total Quality Management (TQM)

- A profound philosophy and 'a way of life' rather than a practical disciplinary
- Aimed at continuous improvement of the organization and personal growth of its individual members
- Quality is viewed in the broadest sense including:
 - Quality of Life (QOL)
 - Well-being and satisfaction of all people Involved
 - Long-lasting relationships with customers and suppliers etc.

Six Sigma

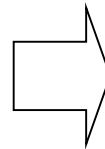


6 Sigma의 등장배경

6σ는 모토롤라의 고객중심 경영의 일환으로 마이클 해리의 주도하에 경영 기법을 체계적이고 과학적으로 발전 시켜왔음.

시작 : Motorola

- 80년대 초 일본 무선호출기 시장에 진입하면서, 일본 기업과의 품질격차로 인해 충격을 받음
- '81년 5년 내 10배의 품질개선 목표 수립 후 추진하여 이를 달성하였으나, 실제 목표와는 GAP이 큰 것으로 판명됨.
- 각 사업부문의 품질 평가순서를 나름대로 개발하여 사용하던 것을 통계지식을 사용하여 통일된 척도로 개발한 것이 6σ임.
- '87년 총체적 고객만족의 Key Initiative로 6σ 목표 설정



발전 : GE

- '95년에 많은 경영환경의 변화로 가장 도전적이고 기회가 될 수 있는 World Class Quality 달성을 Launching하게 되었음.
- World Class Quality는 향후의 가장 큰 기회이며, 우리는 다음 세대를 위해서 6σ에 Focusing할 것임.

6sigma의 수리적 의미

- 시그마 (σ)
; 프로세스의 산포를 나타내는 척도. 통계적인 용어로 표준편차를 의미
즉, 데이터들이 '중심으로부터 전형적으로 떨어진 거리'
- 6시그마 (6σ)
; 규격상한과 규격하한이 있는 경우 단기적으로 분포의 중심과 규격한계 사이의
거리가 표준편차의 6배나 될 정도로 불량률이 아주 낮은 상태
(100만개 중 0.002개의 불량품 수준)

Sigma	철자오류	돈	시간	DPMO
σ	한 책에서 한 페이지당 1.5개의 철자 오류	\$10억당 \$2.7백만의 부채	1 세기당 3 1/2개월	66,807
4 σ	한 책에서 30페이지당 1개의 철자 오류	\$10억당 \$63,000의 부채	1 세기당 2 1/2일	6,210
5 σ	사전 한 세트에서 1개의 철자 오류	\$10억당 \$570의 부채	1 세기당 30분	233
6	소형 도서관의 모든 책에서 1개의 철자 오류	\$10억당 \$2의 부채	1 세기당 6초	3.4

Safety

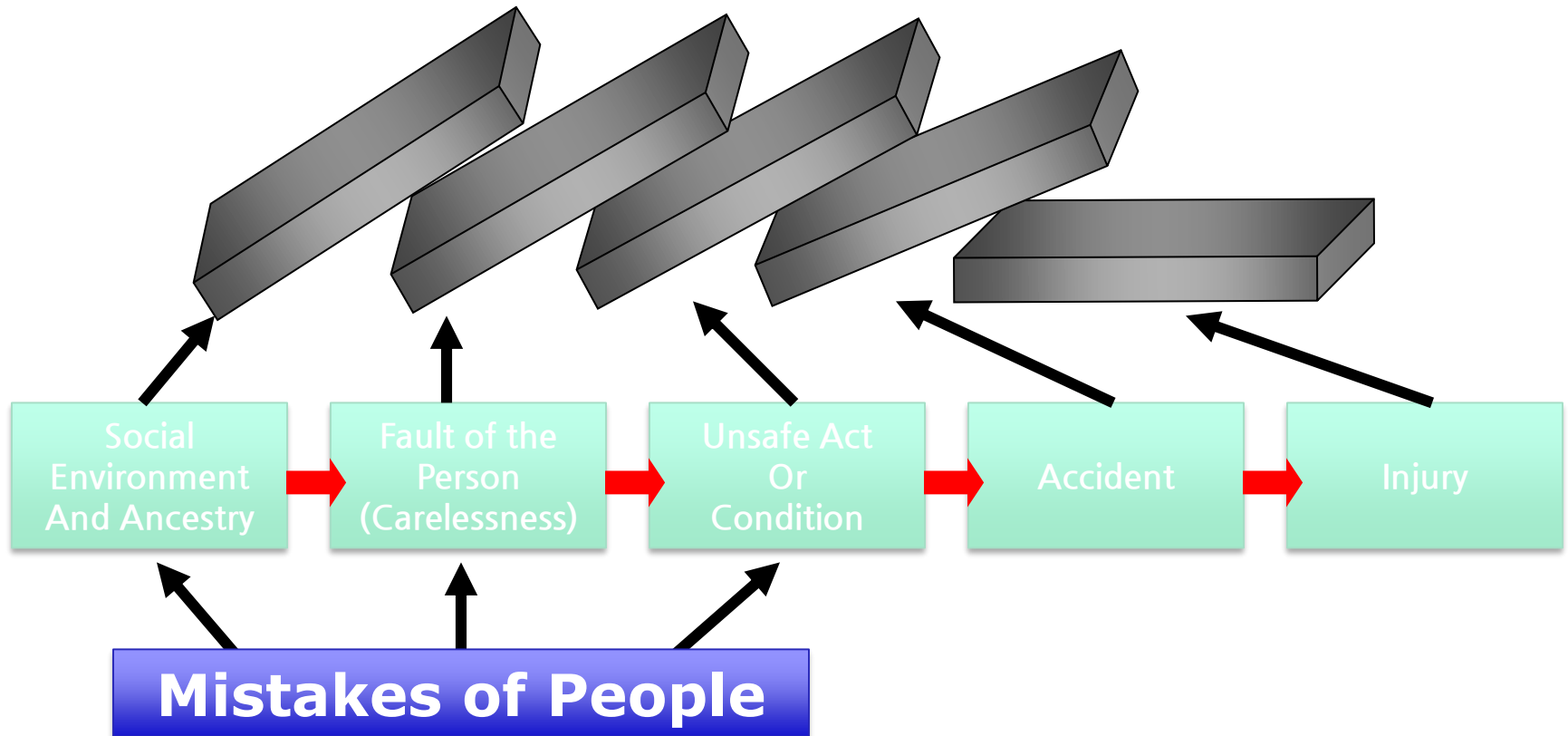
- Risk
 - ✓ safety risk is made up of two parts
 - Likelihood of occurrence of an incident
 - Severity of the incident's consequence
- Hazard
 - ✓ risk of loss or harm
 - ✓ "potential for harm". In practical terms, a hazard often is associated with a condition or activity that, if left uncontrolled, can result in an injury or illness.

Construction Safety Management

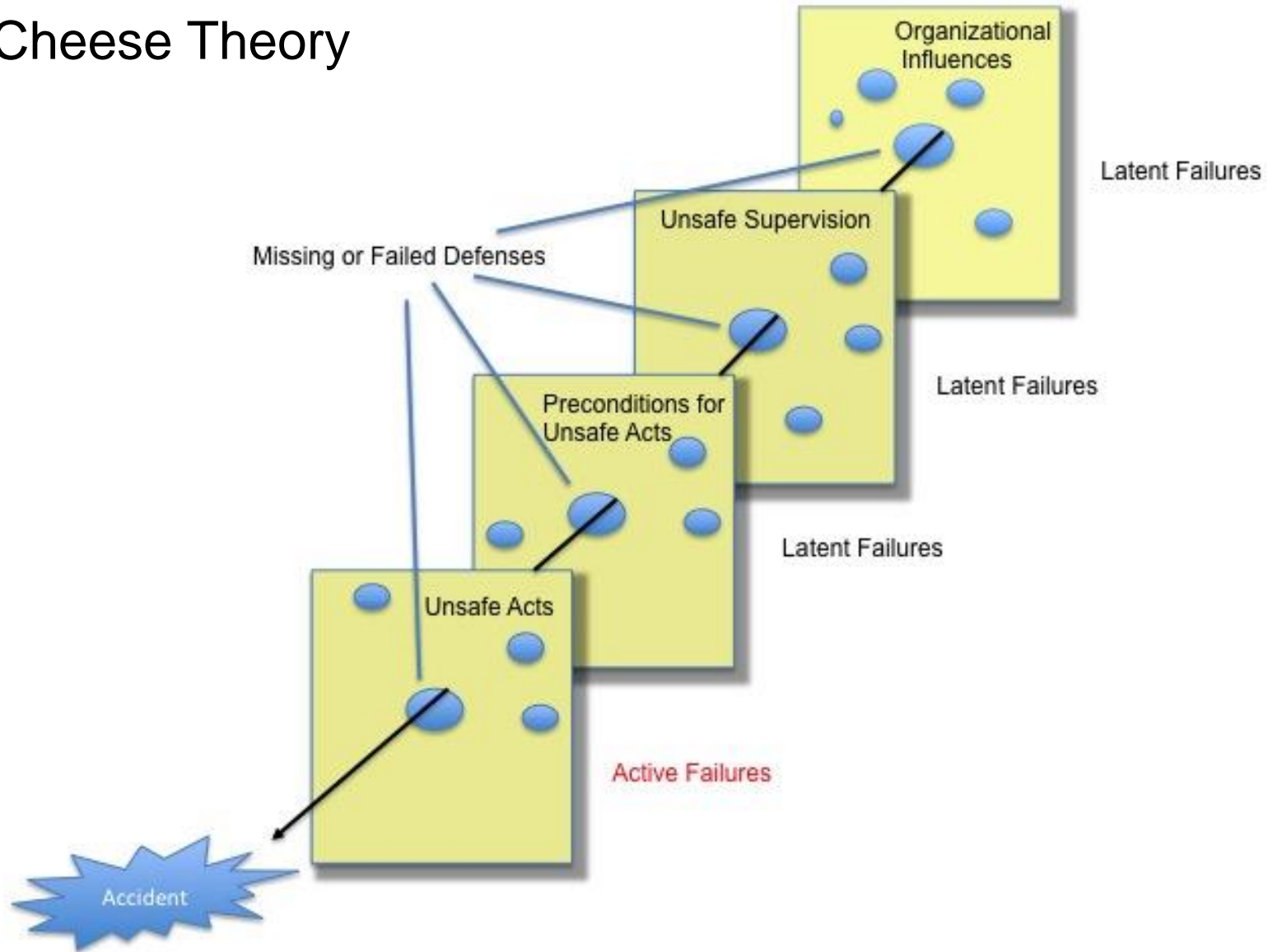
- In the field of construction safety management, it is necessary to cover not only its own technology development, but also academic fields in other fields related to it.
- Construction safety management should be established according to the characteristics of construction accidents, and also considering economic efficiency.
- Construction accidents are more common than other industrial accidents.
- Large scale disasters occur.

Accident Causation Theories

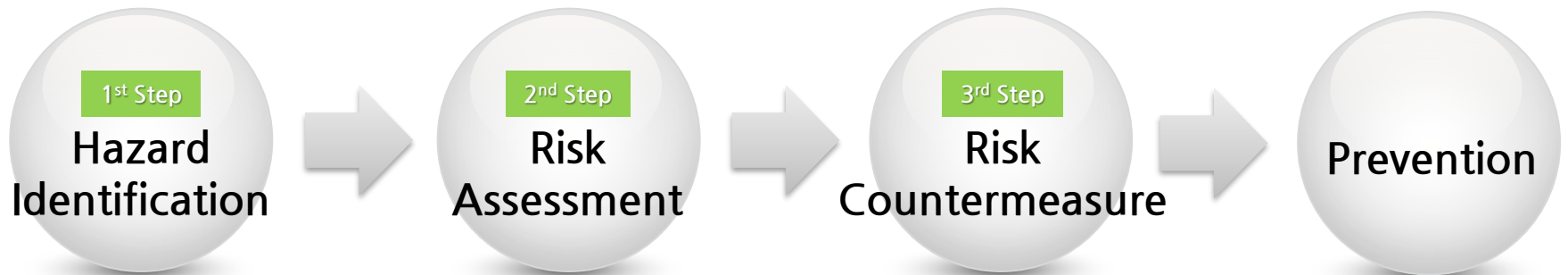
- Heinrich's Accident Causation Model (Domino Theory)



- Swiss Cheese Theory



Safety Management Process



Among these...

공기

안전

품질

원가

Two key points...

정0

정0

Whose fault?



Legge 626. Menzione speciale



<http://asrcconstruction.com/collective-strength/health-safety-environment-training/>



DANGER
FLAMMABLE
GAS

<http://www.dailymail.co.uk/news/article-2552152/>



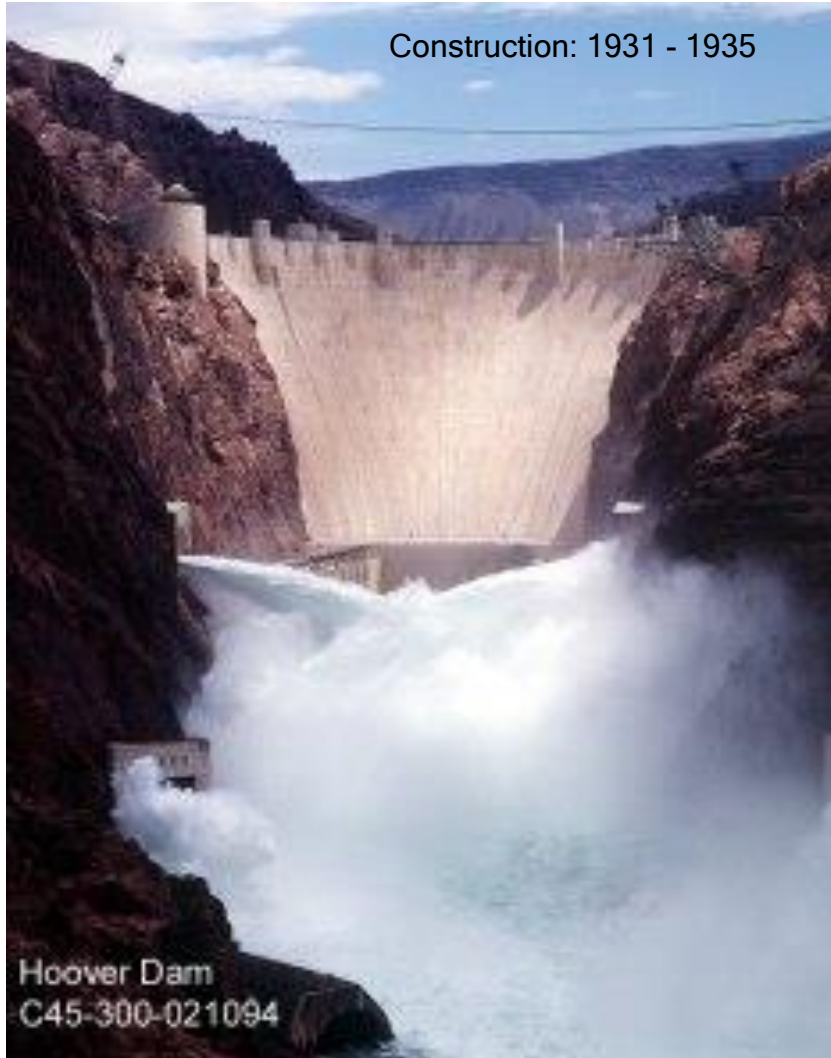
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The Hoover Dam



10. Drowning (4)

9. Electrocution (4)

8. Rock or gravel slide (5)

7. Hit by truck (5)

6. Struck by electric shovel or crane (8)

5. Explosion (10)

4. Hit by falling rocks (12)

3. Heat prostration (13)

2. Crushed by heavy equipment (13)

1. Fell to their death (25)

Total number of Death during Construction: 99

The Golden Gate Bridge



19 workers fell but were saved by a special net.

The safety record remained excellent until 1937 when a falling beam crushed 10 scaffolding workers.

More than 1,200 people have jumped suicidally to their death from the span.

사례연구..별도파일