

[SMS]

/ bgjeong@kari.re.kr,

가 (ATS)
SMS , ICAO

1.

2. SMS

(ICAO)

(SMS)
(Quality Assurance)
(Quality Management System)

SMS QMS(Quality Management System)

70%

(Risk management) 가(Safety assessment)

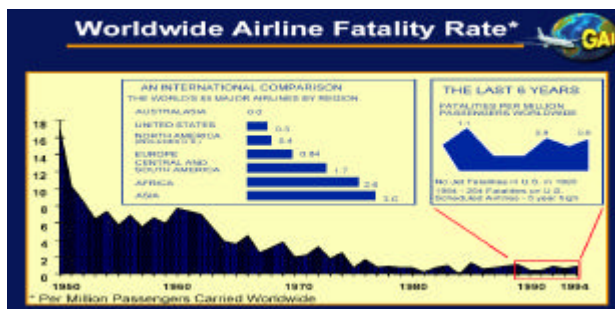
1950

1977

80

(Human Factor)

. QMS



가 SMS

가

가

가

2.1 Safety Management

(Safety)
(acceptable level)

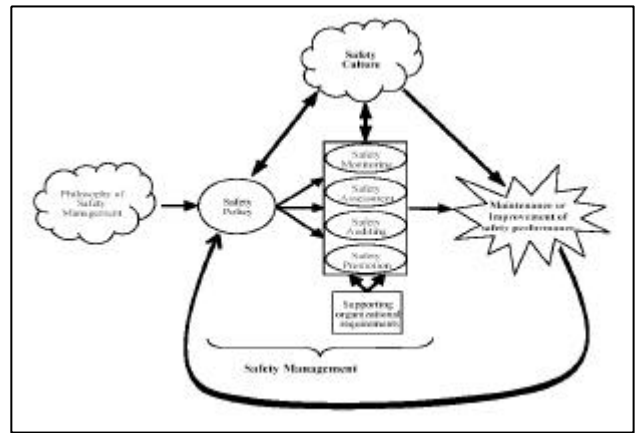
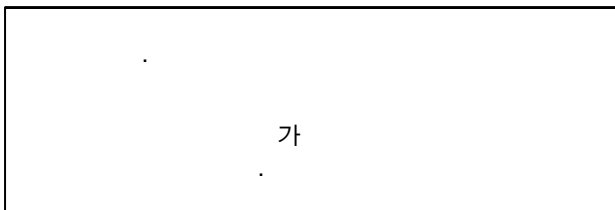
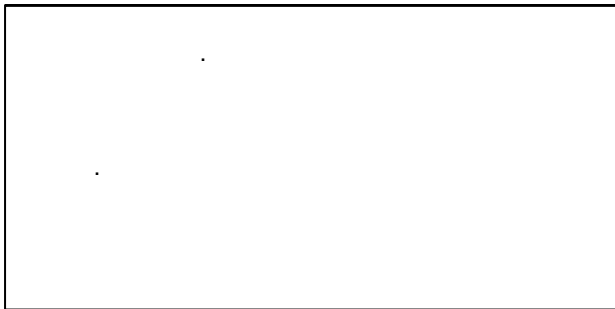
ICAO

가

(Safety Management)
(Philosophy of safety)

management)

(Safety culture)



2. SMS

(Safety policy)

- (Safety performance monitoring)
- 가 (Safety assessment)
- (Safety auditing)
- (Safety promotion)
- (The safety management organization structure)
- (Safety manager)
- (Safety responsibility and accountability)
- (Training and competency of personnel)

2.2.1

2.2 Safety Management System

SMS

(procedure),
(safety)

(process)

(Priority of safety) (Safety objective)

2.2.2

2.2.2.1

(Safety performance

monitoring)

2 SMS

SMS

SPM

가

SPM

2.2.3

SPM

SMS

SMS

(Safety

가

performance indicator)

SMS

(Safety performancetarget)

ICAO

SMS

SPM

가

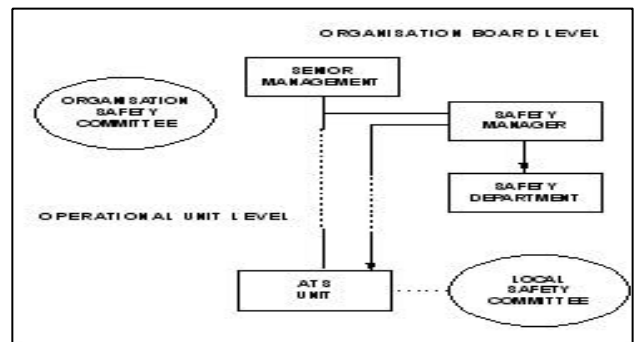
2.2.2.2 가(Safetyassessment)

가 (Hazard)

(Risk) 가

가 PHA, FMEA/ FMECA,

HAZid, AS/NZS 4360, Risk Assessmnt



3.

2.2.2.3 (Safety auditing)

가

2.3.4

SMP

2.2.2.4 (Safetypromotion)

-
-
-
-
-
-

가

Visual Basic code Model . QRA

Spreadsheet

Risk Assessment Materix 가 Risk 가 Risk

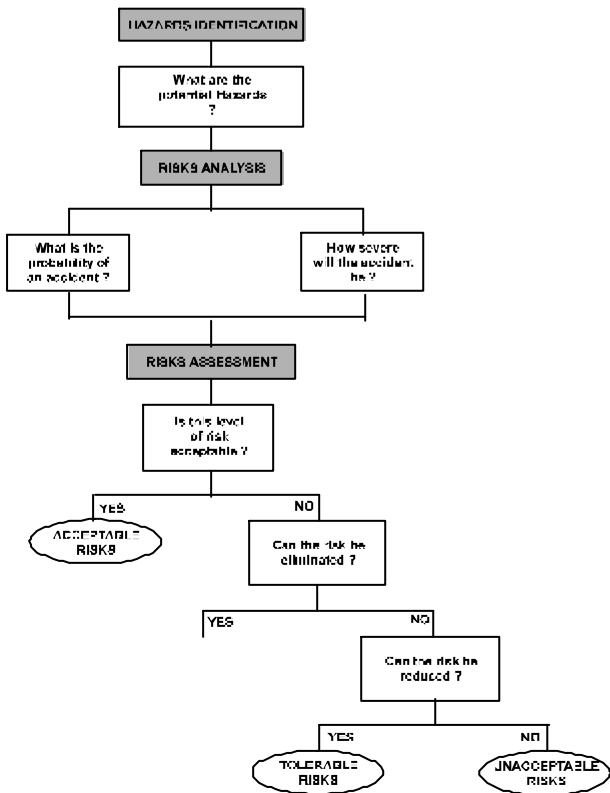
- Hazards Identification
- Accident Definition
- Consequence Modelling
- Frequency Analysis
- Risk Analysis using Event Trees
- Analysis of Options for Mitigation
- Cost-benefit Analysis
- Sensitivity Analysis
- Practical Comments and Recommendations

2.3.3 가

Risk Assessment & Management (Risk) 가

가

(Risk Management)



5.

Rating	Consequence			Probability				
	People	Assets	Env.	A (Rare)	B (Unlikely)	C (Moderate)	D (Likely)	E (Certain)
0	No injury	No damage	No effects	L	L	L	L	L
1 (Insignificant)	Slight injury	Slight damage	Slight effects	L	L	L	M	M
2 (Minor)	Minor injury	Minor damage	Minor effects	M	M	M	M	M
3 (Moderate)	Major injury	Local damage	Localised effects	M	M	H	H	E
4 (Major)	Single fatality	Major damage	Major effects	H	H	H	E	E
5 (Catastrophic)	Multiple fatality	Extensive damage	Massive effects	H	E	E	E	E

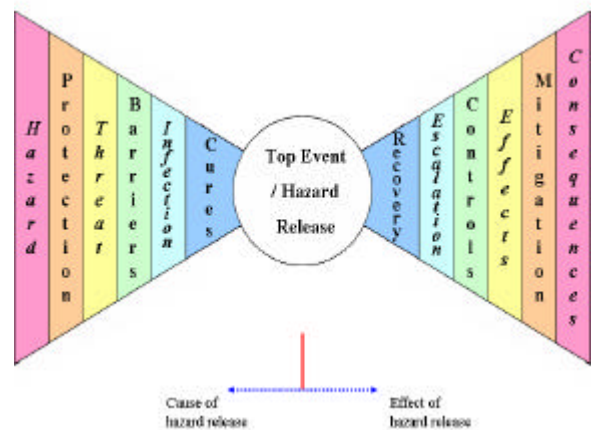
6. Risk Assessment Materix

- ?E - Extrem risk,
- ?H - High risk,
- ?M - Moderate risk,
- ?L - Low risk,

2.3.4 Bow-Tie

Bow-Tie

가



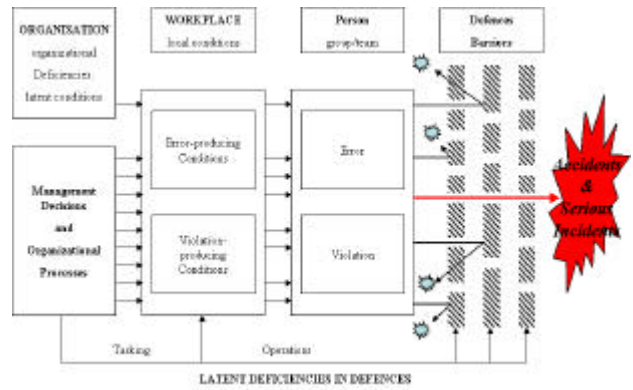
7. Bow-Tie

2. Bow-Tie

위험	위험	예
Hazard	가 가	
Protection	Hazard 가	List, Check
Threat	Protection Hazard	Time Pressure
Barrier	Threat	
Infection	Barrier	
Cures	Infection Barrier	
Top Event	Hazard 가	Landing Gear Pin
Recovery	Top event	
Escalation	Recovery	
Control	Escalation	
Effects	Recovery가	Landing Gear가
Mitigation	Effects	Feedback
Consequence	가	

2.3.5 Reason Model

Reason Model



8. Reason Model

3. ICAO

3.1 ICAO (GASP)

ICAO 1997 3 (Air Navigation Commission) Global Aviation Safety Plan (GASP)

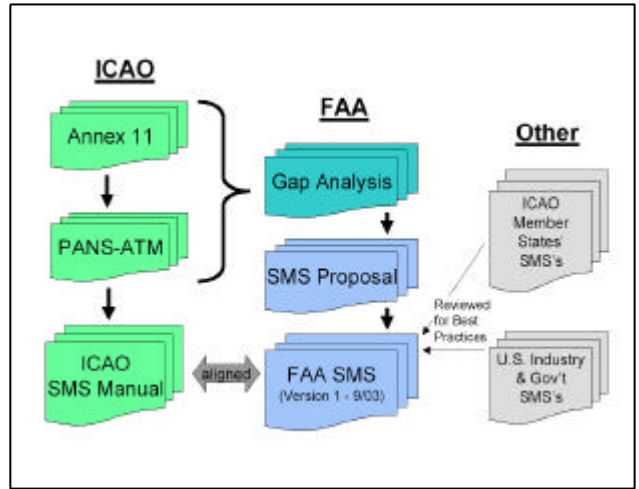
3. GASP

GASP	
1	(Safety indicator)
2	가
3	USOAP (Universal Safety Oversight Audit Programme)
4	가
5	
6	ATS (SMS)
7	

3.2 ATS SMS ICAO

ATSSMS ICAO Annex 11
 40 ICAO Annex 11 2.26
 "ATS safety management" 가 2003
 11 27 ATS (Safety Level) (Safety Objectives)
 ATS safety management programme
 ICAO Doc. 4444 "Procedures for
 Air Navigation Services, Air Traffic Management"
 (PANS-ATM) 2 ATS SMS
 ATS Safety Management Manual 2003
 11

Safety Management System Manual SMS



9. SMS

4. ATS SMS

4.1 ATS SMS

ICAO ATS SMS
 SMS 가
 가
 (, ,)
 4.1.1
 (FAA) National Airspace System (NAS)
 ICAO SMS
 FAA SRM(Safety Risk Management)
 ICAO SMS
 (Annex 11, PANS-ANS) Gap Analysis
 SMS
 FAA ICAO SMS
 SMS FAA Safety risk assessment
 Safety risk management
 FAA SMS
 4
 Order 8040.4 "Safety Risk Management",
 System Safety Handbook (SSH)

4.1.2

2000 SMS
 CAR 17 NPAs (Notice of Proposed Amendments)
 (Aeronautics Act)
 SMS ATSSMS

SMS

Introduction to Safety Management Systems, Safety Management Systems for Flight Operations and Aircraft Maintenance Organizations (TP 13881), Safety Management Systems for General Aviation Operators - A Practical Guide to Implementation (TP14135-1B)
 2004 SMS Implementation Plan

2007 SMS

4.1.3

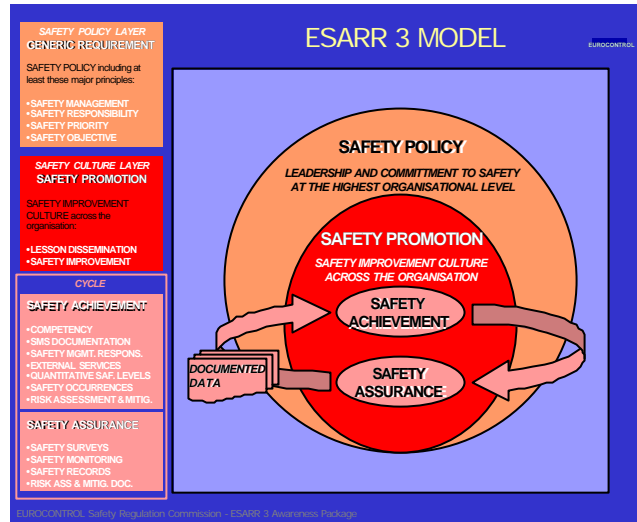
CAA Safety Regulation Group (SRG) ATS SD (Air Traffic Services Standards Department)
 Air Traffic Service Provider 가
 SMS
 SRG AT SIN 4

ATC Provider SMS
 CAP 670 ATSSafety Requirements(2003. 7.16)
 SMS
 AT SIN 4, CAP 670, CAP
 730, SMSGuidanceLeaflet

2002 7 'One Sky for Europe'
 AGAS(A High-level Group on
 ATM Safety) ATMSafety
 action plan
 2006

4. SMS

품서번호	내용
ATSIN 4	The implementation of Safety Management Systems (SMS)
CAP 670	Air Traffic Services Safety Requirements
CAP 712	Safety Management Systems for Commercial Air Transport Operations
CAP 730	Safety Management Systems for Air Traffic Management
SMS Guidance Leaflet	Guidance for Developing and Auditing a Formal Safety Management System
* ATSIN : Air Traffic Services Information Notice	



10. ESARR 3

4.2 SMS

4.1.4

1995 SMS ATM
 2000+ ATM Safety
 Safety regulation SRC(Safety Regulation Commission) Safety Management
 EATMP (European ATM Programme)
 EATMP 1999 Safety Policy
 'EATMP Safety Policy: Implementation Guide Material?
 SMS ESARR 3(ESARR 3 : Use of Safety Management Systems by ATM Service Providers)
 EAM 3/GUI
 1~5, EAM 3/AMC SRC DOC 11

ATS SMS
 SMS
 7 10
 2000 SMS
 SMS SRM(Safety Risk Management) SMS
 4
 2000 SMS
 2004 SMS Implementation Plan
 2007 SMS
 (EUROCONTROL) EATMP (European Air Traffic Management Programme) 1995

SMS

2006

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SMS /
NATS(National Air Traffic
Service) SMS

가
ATS SMS ICAO SMS
7
ICAO

5. SMS /

Safety Policy	
Safety Policy	5
	3
가	
	3
	12
	15
	6
ATC	
	9
	15
/	3

1. ICAO, ICAO 11, 2003
2. ICAO, "Manual on Safety Management for Air Traffic Services", 2003
3. FAA, "Safety Management System Manual", 2004
4. EATMP, "EATMP Safety Policy: Implementation guidance material", 1999

가 , , SMS
SMS
SMS 가 가 가 가

5.

SMS SMS
, ICAO
(, ,) ATS
, ICAO
ATS SMS
SMS / SMS