SPEAR: Safety & Security Management System

Gryphon SOU
School of Graduate Studies
Asia International Open University
Macau Special Administrative Region, People's Republic of China
GryphonSou@AIOU.edu

Abstract

Having analyzed the Compound Risks and realized the Mitigative Strategies, Building Officials could embark on the design of a Safety and Security Management System. Safety and Management Systems in different built environments may vary to a certain extent. However, there are some Critical Components in common for various but quality Safety and Security Management Systems. In this paper, SPEAR representing 5 Critical Components of a quality Safety and Security Management System is introduced.

Keywords: Critical Components; Detention Facilities; SPEAR; Safety & Security Management System; Procedures; Processes.

1 Synopsis

Under the Total Concept Approach, Safety and Security Management of Detention Facilities in buildings with multiple occupancies is based on the analysis of the Compound Risks of some Critical Incidents. Analyzing Compound Risks through 3**D** (**D**ensity of Detention + **D**efects of Hardware + **D**eficiency of Software)[1], the resultant Risk Priority Indicator enables the Building Officials to assess the Compound Risk Level of the existing Detention Facilities at 3 Levels: High, Medium or Low.

Under resources constraint, priority can be accorded to the remedy of Detention Facilities at the High Risk Level. Referring to the contemporary thought in Safety and Security Management, the Compound Risks of the People in the Lawful Custody could be mitigated through 3**E** (**E**limination of Density, **E**nhancement of Hardware and **E**nrichment of Software)[2].

Having analyzed the Compound Risks and realized the Mitigative Strategies, Building Officials could embark on the design of a Safety and Security Management System. Understandably, Safety and Management Systems in different built environments may vary to a certain extent. However, there should be some Critical Components in common for various but quality Safety and Security Management Systems.
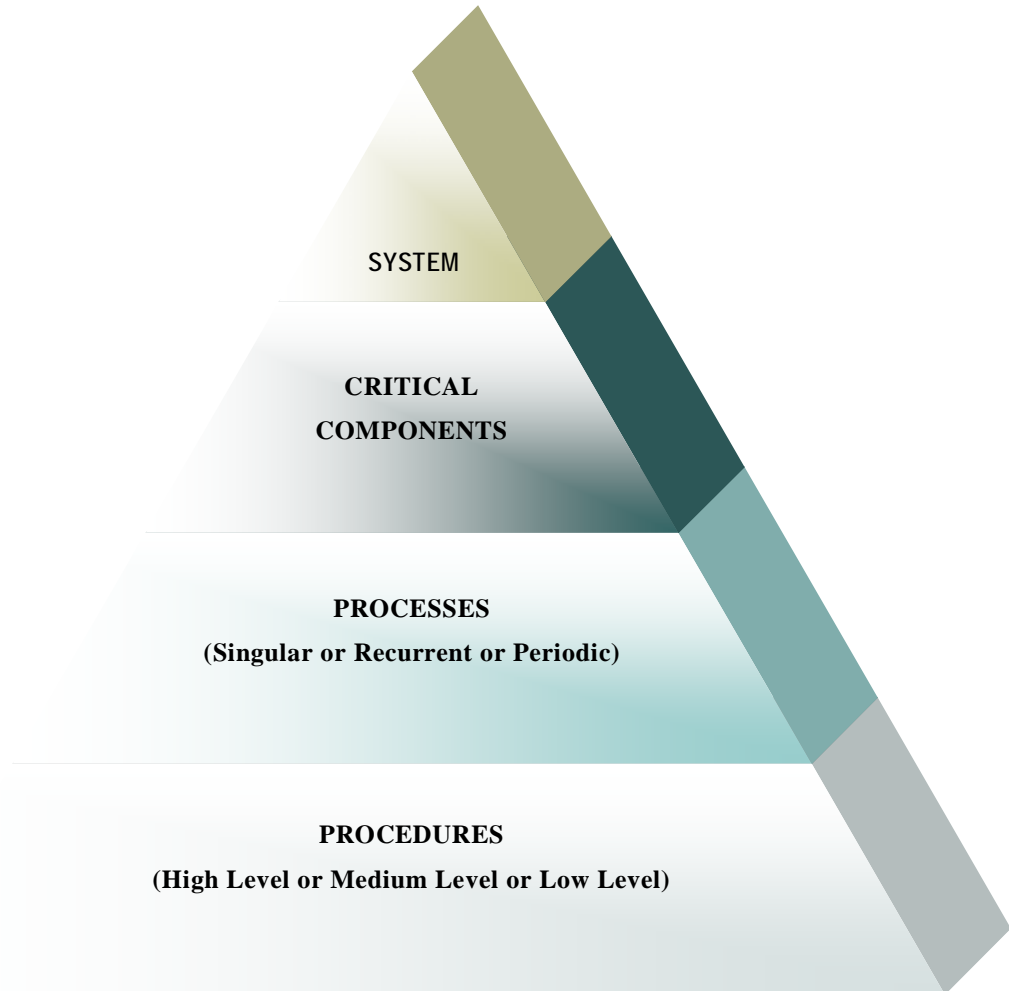
2 Anatomy of a Management System

A Management System is the framework with 'critical components' of 'processes' and 'procedures' (Exhibit 1) that an organization would use to fulfill all tasks required for the prescribed objectives. For instance, a Safety and Security Management System would have Critical Components of safety and security processes and administrative or operational procedures avoiding the occurrence of Critical Incidents in the Lawful

---

[1] http://www.paper.edu.cn/process/download.jsp?file=200503-98

[2] http://www.paper.edu.cn/process/download.jsp?file=200503-118

Custody. Simultaneously, the processes might be executed on a PDCA cycle to ensure and enhance the System performance for continual improvement.

Exhibit 1: Anatomy of a Management System

2.1   Critical Components

Critical Components of a Management System determine the functionability and reliability of the system. In a Safety and Security Management System, the duplication of Critical Components of the System ensures and enhances the reliability of the System. The duplication is called Redundancy. Some components of a Safety and Security Management System may be duplicated or even triplicated. An error in one component can be out-voted by the other(s).

In a Triply-Redundant System, its Critical Components have three sub-components for the purpose of risk

mitigation. All three sub-components must fail before the System fails. In fact, each sub-component rarely fails. In turn, every sub-component is expected to fail independently. Hence, the probability of all three failing is calculated to be extremely small. Such System is an ideal solution for unbearable risky events that might lead to a system failure and so forth a disaster.

2.1.1   Redundancy versus Quality

In general terms, Redundancy refers to the quality or state of being 'redundant'. In other words, it means that the subject is containing an excess – exceeding what is normal or necessary. However in Safety and Security Management System, Redundancy does not carry a negative connotation. Instead, it carries a positive implication. Redundancy is serving as a duplication of Critical Components to safeguard against a total system failure.

Nonetheless, does Redundancy of Critical Components or replication of sub-components ensure the total quality of a Safety and Security Management System? In Total Quality Management, 'even quality' and 'constant quality' are popular terms used in describing an effective Quality Management System. Sometimes, 'redundant quality' is used in place of these terms. Perhaps, it is due to the positive connotation of 'Redundancy' in Safety-Critical Systems.

Nonetheless, Redundancy of Components in a Safety and Security Management System does not necessarily mean that the System has a high quality. Duplication of components perpetually creates high costs of running the System. Therefore, appropriate selection of Critical Components to maintain the risk level at a bearable level is important in the design of a quality Safety and Security Management System. Furthermore, proper processes and procedures attached to the Critical Incidents are expected to play complementary roles in the System.

2.2   Processes

Simply speaking, 'processes' of a Management System could be expressed by the renowned Deming's Quality Cycle: **P**LAN – **D**O – **C**HECK – **A**CT. Strictly speaking, a complete System would include accountability of people to be involved and schedules for activities to be completed. In addition to the responsible persons and scheduled activities, there should be auditing tools to be introduced. Audit(s) leading to corrective action or preventive action which would create an upward spiral of continuous improvement.

In a Safety and Security Management System, a 'process' is construed as a natural occurrence or designed sequence of operations or events. It involves some input of time, energy, expertise or other resources thus producing some outcome. 'Processes' can be categorized as (1) singular, (2) recurrent, and (3) periodic. A Singular Process occurs once while a Recurrent Process repeats more than once. Periodic Process is the Recurrent Process repeating at a constant rate.

Few processes in nature can be considered singular since most processes found in nature are recurrent. In a Management System, it is preferable to have the Critical Components are made up of Periodic Processes. For instance, Periodic Processes creating useful outcome in a Safety and Security Management System can be:

✧　The process of periodic observation on the Detainees ensures their safety in custody.

✧　The process of periodic surveillance on the Detainees avoids their suicidal bids.

✧　The process of periodic fire drill facilitates the evacuation of detainees in emergency.

✧　The process of periodic inspection of the detention facilities detects Hardware Defects.

✧ The process of periodic use of restraint tools deters the Detainees from escape.

To ensure the quality of the 'processes' in a Safety and Security Management System, Deming's Quality Cycle of PDCA is practical. PDCA Cycle ensures continual improvement of the 'processes' of each Critical Component in the System. With the aid of appropriate 'procedures' linked to the 'processes', the System can function well whilst maintaining risks at a reasonably low level. With high counter-risk capabilities, the System could be regarded as a quality Critical Incident Management Tool.

2.3 Procedures

A 'procedure' is a series of activities, tasks, steps, or decisions. When a 'procedure' is undertaken in a prescribed sequence, it would produce the described result, required product, or expected outcome. On the same input conditions, a 'procedure' should produce repeatable results, products or outcome. Procedures in written form are usually called rules, regulations, orders, instructions or guidelines. In military organizations or law enforcement agencies, procedures could be set out at 3 levels and proclaimed by different parties:

Exhibit 2: Three Levels of Procedures

Level	Procedures	Proclaimed by
High	Standing Orders or Standing Procedures	Organization
Medium	Operational Instructions Administrative Instructions Training Instructions	Functional Units
Low	Guidelines	Organization or Functional Units

3 Safety & Security Management System

A 'Safety & Security Management System' enables effective and efficient Critical Incident management by integrating a combination of Critical Components, appropriate 'processes' and proper 'procedures' operating within a common organizational structure. In today's complex built environments, detention in a building of multi-occupancy present additional challenges for the design of a quality Safety and Security Management System. A quality Safety & Security Management System (Chart 1) should embrace the following Critical Components which carry an acronym of **SPEAR**:

✧ **S**upervision of Detainees in Place

✧ **P**revention of Critical Incidents in Custody

✧ **E**vacuation of Detainees in Emergency

✧ **A**dministration of Detention Facilities in Use

✧ **R**estriction of Detainees' Movements in Transfer

In the following paragraphs, there will be an elaboration of these 5 Critical Components. However, 'processes' and 'procedures' will not be detailed. However, some examples will be cited for the readers' reference. Readers will find that these Critical Components are sometimes compounds of Hardware Enhancement and Software Enrichment.

Exhibit 3: Strategic Components of an Effective Safety & Security Management System

3.1   Supervision of Detainees in Place

The purpose of Detention Facilities is to provide a safe and secure place of detention. When the Detainee(s) is/are held in the Detention Facilities alone or in company, there should be adequate supervision. Means of supervision could be officer(s)-on-watch or surveillance under closed circuit television (CCTV) system.

If the latter 'process' is opted, the officer guarding the detainee(s) may be released to carry out other duties. However, CCTV System would require constant monitoring by dedicated officers and such indiscriminate monitoring would probably contravene the paramount Human Rights. Besides, CCTV

Systems usually capture image but collect no sound. Therefore, patrolling 'process' could not be replaced by surveillance 'process' using a CCTV System.

In North America, the law enforcement agencies require the supervisory staff to inspect physically the detainees at least 15 minutes when the detention facilities are occupied. In Asia, a law enforcement agency stipulates that the supervisors to check the detention facilities every hours when the guards have to check the detainees every 25 minutes. These 'processes' are translated into written 'procedures' for implementation.

Apart from periodic inspection 'processes', there should be communication 'processes' between the detainees and the people managing the detention facilities. Inter-communication Device and/or Duress Alarm is/are indispensable hardware of detention facilities. In modern nations, detention facilities are equipped with either or both so that detainees could call for assistance if necessary. In such cases, there would also be 'procedures' of Trigger and Response.

3.2　Prevention of Critical Incidents in Custody

Death or Injury in the Lawful Custody and Escape from the Lawful Custody are the most Critical Incidents which should be prevented and be dealt with properly if occurred. When a detainee is brought into custody, there would be a search 'process'. The detainee should be thoroughly search for any implements which would endanger his or her safety or jeopardize his or her security. If any dangerous articles, drugs or medicine are found, there should be 'procedures' of their disposal.

In the detention facilities, there might be anchoring points which might be used by the detainees for suicidal bids. The 'process' of removing the string-like objects from the detainees could circumvent the abuse of the anchoring points in the detention facilities. Furthermore, there should be rescue 'procedures' when a detainee attempts to kill himself or herself by any means.

When the detention facilities are located in a building of multi-occupancy, a registration or identification 'process', such as 'Visitor Badge System' will certainly help enhance the security level. Registration and identification 'processes' do not only safeguard against trespassers, they would curb the detainees' desires to escape from a secured premises. Moreover, an escapist could be located more easily in secured premises with response 'procedures'.

3.3　Evacuation of Detainees in Emergency

Fire might be a common emergency requiring evacuation. Fire evacuation 'process' may not be totally applicable to that of the other emergencies. In fact, there are 4 types of fires (Accidental, Arson, Terrorist Attack, and Natural Disaster) which need different evacuation 'processes'. Fire safety 'procedures' for general buildings are basically provided for the protection of their occupants against 'Accidental Fires'. There are passive design, active fire protection hardware with fire safety management to harmonize with the Accidental Fire Procedures. Conversely, 'Arson Fire' or 'Terrorist Attack Fire' is a 'security' problem to be addressed in a Safety and Security Management System while 'Natural Disaster Fire' is the most complicated issue to handle.

When detention facilities are located in a building of multi-occupancy, there should be detailed 'procedures' for the evacuation of the detainees in the common emergency like 'Accidental Fires'. Building or Safety Codes might require that the fire-rated doors for the detention facilities are readily openable from the outside without requiring keys, special devices or specialized knowledge of the doors' opening mechanism. Nonetheless, Evacuation 'Procedures' of detainees in a tailor-made Fire Action Plan is to be laid down.

A Fire Action Plan is to be provided to the people managing and using the detention facilities. The Plan shall incorporate specific 'procedures' for the immediate evacuation of the detention facilities in case of fire or other emergencies. Then, either the people managing or using the detention facilities would know what to do in a fire. The premises of a Fire Action Plan are to remove the detainees safely and securely from the detention facilities and transfer them to the refuge without offering them a fleeing chance.

3.4   Administration of Detention Facilities in Use

Detention facilities need to be properly managed and maintained so that they are safe and secure at all time. There could be administrative 'process' embracing accountability, key control, maintenance and repairs and inspection 'process' governing security, serviceability, trouble-shooting, etc. Detention facilities are always equipped with key-operated locking devices. Therefore, there could be key control 'procedures' such as:

✧   Keeping master and extra keys locked in a security or duty office.

✧   Issuing keys of detention facilities to authorized officers only.

✧   Using key-card access systems at the main entrances and other appropriate doors.

✧   Keeping unused offices, closets, service openings, telephone and electrical closets locked at all times.

3.5   Restriction of Detainees' Movements in Transfer

Invariably, transfer of a detainee from one place to the other is a risky activity. The transfer 'process' would offer the detainee a fleeing chance if no appropriate escorting 'procedures' are devised. In buildings of multi-occupancies, the detention facilities might not be equipped with built-in water closets. When the detainee needs to obey calls of nature, the detainee will be required to be transfer from the detention facilities to the nearby toilet or lavatory.

When the Transfer 'process' traverses public places or danger zones within the building, the risks become correspondingly higher. Kindred scenarios also subsist when the detainee is firstly admitted into the detention facilities or eventually removed from the detention facilities to the other places. In all circumstances, the Escorting 'procedures' are critical. Failing that, Critical Incidents might occur unpredictably.

Taking 'Call of Nature' as an example, the critical Escorting Procedures in this Critical Component of a Safety and Security Management System can be:

✧   Responding to a Detainee's request to obey call of nature.

✧   Seeking approval on opening the detention facilities

✧   Calling reinforcement to entertain the Detainee

✧   Checking the itineraries and danger zones

✧   Selecting the appropriate restraint tools

✧   Applying the restraint tools on the detainee

✧ Escorting the detainee to the destination …

4 System Design Toolkit

When each Critical Component of 'processes' is developing into 'procedures', design of a Safety and Security Management System would become a tedious task. Thankfully, toolkits have been developed by the practitioners, professionals, and authorities to facilitate the design of a quality Safety and Security Management System. The following sections exhibits an array of resources and training materials which could help Building Officials in the design of a quality Safety and Security Management System.

4.1 Planning and Design Guide for Secure Adult and Juvenile Facilities, 2000

This design guide provides the necessary information for architects, planners, and administrators to design and construct a facility which is architecturally sound, yet meets safety and security requirements. This resource is also good for anyone interested in how the elements of a correctional facility can work together. Areas covered include planning, design, construction process and issues; inmate services; inmate programs, including correctional industries; administrative functions; service facilities and physical plant; security features and technology; and commissioning. It provides information on budget development, privatization, guidelines, outsourcing/contract services, and staffing. Special focus is provided regarding inmate housing. Top architects, design and construction planners, and adult and juvenile administrators contributed to this guide.

4.2 Correctional Facility Design & Detailing, 1998

This practical reference offers you comprehensive ideas for designing, detailing and specifying correctional facilities of all kinds. Ranging from rural settings to urban high-rises, this book takes you systematically through architectural plans for building first-rate facilities. Readers could find complete coverage of major facilities such as jails and prisons; the graphical approach is based on modules, with photographs, details, specifications, and design issues shown together for easy use. This book includes a wide range of informative case studies of both new and remodeled projects.

4.3 Policies and Procedures: Adult Local Detention Facilities, 1992

Covers major administrative and operational areas of jails or similar detention facilities, including health care, staff development, offender rights, security, industries, and volunteers. The appendix cross references each policy and procedure with applicable standards.

4.4 Performance-Based Standards for Adult Local Detention Facilities, 2004

The release of this manual represents the culmination of countless hours of work by professionals on the Adult Local Detention Facility. This book contains more than 400 standards covering more than 30 program areas including personnel, training, safety, sanitation, security, health care, and supervision.

4.5 SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings, 2000

Published by National Fire Protection Association (NFPA)

4.6 Building Construction and Safety Code, 2003

Published by National Fire Protection Association (NFPA)

4.7 Building Construction and Safety Code Handbook, 2003

Published by National Fire Protection Association (NFPA)

4.8 Life Safety Code, 2003

Published by National Fire Protection Association (NFPA)

4.9 Life Safety Code Handbook, 2003

Published by National Fire Protection Association (NFPA)

4.10 Best Practice Guide, ABHM's Latest Editions

Distributed by The Association of Building Hardware Manufacturers:

✧ Controlled door closing devices devices to BS EN 1154

✧ Cylinders for locks to BS EN 1303

✧ Door coordinator devices to BS EN 1158

✧ Door and window bolts to BS EN 12051

✧ Electrically powered hold-open devices to BS EN 1155

✧ Hardware for sliding doors and folding doors to BS EN 1527

✧ Lever handles and knob furniture to BS EN 1906

✧ Mechanically operated locks, latches and locking plates to BS EN 12209

✧ Padlocks and padlock fittings to BS EN 12320

✧ Panic and emergency exit devices to BS EN 1125 & BS EN 179

✧ Single-axis hinges to BS EN 1935

4.11 Alarm 2.0 CD Standards Package, 2001

Alarm 2.0 is a software tool that helps facility managers and fire safety engineers achieve cost-effective compliance with the widely-used Life Safety Code of the National Fire Protection Association. This version supports analysis of detention and correctional occupancies. This program implements performance-based approaches to code compliance. The user specifies the current safety level of the facility for each of the 13 life safety parameters and then enters construction dimensions for improvements. The software indicates whether the safety level in compliance with the code, and if not, recommends the most cost-effective solution and its projected cost.

4.12 Standard Minimum Rules for the Treatment of Prisoners and Procedures for the Effective Implementation of the Rules (UN Document No. DPI/832), 1984

Distributed by the Department of Public Information, United Nations.

4.13 Outside Escort Training Video, 1996

This video includes lessons covering all aspects of outside escort situations such as: administration, documentation, assignments, route decisions, preparation of equipment, preparation of vehicle, inmate preparation, security in route, security at the destination, the return trip, special situations, 'self-check', and 'on-the-job' practice sheets.

4.14 Practical & Tactical Handcuffing VHS, 2003

Law enforcement professionals need to develop & practice proper ways to handcuff & un-handcuff subjects. This video training program shows a number of handcuffing techniques. It explores such topics as placement of handcuffs on the duty belt, disposable handcuffs, legal considerations, & checking for proper fit.

4.15 Subject Control: The Swarm Method VHS, 2004

This video training program explores a very effective low-liability subject control technique. It covers such topics as positional asphyxia, custody death, safe transport, and the use of restraint systems & tools.

4.16 How to do Scenario Training VHS, 2000

Scenario Training allows law enforcement students to apply learned skills in a controlled setting, resulting in feedback & critique that will help them improve their performance in the field. This video training program teaches training officers how to prepare a scenario.

5   The Way Forward

The world is always on the wheel of change, and so are the work environments of the law enforcement agencies. Work environments have delicate relationships with the built environments in which the detention facilities are located. Detention Facilities may exist in a cargo examination complex in a Point of Entry/Exit, or an Arrival/Departure Hall in a Ferry/Train Terminal, or a maritime base, or an operational office in multi-purpose building, or an out-station in a premises of multi-occupancy.

Planning work environments ahead during the construction of the detention facilities would ease the load of the Safety and Security Management System at a later stage. When there are Design Defects hardly to be overcome in the architecture, the refined 'processes' and tailor-made 'procedures' in the Critical Components of the System would be the next possible solutions. In the latter cases, training could be an additional input in the 'processes' which could boost the expected outcome.

5.1   Hardware Defects Ahead for Prompt Remedy

When detention facilities (either Detention Grade Hardware or Non-Detention Grade Hardware) are built or refurnished, Building Officials are advised to bear **SPEAR**: Safety and Security Management System in mind during the planning stage. In the planning stage, Design Defects which may develop into Inherent Hardware Defects could be more easily eliminated when the Safety & Security Codes are observed. It would save the subsequent investment in Hardware Enhancement and/or Software Enrichment.

5.2 Resources & Training Materials for Handy Reference

In Exhibit 4, there are some resources and training materials for the planners' reference. Those resources and materials address the Hardware Defects and Software Deficiency. When the Compound Risks of Hardware Deficiency and Software Deficiency leading to Critical Incidents are noteworthy, Building Officials could refer to the solutions suggested in those resources or training materials.

If the Inherent Hardware Defects are inevitable in the existing built or work environments, the Software Enrichment in the handling of the detainees might be the alternative solutions. To enrich the Software, one of the possible ways is through training, particularly Scenario Training in the unique built or work environments. The following table also exhibits some training materials in this regard:

Exhibit 4: Applicability of Resources & Training Materials to **SPEAR**

Item	Title	S	P	E	A	R
1	Planning and Design Guide for Secure Adult and Juvenile Facilities, 2000	✔	✔	✔	✔	
2	Correctional Facility Design & Detailing, 1998	✔	✔	✔	✔	
3	Policies and Procedures: Adult Local Detention Facilities, 1992	✔	✔	✔	✔	
4	Performance-Based Standards for Adult Local Detention Facilities, 2004	✔	✔	✔	✔	
5	SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings, 2000	✔	✔	✔	✔	
6	Building Construction and Safety Code, 2003		✔	✔		
7	Building Construction and Safety Code Handbook, 2003		✔	✔		
8	Life Safety Code, 2003		✔	✔		
9	Life Safety Code Handbook, 2003		✔	✔		
10	Best Practice Guide, Association of Building Hardware Manufacturers' Latest Editions	✔	✔	✔	✔	
11	Alarm 2.0 CD Standards Package, 2001	✔	✔	✔	✔	
12	Standard Minimum Rules for the Treatment of Prisoners and Procedures for the Effective Implementation of the Rules (UN Document No. DPI/832), 1984	✔	✔	✔	✔	✔
13	Outside Escort Training Video, 1996					✔
14	Practical & Tactical Handcuffing VHS, 2003					✔
15	Subject Control: The Swarm Method VHS, 2004					✔
16	How to do Scenario Training VHS, 2000	✔	✔	✔		✔

References

Chow, W. K. (2005). Fire Safety in Train Vehicle - Design based on Accidental Fire or Arson Fire? *Green Cross*, 14(2), 24-30.

Cote, R., & Harrington, G. E. (Eds.). (2003). Life Safety Code Handbook (2003 ed.). Quincy, MA: NFPA International.

National Fire Protection Association. (2003). Building Construction and Safety Code (2003 ed.). Quincy, MA: NFPA International.

---. (2003). Life Safety Code (2003 ed.). Quincy, MA: NFPA International.

SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings. (2000). Quincy, MA: National Fire Protection Association.

Solomon, R. E., & Harrington, G. E. (Eds.). (2003). Building Construction and Safety Code Handbook (2003 ed.). Quincy, MA: NFPA International.

Sou, G. (2005). Diffused Risks in Project Management Practices. The Professional Engineers, Spring 2005(49), 6-7.

---. (2005, 16.03.05). *Risk Analysis in 3D & Risk Management through 3E*. Retrieved 16.03.05, 2005, from http://www.paper.edu.cn/process/download.jsp?file=200503-98

---. (2005, 21.03.05). *Safety & Security Management through 3E*. Retrieved 21.03.05, 2005, from http://www.paper.edu.cn/process/download.jsp?file=200503-118

Standard Form of Agreement between Owner, Designer, and Peer Reviewers for Professional Services for Independent Peer Review. (1999). Washington, DC: American Consulting Engineers Council.

Author's Profile

Gryphon Sou is an International Professional Engineer, a Visiting Professor as well as a Doctoral Supervisor. His research interest is engineering management, human resources development, training and education. In 1990s, he was elected Fellowship of The Institute of Management Specialists, United Kingdom and registered as a Management Specialist in Security Forces & Disciplined Services. He has been admitted a member of the 'World Organization of Building Officials "in Special Consultative Status with the Economic & Social Council of United Nations and in Consultative Status with the United Nations Industrial Development Organization" (WOBO)' since 2004.